

2022-2023



STUDENTS PROJECTS CATALOGUE



TRANSVERSAL PROJECTS



EGC



GBA



MAT



IG



MI



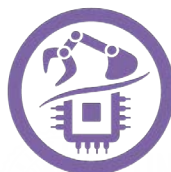
DO



MSI



SE



MEA



STE

API Drone

Piloting an aircraft from a remote computer



Axel
LAGET

Axel LAGET IG Cem SARISOY IG

Academic Supervisor : Arnaud Castellort



Cem
SARISOY



IG



MEA

Objective / Motivation :

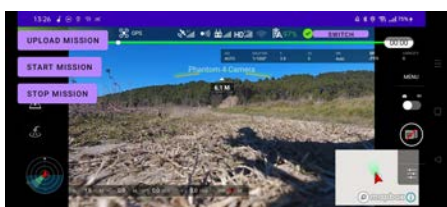
The objective of the mission is to assist the MEAs participating in the COHOMA challenge, by : - providing an operational application to pilot an aircraft from a remote computer - defining the protocol of communication between the application and the remote computer - providing a comprehensive documentation allowing the next groups to take over the application and add new functionalities.

Results :

All the main objectives are accomplished, that is controlling the aircraft from a remote computer. From getting all the aircraft information at a very low latency to flying the aircraft using a game controller, the application is ready to be used. What's more are the additional functionalities as an auto travel to a set GPS coordinate or even a realtime video feed. And finally a well documented application for an easier future development.

Keywords :

Java, Android, Aircraft, Communication, UDP, Waypoint, VideoStream, Documentation, Low latency, Design Patterns, DJI, Phantom 4



Screenshot of the application



The controllable aircraft

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Polymers in the marine environment: vectors of harmful algae and toxins



Lise
RIGOMIER

Methodological study to define which techniques are the most suitable for monitoring changes in the surface properties and potential biodegradation of polymers brought into contact with microorganisms in seawater and the evolution of biofilm formation.

Lise RIGOMIER *MAT*

Academic Supervisor : Lapinte Vincent



Objective / Motivation :

Plastic debris is omnipresent in the oceans. Macroplastics (MP) are a source of pollution of the waters and consequently of the food chain. Another pollution than their ingestion comes from the fact that PM can serve as a support for the colonisation of bacteria, toxins, algae. An important question that we propose to address in this project, in collaboration with the STE department, is the understanding of the development of biofilm on the surface of PM in the presence of *A. pacificum* and their ability to biodegrade plastic.

Results :

The incubation process was defined. An increase in microbial activity was observed. The attachment of organic matter to the polymer surface was also observed by MEB, which confirms the presence of bacteria and their affinity with the polymers studied. However, the study time was too short to observe the formation of biofilm. No biodegradation and no variation in crystallinity could be observed by FTIR. The measurement of hydrophobicity does not seem appropriate for the study of polymer biodegradation by a microorganism in seawater.

Keywords :

Polymer, macroplastic, marine biofilm, *Alexandrium pacificum*, biodegradation, PE, PP



Polymer samples in culture flasks in the incubator



Culture flasks after 19 days of incubation

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Dispersion, deposition and characterization of CNT-FETs (Carbon Nanotube Field Effect Transistors)



Robin
VERLEGH

CNTFET characterization

Robin VERLEGH *MEA*

Academic Supervisor : Comte Mariane / Soulier Fabien



Objective / Motivation :

The objective of this interdepartmental project in collaboration with a materials student is to automate the electrical characterization of a bank of 4 transistors. We want to be able to control 3 voltage sources and measure 3 current/voltage pairs in order to completely characterize a transistor. These measurements must be able to be displayed on a screen. Another more optional aspect of the project would be to use the characterization hardware for the dielectrophoresis (process allowing to place the nanotubes between electrodes).

Results :

I am able to generate a voltage controlled voltage source using a microcomputer. I manage to measure a current-voltage pair, process them and store them in a file. These measurements are displayed dynamically on a screen by making a SSH connection between a PC and the microcomputer. A sinusoidal signal was generated for dielectrophoresis, as well as tests to study the high frequency generation of signals by the microcomputer. A PCB (Printed Circuit Board) that combines some features of the project has been designed and tested.

Keywords :

Analog, PCB, BeagleBone Black, Python, C, Cloud9 IDE, Linux, SMU, ADC, DAC, MUX, AOP, Dielectrophoresis, Transistor, CNTFET, Measurements, Microcomputer

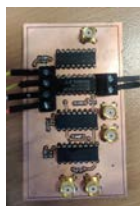


Photo of the PCB produced

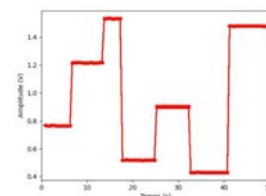


Photo of a measured voltage, dynamically displayed

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Design and manufacture of an articulated finger using a dielectric elastomer actuator



Estelle
CHARASSON

Electromechanical simulation and design of a spring rolled dielectric actuator

Estelle CHARASSON *MI* Lorriss POLLET-VILLARD *MAT* Méric ROSELIA *MEA*

Academic Supervisor : Bertrand Wattrisse



Objective / Motivation :

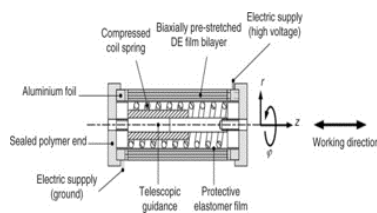
The objective was to design an articulated finger system based on dielectric elastomer actuator. The material aspects of the project, such as the choice and characterisation of the elastomer corresponding to the required mechanical characteristics, were studied by Lorriss Pollet-Villard (MAT). The design of the dielectric actuator using multi-physics digital simulation was carried out by Estelle Charasson (MI). Finally, the control and movement of the articulated finger was carried out by Méric Roselia (MEA).

Results :

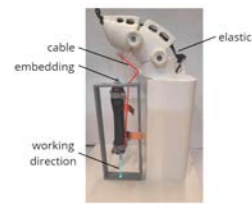
A spring rolled dielectric actuator was designed and used with a cable transmission to move the articulated finger. The DEA with 100 μ m thickness can generate a 10% axial strain under a 3kV activation load. The next step in the project would be to integrate the actuator into a soft 3D printed structure.

Keywords :

DEA, soft robotics, spring rolled dielectric actuator, design, electromechanical simulation



Technical drawing of a spring rolled dielectric actuator



Assembly of the actuator and the articulated finger

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Open Source contributions

Contributing to the Open Source World



Hugo
AMALRIC

Hugo AMALRIC *DO*

Academic Supervisor : Arnaud Castelltort



Objective / Motivation :

My motivation for contributing to open source projects is rooted in my desire to become more competent in DevOps and low-level programming. I believe that contributing to open source projects is an excellent way to showcase what I can do and learn new skills. Being a part of the open source community can enable me to give back to the community that has given me so much. Making open source contributions in rust will be my main goal.

Results :

During this open source journey, I have made several contributions to various projects using Rust. One of the projects that I have contributed to is the Ockam project, which is a set of open-source programming libraries and command-line tools written in Rust about secure communication. Apart from contributing to the Ockam project, I have also worked on other school projects using Rust that touch on low-level concepts such as containerization, virtualization, and orchestration.

Keywords :

rust, containerization, virtualization, orchestration, secure, open source, devops, low-level, community



Ockam company logo

Contact(s) : hugo.amalric01@etu.umontpellier.fr



OpenSource: Provide features to an authorization system



Alexandre
BURGONI

Implement feature to Auth0 authorization system on GitHub

Alexandre BURGONI *DO*

Academic Supervisor : Arnaud Castellort



Objective / Motivation :

We have the objective to contribute to Open source projects, mostly on GitHub, it will help us to understand the open source world and will help us to improve our skills. I plan to contribute to the project OpenFGA, powered by Auth0, it is an authorization system based on Zanzibar (Google authorization system). This open source project aims to provide a simple way to create rules, allowing external systems to determine whether or not a user is authorized to do something.

Results :

I count several contributions to the project OpenFGA, not only on programming features, but also being involved in the community. I'm happy I've been providing my help through development of features and helping people on the project's Discord.

Keywords :

Authorization, Zanzibar, OpenSource, GitHub, Contributing, Golang, Discord, Community



OpenFGA™

Project's logo

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OpenSource contributions

Find one's way with public projects



**Mathias
FLAGEY**

Mathias FLAGEY DO

Academic Supervisor : Arnaud Castellort



Objective / Motivation :

When I started contributing to open source projects, my goal was to find my path in the field of computer science. Indeed, computer science is a very broad domain, with numerous possibilities, and I find many things interesting. So I tried to contribute to several different projects (virtualization, web development, automation, etc.) to figure out what to do after finishing my training.

Results :

Contributions to the Kata Containers, Primereact, Osmoz, and Conference Hall projects. I am also one of the maintainers of Polyflix and RIK. For Kata Containers, the project is quite complex and it was difficult to contribute effectively. The result was simply correcting a command in the developer documentation. After these experiences, I was able to learn more about the areas that interest me for the future.

Keywords :

Open Source, Kata Containers, Osmoz, Polyflix, RIK, Conference Hall, Primereact, React, Typescript, Rust, Golang, Cloud, Community, Kubernetes



The open source projects I have contributed to

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Osmoz

An open source Terraform Registry



Thomas
GOUVEIA

Thomas GOUVEIA *DO*

Academic Supervisor : Castellort Arnaud



Objective / Motivation :

Hosting your personal or company Terraform artifacts on your own infrastructure can be something quite trivial, as Terraform doesn't provide a public implementation of its registry. Osmoz, by implementing with a sake of simplicity the official internal APIs required to integrate perfectly with Terraform, allows users to store their Terraform artifacts with flexibility on various compatible backend systems, such as S3.

Results :

I am working hard on the project to make it open sourced as soon as possible. For the features, I have everything I want for the minimum viable product. I'm working on the project documentation to help users to evaluate it or use it.

Keywords :

Cloud, Terraform, Registry, Infrastructure, Provisioning

Contact(s) : thomas.gouveia@etu.umontpellier.fr



Pentester at Devensys Cybersecurity

Pentester at Devensys Cybersecurity



Léo
HÉRITIER

Léo HÉRITIER DO

Academic Supervisor : Guerrini Eleonora



Objective / Motivation :

As I'm working as a pentester, I have to use many tools and sometimes tools are deprecated or even don't exist for a common vulnerability. I wanted to add my value to the hacking community by developing some tools to exploit common bug and automating tasks. I noticed that a kind a vulnerability named SSTI (Server Side Template Injection) doesn't have tools to exploit it and pentester are testing this vulnerability manually. I wanted to improve productivity using an automated tool.

Results :

My project is named : GoSSTI I wrote my own tool to help pentester detecting and exploiting Server-side template injection that is a big vulnerability but hard to exploit manually. The tool is under development, today it can be use to scan website and identify the presence or not of the vulnerability. It aim to exploit autonomously the vulnerability in the future. You can find the tools here: <https://github.com/LeoFVO/gossti>

Keywords :

Pentest, cybersecurity, cloud, hacking



LeoFVO professional picture

Contact(s) : leo.heritier@etu.umontpellier.fr



Open-source contributions

Continuous Integration and Observability



Julian
LABATUT

Julian LABATUT *DO*

Academic Supervisor : Castelltort Arnaud



Objective / Motivation :

As part of the DO training course, I have the opportunity to contribute to several open-source projects. Open-source is a software development model that promote open collaboration. Most of open-source contributions occur on GitHub, which provides shared source code hosting, features and bug fixes request, etc. Since the source code of an open-source project is public, anyone can propose a code change on a public GitHub repository. The main topics of these contributions are Continuous Integration (CI) and Observability.

Results :

My main contributions are basically Continuous Integration (CI) improvements. In OpenSearch Dashboards public repository (1,3k stars on GitHub), I helped to reduce the GitHub workflows redundancy, which improves code readability and maintainability. I also fixed some CI issues, related to Ubuntu runners version. Additionally, I added a feature in the OpenTelemetry JavaScript SDK (1,8k stars), to be compliant with the specification.

Keywords :

open-source devops ci continuous-integration github typescript opentelemetry opensearch



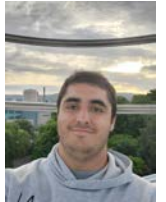
Logos of OpenSearch and OpenTelemetry projects

Contact(s) : julian.labatut@etu.umontpellier.fr



Open-source contribution

Rust and Web



Jérémie
LARDENOIS

Jérémie LARDENOIS *DO*

Academic Supervisor : Arnaud Casteltort



Objective / Motivation :

I am attracted to Rust because of its dynamic ecosystem and growing popularity in the software development industry. I want to get into this ecosystem to improve my skills and contribute to open-source projects. Also, using an ORM like diesel-rs makes database management more accessible by providing a similar syntax across projects.

Results :

During my experience in the diesel-rs open-source project, I learned the importance and richness of the open-source community. I learned a lot about Rust, which is becoming increasingly popular in the industry, as well as its ORM diesel-rs. I also had the chance to actively participate in the review process, as I joined the diesel-rs review team, and even contributed to a Pull Request. I also talked to some talented people and I thank the diesel-rs community for welcoming me.

Keywords :

rust opensource orm postgresqlite mysql



github page of the diesel-rs project

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Open Source

Contributing to an open source community



Kalil
PELISSIER

Kalil PELISSIER *DO*

Academic Supervisor : Castellort Arnaud



Objective / Motivation :

Quickwit is an open-source search engine designed for large-scale log data. It allows you to easily index and search through millions or billions of log messages quickly and efficiently, enabling you to quickly identify and troubleshoot issues in your applications and infrastructure. Quickwit is built using Rust and leverages several open-source libraries and technologies, including tantivy for indexing, serde for serialization, actix-web for HTTP serving, and many others. Quickwit also integrates with various data sources, such as Elasticsearch.

Results :

Contribution CLI Improvement: This first contribution was a first good issue to take on board the project. It brings some minor improvements with the clap implementation of the CLI principally: - add/remove required parameters - parameter display order - default placeholder Bump clap version: I open an issue to bump the version of clap from 3.2.0 to 4.1.0 next to my first contribution. This implies: - rework outdated code - design improvement to use Command Derive instead of Command Builder.

Keywords :

Builder => Creational design pattern. Derive (rust) => Procedural macros allow creating syntax extensions as execution of a function. clap => rust crate to make CLI.



Quickwit

Contact(s) : kalil.pelissier@etu.umontpellier.fr



Malo Polese open-source contributions

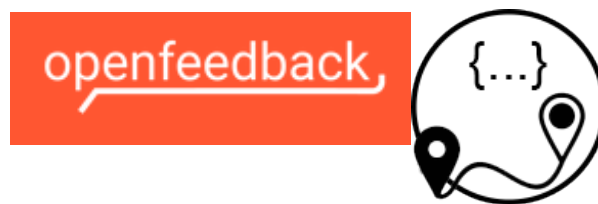
Spontaneous contribution and associations



Malo
POLESE

Malo POLESE *DO*

Academic Supervisor : Arnaud Castellort



Objective / Motivation :

The project consists of several contributions to various public and personal projects. Copy JSON Path is a personal open-source project that allows copying and pasting the path of a key in a JSON file, which is useful for internationalization. I created an extension for VS Code since the IDE does not have this feature. I also contributed to OpenFeedback and ConferenceCenter, which collect user feedback and schedule events using ConferenceHall and OpenFeedback. I have also made other partial contributions to other projects.

Results :

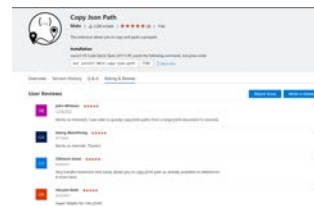
Copy JSON Path is starting to build a community. There are over 4500 users on Visual Studio Marketplace and Open VSX Registry. I have already received external contributions, including one that allows managing JSON files containing non-Latin alphabet characters. OpenFeedback is also popular, with over 80 stars on GitHub and several uses for some events. ConferenceCenter is a new project that has not yet reached version 1, but it has a lot of potential.

Keywords :

Open source, React, Association, Event, Bash, JSON, VS Code.



OpenFeedback homepage for SunnyTech.



User reviews for the "Copy Json Path" extension.

Contact(s) : malo.polese@etu.umontpellier.fr



Open Source Contributions

Rust, Container, Cloud



Sylvain
REYNAUD

Sylvain REYNAUD *DO*

Academic Supervisor : Gwladys Toulemonde



Objective / Motivation :

My objective and motivation in contributing to these open source projects was to gain technical expertise, collaborate with others, and develop innovative and efficient solutions. Through my involvement in various projects, I sought to learn new skills and work alongside like-minded individuals to make a meaningful impact in the open source community. I know I cannot have a deep impact for now but it is a good start!

Results :

I have been able to fix bugs, add new features, and improve documentation across various projects. As a contributor, I have helped to advance the development of some tools around Meta LLaMA and AWS Firecracker. I have also contributed in the field of devops tooling. Through my involvement in those projects, I have not only been able to drive innovation and progress in the open source community, but I have also acquired valuable technical skills, collaborated with other developers, and developed a deep passion for open source software development.

Keywords :

Open Source, LLaMA, cloud orchestrator, Rust, Firecracker, Docker, WebAssembly, JS, email validation, chrome extension, Linux containers



Logo Github, plateforme de projets open-source

Contact(s) : sylvain.reynaud@etu.umontpellier.fr



Open source

PFE Open source



Cyril
ROUMEGOUS

Cyril ROUMEGOUS DO

Academic Supervisor : Arnaud Castelltort



Objective / Motivation :

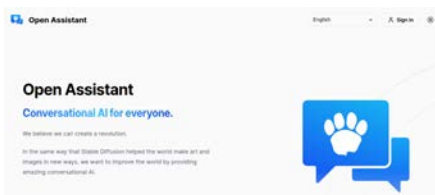
My objective was to contribute to open-source projects and specifically to artificial intelligence-related projects. Because I desired to advance the field of artificial intelligence and make it more accessible to people around the world. I believe that open-source projects are a powerful tool for enabling collaboration and knowledge sharing among developers and researchers. Overall, my motivation to contribute to open-source and AI-related projects stems from a desire to learn, collaborate, and make a positive impact on the field of AI.

Results :

Therefore I worked on multiple projects to this end, especially the open-assistant project. This project is meant to give everyone access to a great chat-based LLM. It can be viewed as an alternative to ChatGPT but fully open-sourced. The goal was to create a platform on which we could collect user's inputs data in order to do RLHF and finetune LLM to create a chat-based assistant. I worked mainly on the backend part to help collect the data. Now the platform is up and the project is at the state of collecting as much data as possible.

Keywords :

open source, large language models, assistant, RLHF (Reinforcement Learning from Human Feedback)



Website of the project in which we collect users inputs

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Creation of a mobile milk pasteurisation unit

Opportunity study



David
ADELIN

David ADELIN GBA

Academic Supervisor : Marchesseau Sylvie / Cunault Charles



Objective / Motivation :

The Haut-Languedoc Regional National Park is planning to create a mobile milk pasteurisation for breeders. The objective is to carry out an opportunity study aimed at evaluating the interest in terms of the market and its feasibility. A prospective approach was implemented to find out the interest of breeders, to make an inventory of existing mobile devices in France to propose solutions that meet the needs of the Park and to calculate its cost of processing. It will allow to develop local circuits and to offer better payment to the breeders.

Results :

Following a survey of a sample of 13 farmers (out of more than a hundred in the NRP), it appears that one breeder is interested in the mobile pasteuriser to sell pasteurised sheep's milk directly. Another breeder is willing to carry out a trial with the device. To test the viability of this project without making large investments, a collaboration with a company that has a mobile pasteuriser for apples is envisaged. Finally, a model for estimating the cost of treatment has been produced, estimating it at 1.14€/L.

Keywords :

Pasteurization, mobile pasteurizer, animal milk, local

	Strengths	Weaknesses
Internal data	<ul style="list-style-type: none"> Mobile device Available power supply (generator) Continuous pasteurization (9 spiral tube exchanger) Choice of water possible according to the farmer's request 	<ul style="list-style-type: none"> Difficulty of movement in restricted areas Possible a water connection at the farmer's premises Difficult to dismantle for thorough cleaning Storage area of the water Lack of transportation Lack of operational flexibility for farmers There is no alternative so there is no time control There is no existing culture about this for the area
External data	<ul style="list-style-type: none"> Collaboration with Machine MOYENS of "La Bonne Energie" Launch and development with MAJ (Marchés d'Apprentissage) Request Even collective catering (under conditions) Trial with the milk of Mrs Delphine Lutz (NRP) - potential use of the device in the future 	<ul style="list-style-type: none"> Farmers' reluctance to purchase such No customer demand according to farmers

SWOT matrix after survey and collaboration with "La Bonne Energie"



"La Bonne Energie" team and the mobile transformation workshop

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Development of biscuits from the research stage to the industrialization stage



ROMANE
ALPHONSE

R&D professionalization contract

ROMANE ALPHONSE *GBA*

Academic Supervisor : Michael NIGENS



Objective / Motivation :

The purpose of this professionalization contract in R&D will be the development of several recipes and then the industrialization of these. Two of these will be sweet: cocoa micro-biscuits and expanded biscuits (cereals) and a savory type recipe: tacos (tortillas) Initially, laboratory tests will have to be carried out to adjust the formulation of the recipes. When these are validated, they will have to be produced on a mini-rotary, then on the production lines. In parallel, secondary missions will be carried out to help the R&D engineer.

Results :

Micro-biscuits: I had to change the wholemeal flour to T45 flour due to the bad visual. In addition, prints have been ordered to begin on-line testing. Expanded biscuits: to reduce the hardness of biscuits, several recipes have been made: reduction in flour or corn starch with an increase in sugar. For future trials, research will focus on the taste of cookies: chocolate coating or addition of flavoring. Tacos: the recipe being validated, the research will mainly be at the level of the shape of the biscuits.

Keywords :

Cereals - Crisps - Development - Industrialization

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New ways of food preservation to reduce the energy impact of the stabilization unit operation



Elisa
ANGONIN

Process intensification

Elisa ANGININ GBA

Academic Supervisor : Marie-Pierre Belleville



GBA

Objective / Motivation :

The objective of this project is to carry out a bibliographic report related to new food preservation processes with the aim of reducing the energy impact of the stabilization unit operation.

Results :

New food preservation technologies reduce the energy impacts of this unit operation. This consists in developing new processes to replace those used conventionally. The integration of a pre-treatment (membrane filtration, pulsed electric field) during a preservation process also makes it possible to reduce the heat treatment time. The obstacles to the development of these technologies are their investment cost and their acceptance by consumers. Biological processes are also developed to reduce energy consumption related to food stabilization.

Keywords :

Energy, processes, intensification, integration, high pressures, pulsed electric field, membrane, fermentation



Energy consumption

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Waste in the food industry: by-products and the different ways of recovery



Bibliographic report & Case study

Audrey
BIZET

Audrey BIZET GBA

Academic Supervisor : Sylvie MARCHESSEAU



RESURRECTION

Objective / Motivation :

First of all, an inventory of the situation on food waste nowadays is established by presenting its causes, its consequences as well as the regulation set up on this subject. Then, the notions of appearance of co-products on the food chain are evoked, which then gives rise to a reflection on the questions around the various ways of valorizing these food co-products as well as the regulation which is associated with it. In the last part, a concrete case study on the development of a spread based on soy okara will be presented.

Results :

Food waste is growing, as are the sources of food co-products. All kinds of food industries will be able to valorize these co-products in one way or another. Indeed, this valorization is a source of many innovations in different sectors. As far as the case study is concerned, the texture of the product could be optimized. Unfortunately the coloring and taste of the product were not conclusive. Further research and experimentation on this subject is essential for the completion of the project.

Keywords :

Waste, by-products, upcycling, recovery, tarama, soy okara



30% of the food produced each year in the world for human consumption is lost or wasted

Contact(s) : audrey.bizet@etu.umontpellier.fr



Apprentice in process improvement and research and development

Apprentice in process improvement and research and development

Julia BRAS MARTINS *GBA*

Academic Supervisor : Marie-Pierre BELLEVILLE



Objective / Motivation :

I had 3 different missions during this experience. Sensory analysis: creation of all documentation to organize tasting session and exploit data. Cleaning plan: update the one existing in adding certain area and element to clean, choose the convenient frequency. Water activity: creation of methodology documentation to use, clean and calibrate the aw-meter. Bibliography to find upper and lower bounds of water activity.

Results :

Sensory analysis: 3 documents have been created. A general about procedure and explanation on each type of session (hedonic, descriptive and triangular), advices for taster... A WORD document for each kind of session: an answer paper to give to taster during the session, with information about the product An EXCEL table which gives directly graphs, averages and standard deviations with raw results. Cleaning plan: an EXCEL table gather all areas and all document to clean respecting the TACT methodology

Keywords :

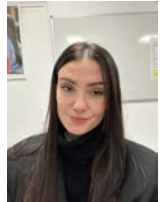
Tasting session, sensory analysis, cleaning plan, water activity

Contact(s) : julia.bras-martins@etu.umontpellier.fr



Health certification

Updating and enhancing



**Julie
CHARRIER**

Julie CHARRIER GBA

Academic Supervisor : **Mora Valérie**



Objective / Motivation :

Quality is a dynamic department who must follow strict rules in the aim to answer to the customers' expectations that becoming more and more demanding. The health certification is an obligatory measure aimed at ensuring their security. This document must prove that the company complies with hygiene and food's European security norms. This document is frequently updated to stay true to the company's practices that can involve. It is a very complete document who covers all the activity and process of the company.

Results :

One of the Health Certification's point is the hazard analysis. It leads me to work on biological hazards (microbiological development on stored cheese) and on physical hazards (glass and plastic procedure).

Keywords :

Quality, food safety, health certification, cheese, norms and regulation



Health stamp present on products from certified establishments

Contact(s) : julie.charrier@etu.umontpellier.fr



Study of the production of aromas by yeasts during the fermentation of cocoa pulp



Clémence
DESPHELIPON

Biological and Food Engineering

Clémence DESPHELIPON GBA

Academic Supervisor : Mr Colas de la Noue and Ms Lorn



Objective / Motivation :

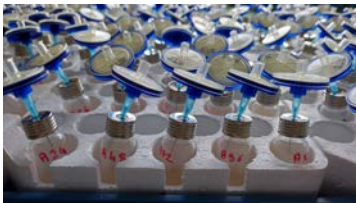
A team of UMR Qualisud wants to continue the research about the yeast strains and their impacts on the production of aromas during the fermentation of the cacao pulp. My project specifically relates to the production of aromas by *Torulasporea pretoriensis* (N5) and *Saccharomyces cerevisiae* (S35) and *Pichia kudriavzevii* (P36) during the fermentation of cocoa pulp during 5 days at 30°C. There are five terms : three single-strain cultures (N5, S35, P36) and two co-cultures (N5-P36 and S35-P36).

Results :

The co-cultures N5-P36 and S35-P36 do not follow the fermentation kinetics of P36. At 96h of culture the microbial load of S35 is 6 times higher than that of P36. Carbohydrate consumption and ethanol production are in line with fermentation kinetics. In terms of aromas, for all modalities, alcohols are produced first and esters second. The majority aromas are isoamyl alcohol (aromas of banana), 2-phenylethanol (floral, rosé, spicy, honeyed and caramel aromas), isoamyl acetate (banana and pear aromas) and ethyl acetate (pineapple aromas).

Keywords :

Cocoa pulp, Fermentation, Yeasts, Aroma

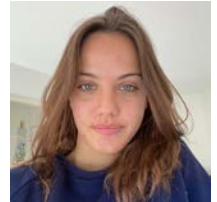


Vial of fermentation

Contact(s) : clemence.despHELIPON@etu.umontpellier.fr



Optimization of a packaging line and realization of an information flow map



Célia
DULERM

Biological and Food Engineering Production Option

Célia DULERM GBA

Academic Supervisor : Mme Saloua ZGOULLI



Objective / Motivation :

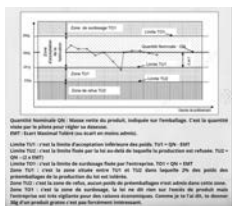
As a developing company, a lot of data still circulates on paper while a new CAPM has just been installed. The objective of my first project is to identify the information that circulates in the different workshops in order to identify KPIs and to simplify exchanges by avoiding double data collection. The second project is the optimization of a new packaging line. The packages packed with this line have weight errors. Some are overweight (loss for the company) and others are underweight (non-conforming and therefore unsaleable)

Results :

The interest of the first project is to simplify the exchange of data within and between the manufacturing workshops, to create performance indicators (KPI) in order to challenge the operators. The interest of the second project is to reduce the financial losses induced by the overdosing of a packaging line. The final objective is to create a good use of the packaging line sheet for the operators once the right settings have been found. This sheet will then allow to reduce the losses on the long term.

Keywords :

sausage / cold cuts / CAPM (computer assisted production management) / KPI / packaging / production / Power Pivot / Power Query



Weight control card with regulatory limits TU1 and TU2

Contact(s) : celia.dulerm@etu.umontpellier.fr



Antioxidant dosage

Control and impact of ascorbic acid dosage on products



Charlotte
GIL

Charlotte GIL *GBA*

Academic Supervisor : Palmade Laetitia



Objective / Motivation :

Nowadays, there is a pressing demand for new products, flavors and tastes, and preservation and safety requirements. The addition of antioxidant such as ascorbic acid is essential during the manufacturing process of puree. Today, in the Charles & Alice company, these additions need to be checked. Thus, this project aims to study and control the impact of the dosage of antioxidant on the products in order to obtain a compliant product in terms of taste and color at the end of life.

Results :

Concerning the control of the antioxidant dosage, a follow-up was carried out at the level of the crushing of the apple. During this stage, the targeted ascorbic acid content must be between 100 and 300 ppm. Many variations in the ascorbic acid level were observed. This can be explained by some irregularities such as the inaccuracy of the measuring device, and the preparation of the injected solution. Then, I will study the impact of the dosage by carrying out aging tests on several recipes. The final goal is to propose solutions.

Keywords :

Antioxidant, Ascorbic acid, Dosage, Oxidation, Control, Impact



Charles & Alice products

Contact(s) : charlotte.gil@etu.umontpellier.fr

Missions in continuous improvement within the production of the Kronenbourg brewery

Integration of the beer filtration unit

Manon LASSUS *GBA*

Academic Supervisor : Francis COURTOIS



Objective / Motivation :

Optimization of the dosage of the filtration aid used to remove the polyphenols in beer and ensure its colloidal stability. Reduction of water consumption for tank cleaning. Implementation and monitoring of a qualification plan for new cleaning recipes using less concentrated caustic soda.

Results :

Database on the polyphenol content of three lagers. Accelerated aging test to study the stability of the product over time. Taking 3 samples of the last rinsing water at the tank outlet and microbiological control (total germs, lactic acid bacteria and brewer's yeast) in order to validate the conformity of the new cleaning recipes.

Keywords :

Brewery - Filtration - Continuous improvement - Industrial optimization



Representation of the colloidal stability of beer (haze formation)

Contact(s) : manon.lassus@etu.umontpellier.fr



Professionalization contract Atelier des Lilas

R&I



Claire
LESCURE

Claire LESCURE GBA

Academic Supervisor : Céline Pochat



Objective / Motivation :

Development of new gluten free product with calculation of nutritional values and production costs. Improvement of existing recipe.

Results :

In order to improve the manufacturing process of pies, I was in charge of the setting up of new manufacturing equipment for seasoning of the different food preparation and also responsible for developing production sheets describing each manufacturing process. These sheets are made available to operators in order to simplify their professional training on these process and to standardize the production of pies. I also had the opportunity to discover and participate in the different development stages of new salads formulation.

Keywords :

R&I, gluten free, continuous improvement



Pie production sheet

Contact(s) : claire.lescure@etu.umontpellier.fr



Study of cosmetic product and characterization of hydrosols



Mélanie
MARECHAL

Stability study of a new concealer formula and characterization of pine hydrosols

Mélanie MARECHAL GBA

Academic Supervisor : Pascale Chaliel, Michael Nigen



L'ACCENT
DERMO / MAQUILLAGE

Objective / Motivation :

The project carried out for L'accent decomposes into two missions. On the one hand, the study of the stability of a concealer formulated with an extract of chestnut with the aim of being placed on the market. On the other hand, the characterization of pine hydrosols in order to be able to use it in future cosmetic formulations

Results :

The results showed that the concealer is stable at normal storage temperatures. The characterization of pine hydrosol shows that this product is interesting for the cosmetics field due to its composition.

Keywords :

cosmetic pine hydrosol chestnut concealer



Final concealer formulation



pine hydrosols

Contact(s) : melanie.marechal@etu.umontpellier.fr



Processing and coordination of sample requests



Sandra
MATHIEU

Sandra MATHIEU GBA

Academic Supervisor : Laetitia PALMADE



Objective / Motivation :

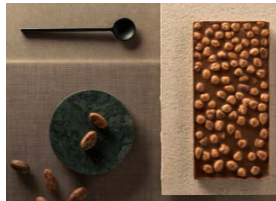
Natra produces and delivers chocolate products and cocoa's ingredients. One of its production sites is dedicated to the production of chocolate slabs for private labels intended to mass market. The clients ask to receive chocolate slabs, whether for a call for tenders, a verification of a product or innovation. The number of requests being consequent, it is important to process and coordinate those requests : from its reception to their sending, through its decoding with the project managers, and its transcription to the R&D laboratory.

Results :

The process and coordination of the samples requests involves prioritizing some sample requests and adapting the schedule of slabs molding.

Keywords :

chocolate, customers, coordination, tempering, sample requests, private label, research & development (R&D), slabs



Chocolate slabs with inclusions

Contact(s) : sandra.mathieu@etu.umontpellier.fr



Production manager in a brewery

Quality and production optimisation missions



Titouan
MERLAND

Titouan MERLAND *GBA*

Academic Supervisor : PREZIOSI-BELLOU Laurence



Objective / Motivation :

My missions are ranged from industrial optimisation to the drafting of procedures to enable better training for future interns. I had to first take over all the processes within the company to be autonomous, then I could write the necessary procedures, in particular the brewing procedure and the microbiological analysis procedure. I have also ancillary missions that I has or will carry out over the duration of the internship, like the introduction of gluten-free beer.

Results :

Given the short time spent in the company, I don't yet have exploitable results.

Keywords :

Beer, Analysis Lactiques, Diastaticus, Process Optimization



Entrepôt de production

Contact(s) : titouan.merland@etu.umontpellier.fr



Epâtantes

Concours ECOTROPHELIA France 2023

JULIE GAXIEU *GBA* LUCIE FANTINO - LAURA MIQUEL *GBA* Doriane NGUESSAN - MARC ROUCHON *GBA*

Academic Supervisor : Mme Dominique Chevalier-Lucia / Mme Sylvie Marchesseau / Mme Maeva Hostachy / Mme Céline Breton



Objective / Motivation :

The Epâtantes is a team of 5 students from Food Science and Biology at Polytech Montpellier. We participate in the ECOTROPHELIA student food innovation competition. We have noticed a lack of products for people over 50 and we found that these categories have specific needs in proteins. This project has been developed in accordance with environmental issues.

Results :

Our product called Legumini is a revisit of the ravioli (stuffed pasta), naturally rich in protein and source of fiber thanks to its main ingredients: legumes! This vegetarian product matches with current trend. The packaging was made in an ecodesign approach. The industrialization plan allowed to finalize the start-up's business plan.

Keywords :

Innovation - Vegetarian dish - Rich in proteins



Our product "Leguminis"

Contact(s) : julie.gaxieu@etu.umontpellier.fr lucie.fantino@etu.umontpellier.fr marc.rouchon@etu.umontpellier.fr



Development of methods to extract and purify exosomes from biofluids



Nicolas
ROPIQUET

Pharmaceuticals R&D

Nicolas ROPIQUET *GBA*

Academic Supervisor : Delphine GITENAY



Objective / Motivation :

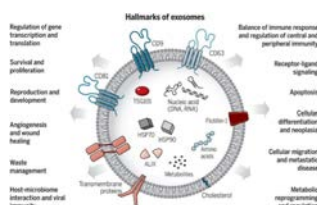
Parkinson's disease is a neurodegenerative disease characterized by the accumulation of α -synuclein protein aggregates in the brain. To slow down or block the progression of the disease, a therapeutic strategy would be to decrease α -synuclein brain contents. To validate this type of treatment, the quantification of α -synuclein is necessary. It has been shown that α -synuclein can be secreted into biofluids via exosomes. The objective is to develop a protocol to extract exosomes from biofluids in order to measure α -synuclein.

Results :

No results yet

Keywords :

Alpha-synuclein, Biological fluid, Exosome, Parkinson's disease



Composition and biological interests of exosomes

Contact(s) : nicolas.ropiquet@etu.umontpellier.fr



Compliance, improvement and management of the Quality system of Orïgin



Biological and Food Engineering

Apolline
SARTORI

Apolline SARTORI GBA

Academic Supervisor : Alexandre Colas De la Noue



Objective / Motivation :

Orïgin is a VSE specializing in the transformation and development of vegetable proteins, in particular from soybeans. Their products are organic and are manufactured by different subcontracting companies because Origin does not yet have its own premises. As the company did not have an employee responsible for quality, many problems arose on a daily basis. My work has therefore focused on the continuous improvement of communication and quality management in order to ensure the delivery of a compliant product to their customers.

Results :

My work was carried out at different levels to improve communication, logistics and quality. Some labels had to be created or modified to comply with the requirements of the INCO regulations. The technical sheets have also been modified to comply with the requirements of organic certification among others. Specifications for subcontracted factories have been produced in order to define the requirements for labeling (in particular by creating a batch number allowing for optimal traceability) or the requirements for logistics and communication.

Keywords :

Quality – Specifications - Subcontracting companies – Continuous improvement - Label



Orïgin products

Contact(s) : apolline.sartori@etu.umontpellier.fr



Apprenticeship as a production support engineer

environmental monitoring of production areas



Joya
SAYES

Joya SAYES *GBA*

Academic Supervisor : Angélique fontana



sanofi

Objective / Motivation :

For the beginning of my apprenticeship, I joined Sanofi as a production support apprentice. The continuous improvement of the production site is the main part of my mission. I had the opportunity to discover different aspects and poles of this industry. During this period, I started my first mission, and during the upcoming months I will pursue it and start my second mission. It has been an enriching experience so far.

Results :

This study will let us implement a new way of monitoring the production site during a break of 1 week or more.

Keywords :

Production, environment, continuous improvement, vaccins

Contact(s) : joya.sayess@hotmail.com



Product R&D Project Manager



Alice
SEIGNOVERT

Alice SEIGNOVERT *GBA*

Academic Supervisor : Pascale Chali r



Objective / Motivation :

I am doing a professionalization contract with the company Arcadie which is located in France. Arcadie is specialized in the marketing of organic spices and herbal teas. The names of its brands are "Cook" for spices and herbs and "L'Herbier de France" for herbal teas. I joined the "marketing & innovation" department and my role at Arcadie corresponds to all the needs of the company in terms of product R&D and therefore includes various missions.

Results :

I have decided to highlight two projects that seem relevant to illustrate the application of my engineering skills in a company : the development of knowledge on the raw materials used at Arcadie (whether spices or medicinal plants) and the renovation of the Cook brand spice mixes.

Keywords :

spices - herbal teas - organic - innovation - marketing - professionalization contract



Logos of Arcadie's two brands

Contact(s) : alice.seignovert@etu.umontpellier.fr



Development of a new range of crunchy mueslis

Optimization of the nutritional profile



Annette
VAZILLE

Annette VAZILLE GBA

Academic Supervisor : Dominique CHEVALIER-LUCIA



Objective / Motivation :

The objective is to work on optimizing the nutritional profile of crunchy mueslis in order to launch a new range. This optimization is done by working on the recipe, tests are carried out in the laboratory with a view to launching the product in stores.

Results :

Laboratory testing is underway. No results to report. Confidentiality to be respected.

Keywords :

mueslis, crunchy, nutrition, organic

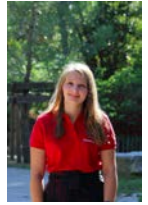


Crunchy muesli lab test

Contact(s) : annette.vazille@etu.umontpellier.fr



Support in the implementation of ISO 22000: 2018 within Maison Pecou



Mathilde
VENNE

Biological and Food Engineering

Mathilde VENNE GBA

Academic Supervisor : Alexandre Colas de la Noue



Objective / Motivation :

Maison Pécou was in need of someone who could work full-time on the implementation of ISO 22000 within the company. The certification was a demand of several clients worldwide. It is scheduled for the end of 2023.

Results :

I identified all needed documents that the company did not have. Then, I established from scratch the microbiological, chemical and physical analysis plan and supervised its implementation. I also wrote several missing procedures along with the redaction of both food defense and food fraud plans and their implementations. The plan also incorporates regulatory aspects regarding packaging. Furthermore, to guarantee the food safety of products to consumers, it is necessary to evaluate its service providers. To do so, I drafted a questionnaire.

Keywords :

Sugared almonds, Quality, ISO 22000, Microbiological analysis plan



Food Safety Management

Contact(s) : mathilde.venne@etu.umontpellier.fr



Chargé de production



**Benoit
VINCENT**

Atelier de conditionnement des formes pâteuses

Benoit VINCENT *GBA*

Academic Supervisor : Catherine FAUR



Pierre Fabre

Objective / Motivation :

The time goals of the different changes to do on these packaging lines had not been clearly defined on this workshop. I was asked to perform an analysis and scheduling work to define achievable objectives based on real facts. I had to do an observation work in collaboration with the workers, the managers and the technicians. Thanks to them, I was able to get essential information to define new time goals. In addition to this mission, I developed a workshop performance analysis tool.

Results :

The results obtained on the changes made it possible to obtain time standards based on reality and not on old data. As far as the performance analysis tool is concerned, I update it every week, which allows me to have a constant follow-up of the production lines of the liquid and paste form packaging workshops.

Keywords :

Packaging, continuous improvement, scheduling, industrial performance



Le site de production Pierre-Fabre Médicament Production

Contact(s) : benoit.vincent@etu.umontpellier.fr





Creation of a Web Scraping Application

Extraction of posts on unpaid issues from LinkedIn



Zahra
AHLAL

Zahra AHLAL IG Afaf BENTOUIL IG

Academic Supervisor : Toulemonde Gwladys



Afaf
BENTOUIL



Objective / Motivation :

This report is an account of a work in binomial carried out during the end of studies project within the framework of our engineering training in Computer Science and Management at Polytech Montpellier. Our mission for this project was to design and implement a web application that allows applicants to have a list of people who have expressed on social networks (such as LinkedIn) problems of unpaid invoices to other companies through publications.

Results :

We have developed a web application in Python and Django named "Walti Scraper" that shows the extracted informations about posts that talks about unpaid invoices.

Keywords :

Web scraping, LinkedIn, User interface, Unpaid

Titre	Date de publication	Profession / Secteur d'activité	Site	Nombre de commentaires	Actions
Walti Scraper	9 mai	Professionnel / Stratège de contenu Top 100 Créateurs LinkedIn 2022 Freelance	LinkedIn	80	Details
Crédit client	5 mai	Coach Stratégie & J'ai accompagné les entrepreneurs à développer des stratégies marketing efficaces et rentables et à augmenter leurs revenus	LinkedIn	40	Details
Crédit client	7 mai	J'ai rendu les crédits simples Une nouvelle façon de faire	LinkedIn	50	Details
Crédit client	8 mai	Service Client Manager (MS) Support & Service Stratégie Créateur de contenu Freelance	LinkedIn	40	Details
Crédit client	7 mai	Customer Success Consultant - SECURITY	LinkedIn	40	Details

Walti scraper

Contact(s) : zahra.ahlal@etu.umontpellier.fr afaf.bentouil@etu.umontpellier.fr

Creation of informative dashboards

Display statistics and data on massifs, countries and caves for a caving association

Ophélie AMARINE IG Margot GEORGET IG

Academic Supervisor : Eleonora Guerrini



Objective / Motivation :

Wikicaves is an association of speleology enthusiasts, created in 2013, with the goal of collecting and making available information about the underground world. To achieve this, the association has developed Grottocenter.org, a collaborative "Wiki" format web application. Their database is very rich and dense but they are currently not displaying any of it to the user. Our objective was to use this data, treat it and display it in nice dashboards over the massif, country and homepage pages.

Results :

We ended up making 3 dashboards on 3 different pages : massif, country and homepage. Our request and treatment needed to be resilient and scalable on a big set of data, we used materialized views and cron jobs to achieve it. Also, with the informations present in the database, we were able to calculate an indicator of the data quality, using the number of contributors and the latest date of update, motivating the users to collaborate if the score on a cave is low. <https://grottocenter.org/ui/massifs/490>
<https://grottocenter.org/ui/countries/FR>

Keywords :

Dashboards, Data science, Data engineering, SQL, View, React, NodeJS, PostgreSQL



Dashboard on homepage



Dashboard on country page

Contact(s) : ophelie.amarine@etu.umontpellier.fr margot.georget@etu.umontpellier.fr

Design and Development of an Anti-Procrastination Mobile Application



Thomas
SCHOLIVET

Empowering Students with a User-Friendly Task Management App
Built With React Native

Thomas SCHOLIVET IG Vincent BARET IG

Academic Supervisor : Chouki Tibermacine



Vincent
BARET



Objective / Motivation :

Student-led project aimed at creating a mobile application to help combat procrastination. The students were involved designing the architecture and user interface, and implementing features such as task list, homescreen, and daily calendar.

Results :

The application was designed in accordance with the mockups and is compatible with both Android and Apple operating systems. The planned features were implemented, as well as additional features such as theme management and language translation capabilities.

Keywords :

React Native, Android, Mobile Application, Anti-procrastination, To-do list, Time Management, Cross-platform development, User interface design, User experience, Task organization, Focus improvement, Productivity enhancement



An Overview of the Homescreen, Todo List, and Calendar Features

Contact(s) : thomas.scholivet@gmail.com vincentbaret865@gmail.com

Contrat de professionnalisation chez Sopra Steria

Développeur Backend



Nicolas
BOFI

Nicolas BOFI /IG

Academic Supervisor : Lysiane Lopez



sopra  steria

Objective / Motivation :

Un outil d'accompagnement des agriculteurs avec une démarche conseil complète permettant d'accompagner les agriculteurs dans la compréhension de leur situation, la projection des risques potentiels et l'adaptation de leur stratégie. Cet outil sera utilisé par une banque.

Results :

Des premières fonctionnalités terminées autour de la connaissance client.

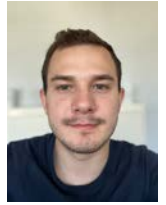
Keywords :

Secteur bancaire, accompagnement, finance, développement, backend

Contact(s) : nicolas.bofi@etu.umontpellier.fr



Repenser le Front End de Lox



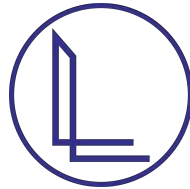
Radu
BORTAN

Radu BORTAN /G Túpac ROCHER /G

Academic Supervisor : Fiorio Christophe



Túpac
ROCHER



Objective / Motivation :

Notre demandeur est l'entreprise Lox, une start-up basée à Rotterdam qui propose un outil permettant à des entreprises de réduire leurs coûts logistiques en calculant les sommes qui leurs sont remboursables par les livreurs de colis. La partie frontend de cet outil est difficile à maintenir. Notre mission est la mise en place d'une nouvelle architecture frontend. Cette architecture devra permettre une maintenance plus simple du code. Le frontend devra utiliser VueJS3, tout en restant compatible avec VueJS2.

Results :

Nous avons implémenté la page de connexion et de création de compte, ainsi que les barres de navigation et la page principale avec les graphes donnant un aperçu global des données du client. Durant la migration, nous avons simplifié et documenté le code, le rendant plus maintenable.

Keywords :

frontend, VueJS, TypeScript, Pinia, JavaScript, SCSS, architecture



Page d'accueil du site

Contact(s) : radu.bortan@etu.umontpellier.fr tupac.rocher@etu.umontpellier.fr

Datacamp mobile app

Bringing value to Datacamp's mobile app



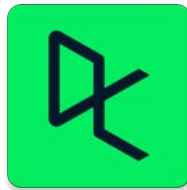
Nathan
DJIAN-MARTIN

Nathan DJIAN-MARTIN *IG*

Academic Supervisor : LOPEZ Lysiane



IG



Objective / Motivation :

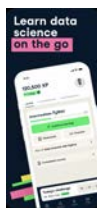
I decided to do an apprenticeship at Datacamp after my 3 months summer internship in the same company. It was an incredible experience to work in such an open minded and kind environment. Also the work was interesting and challenging I had the desire to continue working in the same company and same team. Also I prefer mobile development over web development so joining Datacamp's mobile team was ideal for me.

Results :

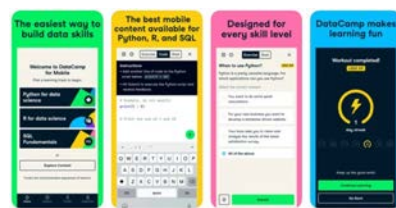
Results are constant during this project. Indeed, Datacamp's mobile team uses an Agile method so value is added to the mobile app every 2 weeks. So far the most important results we brought to the mobile app are: more courses, refine the onboarding flow for new users and allow users to do the first chapter of every course for free.

Keywords :

Mobile, React Native, Datascience, Datacamp, Software Engineering, Agile,



Datacamp's mobile app (AppStore ad)



Datacamp's mobile app carousel

Contact(s) : nathan.djian-martin01@etu.umontpellier.fr



Conception d'un outil de gestion des banques de travail

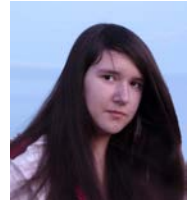


Alex
BENBOUAZZA

Projet de fin d'études n°9 : Analyse et conception d'un outil
"banque de travail"

Alex BENBOUAZZA IG Tiffany DUMAIRE IG

Academic Supervisor : Anne LAURENT



Tiffany
DUMAIRE



Objective / Motivation :

The Boutiques Paysannes d'Occitanie network wishes to change its tool. This tool allows to manage the banks of work within the framework of the agricultural mutual aid. The objective of the project is to realize the design phase of this new tool to answer the best to the need of the network. The result will be a specification as complete as possible containing the context, the scope of the project, the constraints, the models, etc. This specification will allow future teams to develop the tool with all the necessary information.

Results :

The final result of this project is the writing of the most complete specifications possible. It contains the elements of analysis, the constraints of the project, the elements of design in terms of database, models, forecasts (budget and planning) and technical choices.

Keywords :

specifications, models, database, banks of work



Maquette : Tableaux de bord des différents utilisateurs



Cahier des charges

Contact(s) : alex.benbouazza@etu.umontpellier.fr tiffany.dumaire@etu.umontpellier.fr

eStory



Adnane
EL ABBAS

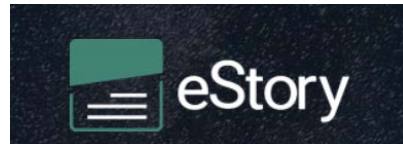
Visualize the key events of stories

Adnane EL ABBAS IG Ouissem REDJEMI IG Souhaila KESBI IG

Academic Supervisor : Tiberiu Stratulat



Ouissem
REDJEMI



Souhaila
KESBI

Objective / Motivation :

Notre objectif principal est de gérer les différents types d'utilisateurs de manière efficace et fiable afin de pouvoir leur recommander un plan de tarification. Pour cela, nous devons créer un onboarding pour savoir quel type d'utilisateur nous avons sur la plateforme.

Results :

Les fonctionnalités des pages de fictions et des composants associés sont opérationnelles et offrent une expérience utilisateur fluide et agréable. La page de tarification est également fonctionnelle et permet aux utilisateurs de choisir parmi différents plans tarifaires. La mise en œuvre de la gestion des tokens a également été aboutie, permettant aux utilisateurs de gérer leur abonnement. L'onboarding est également fonctionnel pour les nouveaux utilisateurs de l'application. Une nouvelle fonctionnalité, une timeline verticale a été ajoutée.

Keywords :

Typescript, NodeJS, React, MySQL, Timeline, Fiction, Évènement, Histoire, OpenAI, eStory



Application Estory

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Contrat de professionnalisation Développeur Full-Stack

Contrat de professionnalisation Développeur Full-Stack

Alexandre FERNIQUE IG

Academic Supervisor : Lysiane LOPEZ



Objective / Motivation :

Collaborer avec l'ensemble des parties prenantes du projet?; Concevoir tous les aspects techniques et fonctionnels du back-end et front-end d'un site web ou d'une application (architecture, stockage des données, interface utilisateur, sécurité, ...) ; Veiller au respect des normes et standards?en vigueur ; Rédiger la documentation technique?et former les utilisateurs ; Résoudre les éventuels problèmes techniques?; Effectuer une veille technologique régulière afin de rester à jour sur les dernières innovations.?

Results :

Travaille sur 2 projets Urbaproject France et Italy. 3 Sprints réalisés

Keywords :

Développement Full-Stack Projet Photovoltaïque

Contact(s) : alexandre.fernique@etu.umontpellier.fr



Use case for CO2BOT - CGI

Cloud Storage Audit Tool



Sébastien
GINESTE

Sébastien GINESTE IG Xavier CORBIER IG

Academic Supervisor : BERRY Vincent



Xavier
CORBIER



Objective / Motivation :

As part of the RGENS (General Reference for the Ecodesign of Digital Services), which aims to reduce the consumption of IT and energy resources and the contribution to equipment obsolescence, the CGI company wishes to develop tools to optimise key processes around energy consumption within an entity. This PFE is one of these tools. It allows auditing the environmental cost of data stored on a drive and to carry out deletion policies in order to avoid data obsolescence.

Results :

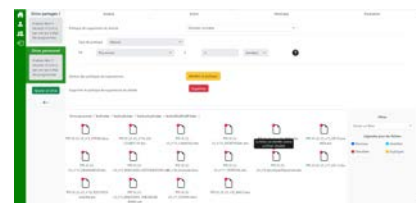
The application allows you to add drives from Google Drive and OneDrive providers. An audit of these drives is carried out at a time interval defined by the user. This audit measures the environmental and energy impact of the stored files. It also identifies any duplicated file. The user can define deletion policies according to the type of data and its last modification date. These policies allow files that do not respect them to be deleted or made obsolete. The user can also visualise the consumption of the drive over time.

Keywords :

Dashboard, Audit, Drive, OAUTH-2, ecology, environmental impact, delete policy, Microservice, Docker, Nest.js, Angular, RabbitMq, PostgreSQL, MongoDB, Redis.



Drive analysis dashboard



Setting up a deletion policy on a folder

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Développeur full-stack à Waalaxy

Développeur full-stack à Waalaxy



Marouan
LAROUÏ

Marouan LAROUÏ IG

Academic Supervisor : Kévin Giordani



IG



Objective / Motivation :

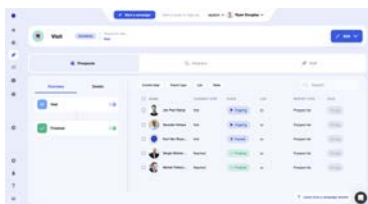
Le premier objectif consistait à développer la nouvelle interface utilisateur de la gestion des campagnes de prospection ainsi qu'ajouter de nouvelles fonctionnalités. J'ai pu développer l'affichage dans l'interface de gestion de campagne des différentes étapes, ainsi que le nombre de travelers sur ces étapes. Ce qui permet ainsi une meilleure compréhension de la campagne en cours et des travelers la parcourant. La deuxième consistait à ajouter une fonctionnalité remettre des traveler sortis ou en erreur de nouveau dans la campagne.

Results :

Pour le backend : Trois routes d'API fonctionnelles, documentées et testées (unitaire et intégration). Une nouvelle entité en base de données, avec des indexes associés. Fonctions utilitaires pour la gestion des travelers et des "travelersSummary" Pour le frontend : Des composants reactjs réutilisables : bouton et modale pour remettre un traveler dans une campagne fonctions utilitaires pour la gestion de la nouvelle entité "travelerSummary" (gestion de l'état de l'application, requêtes pour la base de données, temps réel avec système de socket.

Keywords :

fullstack, développement, waalaxy, campaign, prospection, entité, base de donnée, backend, frontend



Nouvelle interface gestion des travelers

Contact(s) : marouanlaroui2000@gmail.com



Application web d'analyse de trace SQL

Développement d'une application web en React



Aaron
LAZAROO

Aaron LAZAROO IG

Academic Supervisor : LOPEZ Lysiane



Objective / Motivation :

L'objectif était d'analyser les fichiers de logs de base de données et détecter des anomalies. Pour cela, la mission était de développer une application web qui permet à partir d'un fichier de trace de log SQL, de l'analyser pour obtenir des éléments clés et les afficher dans un rapport, de détecter automatiquement les requêtes, calculer et analyser leur temps d'exécution et de générer un rapport d'erreur paramétré par l'utilisateur.

Results :

Résultats obtenu: application web fonctionnel et hébergé sur les serveurs de l'entreprise. Les fonctionnalités principales sont: Dépôt de fichiers log sql (.trc) Consulter la liste des fichiers log disponibles Consulter le contenu des fichiers log Télécharger les fichiers log Supprimer des fichiers logs Consulter et imprimer le rapport généré pour chaque fichier log Consulter la liste des requêtes pour chaque fichier log des options de tri Générer et imprimer un rapport d'erreur pour un fichier log à partir des paramètres données

Keywords :

Javascript, HTML, CSS, React, Bootstrap, SQL, NodeJS, Express, Algorithmes de tri, Git, Tests unitaires, Déploiement



Page d'accueil de l'application avec l'affichage de la liste des fichiers logs disponibles pour analyse



Exemple d'un rapport généré à partir d'un fichier log (.trc)

Contact(s) : aaron.lazaroo@etu.umontpellier.fr



Feasibility study of a communication tool during a crisis in hospitals



Joan
TERIIHOANIA

A communication solution for a resilient organization

Joan TERIIHOANIA IG Quentin DESBROUSSES IG

Academic Supervisor : BOURDON Isabelle



Quentin
DESBROUSSES



Objective / Motivation :

Our project is part of the activities of KIM Phoenix, the main objective of which is to highlight the effects of extreme climate risks on health organizations and to propose managerial solutions to develop resilient organizations. In this context, the objective of our project is to study the feasibility of a working communication tool in times of crisis and extreme conditions in hospitals.

Results :

We have : - Determined the needs of end users - Identified existing solutions - Evaluated these solutions - Proposed a complete solution meeting the needs

Keywords :

kim, hospitals, health, manet, study, feasibility



Poster du projet

Contact(s) : joan.teriihoania@etu.umontpellier.fr quentin.desbrousses@etu.umontpellier.fr



Contrat de professionnalisation au sein d'Atos Montpellier



Théo
URIOT

Ingénieur études et développement web

Théo URIOT *IG*

Academic Supervisor : CHAPPELLIER Philippe



IG



Objective / Motivation :

Mon projet industriel a été réalisé sous forme de contrat de professionnalisation à Atos Montpellier. J'ai ainsi intégré une équipe de développement web frontend sur un projet de l'entreprise. J'ai ainsi rejoint l'équipe UPS (Usager-Professionnel de Santé) du projet Mon Espace Santé, une application commandée par la CNAM et le ministère de la Santé. L'objectif de mon contrat de professionnalisation a été d'aider cette équipe en développant un maximum de fonctionnalités frontend avec VueJS, TypeScript et GraphQL ainsi que de réaliser des tests.

Results :

Après ces deux mois, j'ai réalisé de nombreuses tâches : développer des fonctionnalités frontend, comme la suppression d'un établissement de santé sur l'application ou le listing de ceux-ci, ainsi que la réalisation des tests qui sont complémentaires. De plus, j'ai de plus, fait une analyse de la composition API sur VueJS afin de migrer le projet avec ce modèle, j'ai fait ceci sur quelques fichiers. De même, j'ai migré quelques composants du frontend avec la clean architecture qui est un pattern devant maintenant s'utiliser sur l'application.

Keywords :

Développement Web - Frontend - VueJS - TypeScript - GraphQL - Agile SCRUM



Logo de Mon Espace Santé, application sur laquelle j'ai travaillé

Contact(s) : theo.uriot@etu.umontpellier.fr



Managing the historization of contributions on a Wiki



Julien
VENDRAN

Julien VENDRAN IG Cécile DESTAING IG

Academic Supervisor : Thomas Godel



Cécile
DESTAING



Objective / Motivation :

The goal during this project was to add a management of snapshots for an entrance. When creating a wiki, there are many objects added inside. Sometime you need to update them, due to natural change or mistake. But if someone does incorrect changes, you don't want to loose your correct version and you want to come back to that version.

Results :

In order to help WikiCaves, we add a new page in their website to view every update for each component inside an entrance page. Inside of it, you can see a highlight of those modifications to see more precisely what have been updated. If you want to restore an old version, a button is available.

Keywords :

caving, programing, react, sailsjs, web developement, postgresql, nodejs



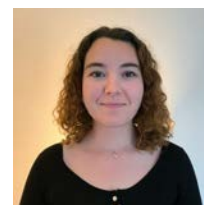
Screenshot from grottocenter

Contact(s) : julien.vendran@etu.umontpellier.fr cecile.destaing@etu.umontpellier.fr





Valorization and reuse of rice husk in optical glasses



Lorena
AGUIAR

Lorena AGUIAR *MAT*

Academic Supervisor : Andrea PIARRISTEGUY, Ahmad MEHDI



Objective / Motivation :

This project is dedicated to the use of a natural source of silica from agriculture for the elaboration of several glass compositions. This natural source of silica is rice husks (envelope of the rice grain), which can contain up to 20% of silica. This silica will be used for the synthesis of glass by fusion. The biobased silica will thus be compared to commercial silica. Finally, glasses containing nanoparticles will be studied for applications in optical fibers.

Results :

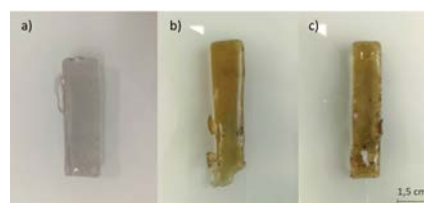
The characterization of the synthesized glasses allowed us to determine that the silica from rice husk is capable of replacing commercial silica within borosilicate glasses. The washing of rice husk has yet to be optimised in order to obtain colorless transparent glasses like the ones obtained with commercial silica. The characterization of nanoparticle-doped glasses has shown that nanoparticles react with the network modifying oxides which prevents them from performing their function of amplification of light signals within the optical fibers.

Keywords :

silica, rice husk, rice husk ash, fusion, glass, nanoparticle, composition, oxide, biobased, burning, extraction, optics, optical fiber, stretching



Scheme of a paddy rice grain



Borosilicate glasses of molar composition $2/7 \text{ SiO}_2$ $2/7 \text{ B}_2\text{O}_3$ $2/7 \text{ Li}_2\text{O}$ $1/7 \text{ Na}_2\text{O}$ synthesized from (a) commercial silica, (b) rice husk silica and (c) rice husk silica and doped with titanium oxide nanoparticles

Contact(s) : lorena.aguiar-azevedo@etu.umontpellier.fr



Field effect transistors based on carbon nanotubes

Field effect transistors based on carbon nanotubes



Hugo
ARNOUX

Hugo ARNOUX *MAT*

Academic Supervisor : Eric ANGLARET



Objective / Motivation :

Carbon nanotubes are nanomaterials that have versatile properties that can be very interesting depending on their field of application. This is why their use is now being studied for the design of biosensors. Indeed, its electrical properties are important because they are introduced within transistors used for this type of technology. Its biocompatibility is also interesting when these nanomaterials are functionalized (addition of chemical functions to the surface of the material).

Results :

This project confirms that it is possible to disperse carbon nanotubes in aqueous solutions despite their hydrophobic nature. In addition, it is possible to characterize these dispersions using optical spectroscopy (absorption, photoluminescence and Raman scattering). The spectra provide key informations on the characteristics of the nanotubes (chirality, diameter, dielectric environment, defects, semiconductors or metals, etc.).

Keywords :

Carbon nanotubes, optical spectroscopy, field effect transistors



Photographs of carbon nanotube dispersions (two different surfactants); the mass proportions are identical in both cases, so we can see macroscopically that the BS disperses the nanotubes better

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Study of the microstructure of AZS refractory materials

Modified AZS (Alumina, Zirconia, Silica) refractories block for glass furnace

Jean BOURLON *MAT*

Academic Supervisor : Fréty Nicole



Objective / Motivation :

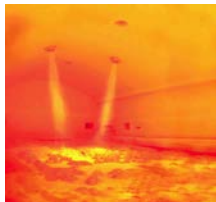
Alumina-Zirconia-Silica (AZS) electro-melted materials are refractory ceramics used as blocks of glass furnace. The aim of this project was to study the microstructure of AZS materials using Scanning Electron Microscopy (SEM) associated with Energy Dispersive Spectrometry (EDS) and Electron Back-Scattered Diffraction (EBSD).

Results :

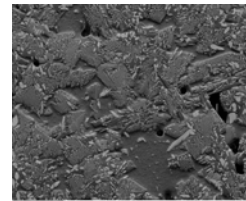
The microstructure of AZS ceramics has been studied focussing on the morphology, the chemical composition and the cristalline structure of the different phases. The evolution of the microstructure has been determined after different thermal treatments.

Keywords :

AZS, SEM, EDS, EBSD



Extreme conditions inside an industrial glass furnace



SEM picture of the microstructure of modified AZS based refractories

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Study of phosphate glasses new composition

The effect on the addition of both alumina and silica subistant to phosphorus oxide



Arnaud
CEBULSKI

Arnaud CEBULSKI *MAT*

Academic Supervisor : Faivre Annelise



Objective / Motivation :

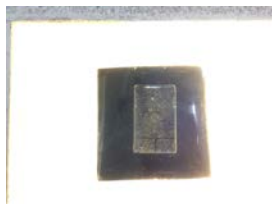
Phosphate glasses are well known for their high hydrolytic attack susceptibility which limited their applications. However, it has been shown that the dissolution depends on the chemical composition, allowing rising the range of applications by controlling it, such as slowly degradable calcium phosphate based glasses. They can be used in the medical sector due to their bioactivity. The aim of the project was to study the influence of silica and alumina addition on the properties of phosphate glasses.

Results :

pH and mass loss have been measured during a dissolution experiment in ultrapure water. It shows that the addition of alumina increase the pH solution, and the mass loss along the time was quite low. The presence of Al allows to increase the hydrolytic attack resistance. On the contrary, the effect of Si depends on the concentration and rather lowers the resistance. Explained by the structural impact, Al induces some cross-linking between the phosphate chains, which rise the network strengthening

Keywords :

Phosphate-based glasses Hydrolytic attack susceptibility Bioactivity Network strengthening



Picture of a phosphate glass with 8%mol of alumina through crossed polarizer analyzer

Contact(s) : Arnaud.cebulski@etu.umontpellier.fr



Dexel professionalisation contract

Substitution of a CMR raw material from the formulation of a waterproofing coating



Léa
CHAPTAL

Léa CHAPTAL *MAT*

Academic Supervisor : Piarristeguy Andrea



Objective / Motivation :

Since July 2022, Dexel has been recovering the production of an existing waterproofing coating in various colours. Dexel didn't produce this product before and will take over the production from a Sika factory. The objective of this assignment is to remove a CMR ingredient from the formulation of this exterior waterproofing coating. Sika's values are to reduce environmental impact and eliminate CMR products. In addition, this will enhance the safety of employees when producing this product.

Results :

I called different suppliers and we chose 4 substitutes to test. I tested different physicochemical (pH, viscosity, dry extract, density) and mechanical (maximum strength and elongation at break) characteristics of the different formulations to compare them with the specifications of the starting product. There were similar. I measured the drying time, which was different for each formulation. A substitute was chosen because it was closest to the reference. Cost calculations were made and validated by the director. Tests on site are underway.

Keywords :

Coating, coalescence, sealing, CMR, substitute



Product for waterproof coating



Drying time measurement method

Contact(s) : lea.chaptal@etu.umontpellier.fr



PZT ceramics



Synthesis and characterization of PZT ceramics

Joao Vitor
DOS SANTOS RITTER

Joao Vitor DOS SANTOS RITTER *MAT*

Academic Supervisor : Philippe Papet



Objective / Motivation :

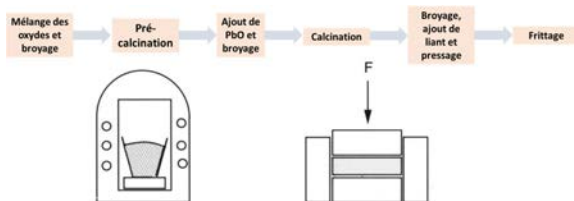
The objective of this internship is to develop piezoelectric ceramic materials with commercialisable properties. More importantly, a highly soft PZT material for medical applications is to be developed.

Results :

A material with properties very close to the desired ones has been developed. The composition and synthesis are well mastered with some final adjustments needed to optimize the desired properties.

Keywords :

PZT, piezoelectricity, ceramic.



Simplified steps for the production of ceramics.

Contact(s) : joao.dos-santos-ritter@etu.umontpellier.fr



Structural conversion of carbon nanotubes by electrical modulation during growth



Benjamin
GUYOT

Find and realise an adaptable system to expose the carbon nanotubes to an electrical field during their growth

Benjamin GUYOT *MAT*

Academic Supervisor : Vincent Jourdain



Objective / Motivation :

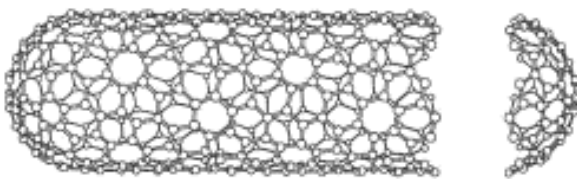
Carbon nanotubes have amazing properties. Using them as semiconductors in field-effect transistor seems to be one of the most promising areas. For this project I will focus on the problem of chirality of carbon nanotubes. In 2018 a study showed impressive results in term of choosing the nature of carbon nanotubes by exposing them to an electrical-field during their growth. The aim of the project is to develop a system capable of applying an electrical-field adapted to the electrotwisting phenomenon in a small chemical vapor deposition cell.

Results :

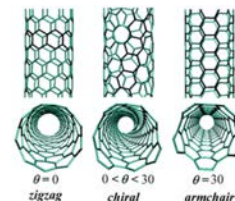
After studying the different ways for setting up the system, we decided to use suitable electrodes, wires and a generator. Studying, exchanging and thinking on the solution to be used occupied most of the project. Finally, we carried out 3 synthesis by varying the electrical field parameters and then observed the results under a Scanning Electron Microscope (SEM).

Keywords :

- Carbon nanotubes and their growth - Project management - Find solution to adapt existing solution to our working conditions - Communication and exchange with external people - Trial our materials choice in real conditions



Schema of a single walled carbon nanotubes (SWCNT)



3 physical structures of the carbon nanotubes (CNT)

Contact(s) : benjamin.guyot@etu.umontpellier.fr



Professionalisation contract at Pasquier

Breakage of donut trays



Elisa
LEMONNIER

Elisa LEMONNIER *MAT*

Academic Supervisor : FAIVRE Annelise



Objective / Motivation :

In 2022, the site of Pâtisserie Pasquier Les Cerqueux received several consumer nonconformities concerning the breakage of donut trays. Thus, the objective of this project is to reduce the number of consumer nonconformities in 2023. The first mission is to identify the origin of the tray breakage by analyzing the production line and elements which can provoke the breakage. The second assignment consists in setting up corrective actions depending on results obtained to limit or remove the tray breakage.

Results :

To date, the production line of the Pasquier site and that of the tray supplier have been analyzed. In addition, some elements from productions concerned by consumer nonconformities have been checked. However, none of these elements has allowed to determine the origin of the tray breakage. Therefore, analyses and tests are currently being carried out.

Keywords :

Amorphous polyethylene terephthalate (APET), Thermoforming, Foreign body, Packaging



Breakage profile of trays

Contact(s) : elisa.lemonnier@etu.umontpellier.fr



Valorization of leather shavings



Thomas
LENFANT

Valorization of leather shavings by pyrolysis

Thomas LENFANT *MAT*

Academic Supervisor : Ahmad Mehdi



Objective / Motivation :

Turning hides into leather is one of the oldest known manufacturing practices. As this technique has been perfected, production has increased, which in turn has led to an increase in waste. Leather shavings are the result of the leather sanding process. They are a waste product that has no use and are usually incinerated. The objective of this project is to examine the production of useful materials during the pyrolysis of these shavings.

Results :

Pyrolysis experiments were performed in a nitrogen atmosphere furnace between 415 and 800°C at different heating rates and temperature steps. Carbonaceous solids (chars) were obtained and characterized using different analytical techniques. They can potentially be used as solid fuel, adsorbent, biochar (fertilizer) or reinforcement in a polymer matrix.

Keywords :

Leather, Pyrolysis, Valorization



Leather shavings before pyrolysis

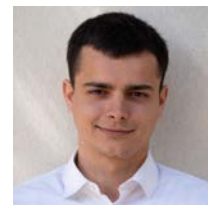


Leather shavings after pyrolysis

Contact(s) : thomas.lenfant@etu.umontpellier.fr



Product Manager Engineer at SUDFLUOR



Romeo LEONE

SUDFLUOR is a company specialized in the chemistry of molecular fluorine and its derivatives. As a product manager in this company, I work on the invention developed by the company: a fluorine generator using an eco-responsible material as a source of fluorine.

Romeo LEONE *MAT*

Academic Supervisor : Jourdain Vincent



Objective / Motivation :

The R&D project led by SUDFLUOR and on which I work is based on the fluorine generator developed by the company which uses a porous material to generate fluorine. This product is an alternative to the use of fluorine in pressurized gas cylinders which is highly regulated because of its dangerousness. The target market for this product is the microelectronics industry. The goal is to demonstrate the efficiency of difluor in this industry, to find new applications and to propose technical improvements of the product.

Results :

Fluorinated products are widely used in the microelectronics industry. The manufacture of electronic chips requires different stages of deposition of materials and etching of these materials on semiconductor wafers. The deposition sequence requires the cleaning of the CVD deposition chambers with fluorination agents to eliminate the material remains on the inner walls. Greenhouse gases such as NF₃ are mainly used, but F₂ is more effective. Our product is therefore an eco-responsible alternative whose effectiveness remains to be demonstrated.

Keywords :

chemistry, fluorine generator, eco-responsible material, semiconductor, etching, cleaning, wafers, microelectronic



Fluorine generator developed by the company



Fluorine source material patented by SUDFLUOR

Contact(s) : romeo.leone@etu.umontpellier.fr



Projet de fin d'études

Développement et optimisation de lévitateurs quantiques à base de supraconducteur YBaCuO



Hugo
LONGÈRE

Hugo LONGÈRE *MAT*

Academic Supervisor : Guerrero Gilles / Jourdain Vincent



Objective / Motivation :

The objective of this project is to optimize quantum levitators based on YBaCuO superconductor. Among the high critical temperature superconductors (type II), the mixed oxide of barium, copper and yttrium (YBaCuO or YBCO) of composition $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ and commonly noted Y123 is indeed the source of many research works. The synthesis of YBCO ceramics is generally done by sol-gel process. The project aims at studying the ability of the dip-coating method to obtain better superconducting performances of YBCO ceramics.

Results :

By coating the pellets with foams, the levitation time is optimized because these foams will thermally insulate the pellet and thus maintain it longer under their critical temperature. The tests performed on these wafers were not conclusive. Although a YBCO superconducting layer is present on the surface as shown by the SEM analysis, the superconducting properties have not been optimized because the layer deposited on the surface was not perfectly heterogeneous and in too small quantity.

Keywords :

superconductivity, levitation, ceramics,

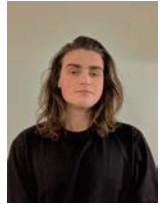


levitating superconducting YBCO pellet

Contact(s) : hugo.longere@etu.umontpellier.fr



Study of agregation and formation mechanisms of plant-based protein fibers for applications in food processing industry and biomaterials



Lucas
LOUBAT

Lucas LOUBAT *MAT*

Academic Supervisor : LE PARC Rozenn / PALMADE Laetitia



Objective / Motivation :

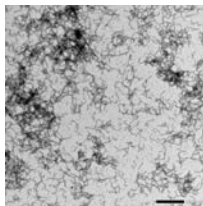
The objective was to create protein nanofibrils from patatin. The process is based on the hydrolysis of the protein into small peptides and auto-assembly into bigger structures to create fibrils. For the hydrolysis and the auto assembly to operate, the solution needs to be acid and cured in the oven for some time.

Results :

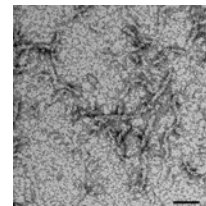
For a 4% patatin solution at pH2 and cured more than 5 hours in the oven at 90°C, the solution transformed into a gel that was unusable for the creation of nanofibrils. We then tried 1% patatin solution at pH2 and cured at different times in the oven at 90°C, and were able to observe nanofibrils of various lengths, depending on the duration of the cure.

Keywords :

protein, nanofibrils, fibrils, patatin, potato, characterisation, hydrolysis



Nanofibrils created from 1% patatin solution pH2 cured 24h in the oven at 90°C - zoom x10k



Nanofibrils created from 1% patatin solution pH2 cured 7h in the oven at 90°C - zoom x100k

Contact(s) : lucas.loubat@etu.umontpellier.fr



Eco-Design project



Liam
MASSENGO

CONDUENT Business solutions France is now the Global Competence Center for Conduent Transit and Intelligent Mobility Solutions worldwide.

Liam MASSENGO *MAT*

Academic Supervisor : Rozenn LEPARC



Objective / Motivation :

My tasks : Eco-design project : carry out the life cycle analysis of ticketing equipment, based on the methodology of the ISO 14044 and ISO 14040 standards - Material selection work: suggest alternative solutions to the polymers currently used as covers for a ticket validator, with a lower environmental impact and according to the standards and requirements

Results :

In progress : Doing an eco-design diagnosis on a leading product, an universal validator - Find improvement areas - Materials selection analysis - Proposal of alternative materials or solutions

Keywords :

Life cycle analysis - Eco-design - Environment - Materials



Example of universal validator I am working on

Contact(s) : liam.massengo@etu.umontpellier.fr



Materials engineer at R&D Concept Recycled Materials

R&D Concept - recycled materials, is a young circular and sustainable economy company. As a materials engineer, I participate in the search for new product applications and the development of new materials.



Marie
MOREAU

Marie MOREAU *MAT*

Academic Supervisor : Jean-Pierre Habas



Objective / Motivation :

My missions are the following: • Integrate and complete knowledge of their first material (PETr), reflect on ways to improve the finished product, and establish its LCA. • Set up R&D specifications for the end of life of the product; • Analyze the technical and mechanical capacities of the other polymers (PEr and Pr) currently in stock and those of the new materials proposed by people canvassing the company. • Reflect on new applications consistent with the materials available or proposed; • Participate in partner meetings

Results :

• Bibliographic research and laboratory tests (characterization and implementation) on the material of the waste in which we are interested: synthetic and cork bottle stoppers. • Realization of a study of recyclability of cork stoppers for the Community of Commune of the Valley of Herault. • Presentation of the project to set up a recycling channel to the decision-making committee of the Region. (find funding and grants) • Realization of a report to share my fresh insights into the company.

Keywords :

Circular economy, recycling, innovation, sustainability, R&D, research and development, recycled materials, waste, raw material, life cycle analysis, polymers, environment, upcycling



Exemple d'un rapport de recyclabilité des bouchons de liège

Contact(s) : marie.moreau@etu.umontpellier.fr



Apprenticeship contract at Capgemini Engineering as an environmental consultant



Maël
NADEAU

Application of Life Cycle Assessment methodology, ecodesign and circular economy tools for a research project at Capgemini Engineering in the HSE (Health Safety and Environmental) team

Maël NADEAU *MAT*

Academic Supervisor : Jean-Louis BANTIGNIES



Capgemini  engineering

Objective / Motivation :

A project in partnership with the Earthshipsisters movement to design an eco-friendly boot. A bibliographical study of materials oriented on polymers will be presented with their applications, their characteristics and their mode of recycling to obtain a list of materials for the design of the boot. An LCA study will compare and measure the impacts of the different materials and processes used. The final objective is to determine the circularity of the product and to promote a circular economy.

Results :

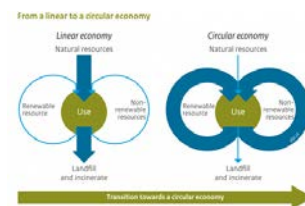
A list of materials was identified according to the part of the boot and materials not suitable for the design of an eco-friendly boot were eliminated : Recycled rubber for the upper and outsole, rPET for the inner lining, rEVA for the removable insole. For the LCA, the life cycle inventory phase is still in progress to determine in detail the recycling processes of the raw materials and the manufacturing processes of the materials and assembly of the boot. This will allow the creation of process records in the database to evaluate the impacts.

Keywords :

LCA, Circular Economy, Recycling, Recycled Materials, Waste, Rubber, Recycled PET, Recycled EVA, Polymers, upcycling, Health Safety and Environmental, Earthship Sisters



Overview of the BooTme boot



Linear Economy vs Circular Economy

Contact(s) : mael.nadeau@etu.umontpellier.fr



Elaboration-Characterisation de matériaux gradateurs de champ électrique



Pierre
ORTHOLAND

Projet fin d'études

Pierre ORTHOLAND MAT

Academic Supervisor : Renaud METZ



Objective / Motivation :

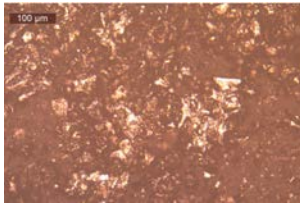
The internship is part of a larger project aiming to develop silicone resin-based composite formulations based on silicone resin allowing to manage electric fields. These particulate composite materials have an electrical resistivity that decreases sharply above a threshold voltage. The project is applicative. It will consist in taking in hand a 3 roll mill allowing to disperse ceramic charges in a matrix (You will be assisted by technical staff).

Results :

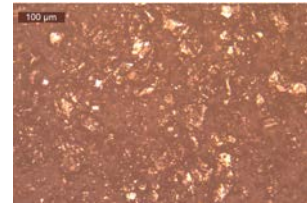
We obtained an efficient grinding with the three roll mill allowing a better dispersion of the fillers in the matrix. On the other hand we could not study the impact on the electrical properties due to lack of time.

Keywords :

three roll mill, composite, graphite



unmilled suspension



suspension after five passes through the TRM

Contact(s) : pierre.ortholand@etu.umontpellier.fr



First steps towards optofluidic microsensors for the detection of microplastics in water



Janèle
PAINDEPICE

First steps towards optofluidic microsensors for the detection of microplastics in water

Janèle PAINDEPICE *MAT*

Academic Supervisor : VIGREUX Caroline



INSTITUT
D'ÉLECTRONIQUE
ET DES SYSTÈMES

Objective / Motivation :

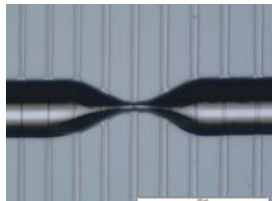
We are interested in systems combining integrated optics based on planar chalcogenide waveguides and microfluidics. The realisation of such systems requires the deposition of an interface layer to ensure the bonding of the microfluidic system (PDMS) to the integrated optical chip. The objective of this project will be to fabricate waveguides by depositing Ge-Se-Te chalcogenide thin films, lithography and etching, to study their covering by a thin interface layer (SiO₂ or Si₃N₄), and then to test the bonding of a PDMS microfluidic circuit.

Results :

After developing the components, we carried out bonding tests. Subsequently, we proposed solutions to improve the bonding between the two systems.

Keywords :

Waveguides, chalcogenide layer deposition, microfluidic system, bonding



Optical photo - Bonding test

Contact(s) : janele.paindepice@etu.umontpellier.fr



Life Cycle Assessment of a bus shelter

Professionalization contract within JCDecaux



Adhémar
PERRIER

Adhémar PERRIER *MAT*

Academic Supervisor : Gilles Silly



Objective / Motivation :

The objective of this project was to perform a life cycle analysis on a bus shelter proposed in the JCDecaux catalog. This life cycle analysis allows to calculate the impacts of the bus shelter on its entire life cycle thanks to different indicators. It also makes it possible to calculate the distribution of impacts over the different phases of the bus shelter's life cycle and to identify the sub-assemblies of the bus shelter that have the greatest impact.

Results :

The results of this project are confidential and cannot be disclosed.

Keywords :

Life cycle assessment, Bus shelter, Outdoor advertising



Bus shelter Altos

Contact(s) : adhemar.perrier@etu.umontpellier.fr



Rheology of deflocculating agents for refractory slurries



Marius
PETIT

influence of dispersant concentration on viscosity

Marius PETIT *MAT*

Academic Supervisor : Nicole Frety



Objective / Motivation :

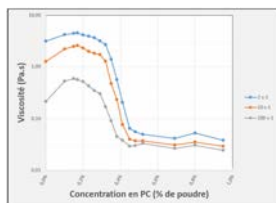
The objective is to determine for three different plasticizers the optimal concentration that minimises the viscosity of the slurry. This will make it easier to work with the slurry before casting. The study was performed using a rheometer associated with a 27mm diameter Couette geometry.

Results :

At the lowest plasticizer concentration, the viscosity of the mixture is too high for an efficient casting. However the study showed that there is a threshold concentration for each family of dispersants at which the viscosity drops by two orders of magnitude.

Keywords :

Rheology, refractory slurry, plasticizer, viscosity



Evolution of the viscosity of the slip as a function of the concentration of the polycarboxylate plasticizer

Contact(s) : marius.petit@etu.umontpellier.fr



Dielectric elastomers for articulated finger design

Fabrication and characterization of elastomers for the design of a dielectric actuator



Loris
POLLET-VILLARD

Lorris POLLET-VILLARD *MAT*

Academic Supervisor : LAPINTE Vincent



Objective / Motivation :

Current assistive devices for people with partial loss of finger mobility use cumbersome actuators (hydraulic or electrical) that reduce their performance. The use of dielectric elastomeric materials (DEM) as actuators for the system would be the solution to this issue. DEMs must be very elastic to be used as actuators. This study focuses on their fabrication and characterization for the design of an articulated finger.

Results :

Three categories of elastomers are studied: TPE, Acrylic and Silicone to determine the most elastic and the less viscous. Following mechanical tests of traction and relaxation, silicones and acrylics seem to be the most adapted materials in the design of actuator with a modulus of elasticity of the order of the ten kPa. As these elastomers tear easily, there is still some research to be done on the design of the actuator

Keywords :

elastomers / silicone / elasticity / mechanical proprieties / viscoelasticity / articulated finger



Articulated finger with its cylindrical dielectric actuator

Contact(s) : lorris.pollet-villard@etu.umontpellier.fr



Eco-design of packaging at Sanofi.

Implementation of Sanofi's "ecodesign" policy in the packaging workshop.



Elisa
VALDERRAMA

Elisa VALDERRAMA *MAT*

Academic Supervisor : [Vigreux Caroline](#)



sanofi

Objective / Motivation :

Implementation of Sanofi's "Ecodesign" policy in the packaging workshop. Contacting suppliers to collect the necessary information and analyze the data with a specific tool. Reduce the environmental impact of the different packaging.

Results :

Project not yet started. Discovery of the software.

Keywords :

Ecodesign, Packaging, environment, life cycle analysis



Analysis of the life cycle of a product

Contact(s) : elisa.valderrama@etu.umontpellier.fr



professionalisation contract : my missions

improve the sorting of plastics and study consumption of multi-energy station



**Baptiste
VEYRE**

Baptiste VEYRE *MAT*

Academic Supervisor : GUERRERO Gilles



Objective / Motivation :

Firstly, I have to understand the plastic sorting already in place and improve it to offer a better sorting to customers who want an ISO certification or bring new solutions. Secondly, I have to study the cost of energy consumption of the station in order to fix the resale cost of energy and to renew the supply contracts. This work could be extended to all the company's sites.

Results :

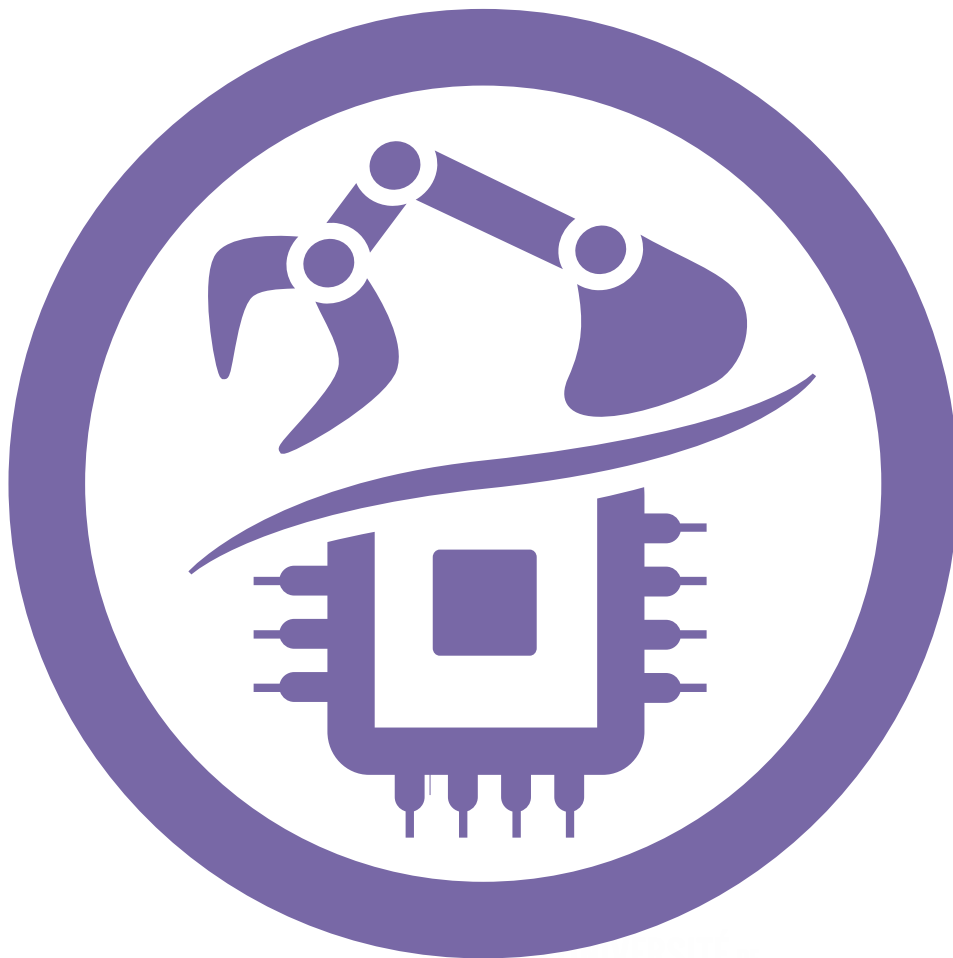
On plastics, I finished understanding how plastics were currently handled by the company. I also attended a first visit to a customer to identify the plastics they generate. The next step of assessing the quantities is underway. On energy, I entered all consumption information going back to 2018 for some important sites. The analysis phase is starting and is now turning to gas.

Keywords :

plastics, energy, hydrogen, consumption, sorting, waste, recycling, recovery,

Contact(s) : baptiste.veyre@etu.umontpellier.fr





PROJET CONDAMINE

Dispositif autonome de mesures de Température et l'humidité
aériens et souterrains



Radouane
22016577

Radouane 22016577 MEA

Academic Supervisor : Fabien SOULIER



Objective / Motivation :

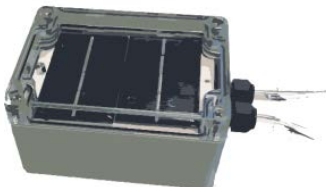
Le problème d'érosion est un enjeu majeur. L'accentuation des phénomènes climatiques ne cesse de faire monter les eaux, aggravant ainsi les dommages provoqués sur les côtes. Dans le but de quantifier cette érosion, l'aéroport souhaite s'équiper d'un dispositif permettant de calculer le taux d'humidité et la température aérien et souterrains.

Results :

Après avoir faire une étude générale de la communication LoRa et mes différents capteurs choisie, j'ai réussi à Configurer mes capteurs et détecter les valeurs de la température et l'humidité que ca soit dans le sol ou bien dans l'air, Mais j'ai pas réussi la communication et le stockage des données.

Keywords :

LoRa, Communication, Température, Humidité, érosion, capteurs, structure, One-wire, LoRaWan.



Prototype finale de projet

Contact(s) : radouane.choukeir@etu.umontpellier.fr



Aquatic light field profiler with high vertical resolution



Resumption of a 2020-2021 project

Tifaine
DELTEIL

Tifaine DELTEIL MEA

Academic Supervisor : Laurent Latorre



Objective / Motivation :

At first I had three main parts of work : an electronic one, a software and a mechanical one. The main objective is the addition of two sensors of total light radiation (PAR: photosynthetically active radiation) placed on the upper and lower caps. The measurement is done via a «visible» photodiode (BPW21), with optical high-pass/low-pass system to precisely select the 400-800 nm range. Then there is code optimization with addition of the new sensor Finally, the realization of a new 3D model

Results :

For my results, I made the photodiode assembly and encode the transformation into lux that I later compared to the luxmeter of building 14. Then, I programmed the new prototype that will probably have to be made during a next PFE as well as the Python code.

Keywords :

FreeRTOS Embedded system Biodiversity 3D modeling



Final device



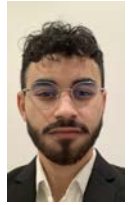
Photodiode assembly

Contact(s) : tifaine.delteil@etu.umontpellier.fr



VR FOE

De la VR accessible a tous



Adnane
DINAR

Adnane DINAR *MEA*

Academic Supervisor : Philippe Fraisse



Objective / Motivation :

L'objectif est entrepreneurial, donc il faudra avoir une proposition de valeur bien définie. Je veux rendre accessible ce monde de la VR à toutes personnes possédant le matériel le plus élémentaire tel qu'un ordinateur et un téléphone portable. La technologie consiste à combiner des algorithmes de traitements d'images pour détecter et isoler les mains du joueur et avec un traitement des valeurs et une configuration préalable par le joueur de la taille et forme de ses mains puis une intégration dans un moteur de jeu. (Unity)

Results :

J'ai actuellement de bon résultats avec une détection efficace et une intégration dans un moteur de jeux et une application fonctionnelle permettant la VR grâce au téléphone portable.

Keywords :

VR, OpenCV, Handtracking, Unity, Game



Démonstration de l'intégration de la main dans le moteur de jeu

Contact(s) : adnane.dinar@etu.umontpellier.fr



Development of an NFC reader with coil antenna for AIMD



Neurinnov

Timothée
DUPONCHEL

Timothée DUPONCHEL MEA

Academic Supervisor : Vena Arnaud / Béchet Matthieu



Objective / Motivation :

The objective is the development of a NFC reader with coil antenna for AIMD (Active implantable medical devices). For now, prototypes of the reader are existing with printed antennas but we noticed a lack of power. My goal for this project is to determine the interests (or not) of a coil antenna instead of the current planar antenna.

Results :

First, I drafted a state-of-the-art report on the subject in order to get some initial answers on the problem. Then, I performed tests on different antennas to compare the results and modeled and did simulations on CST Studio to get additional results. For now, these tests are rather in favor of the planar antenna, however there are still some research to do for coil antennas.

Keywords :

NFC, RFID, AIMD, antenna, coil, ferrite, radio frequency, electromagnetism, magnetic field, CST Studio, printed antenna



Picture of a coil antenna test experiment

Contact(s) : timothee.duponchel@live.com



Robotization of the manufacturing of DV70 type container

Robotization

Anne-Laure GERUS *MEA*

Academic Supervisor : Facerias Michel



Objective / Motivation :

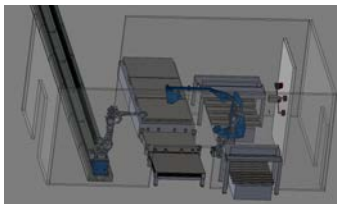
The objective of this feasibility study is to evaluate the opportunity of robotizing the manufacturing of DV70 type metal containers. I propose a first implementation which is located at the beginning of the production line, a strategic place since this stage involves many handling operations. If the base of the container is well done, the container will be as well.

Results :

This study includes the choice of robots and peripheral equipment (conveyors, tool changer, protective enclosure...), their implementation in compliance with applicable standards, the 3D representation of the whole, contacts with the technical-commercial representatives of the suppliers, relations with the customer, the costing of the entire project, the calculation of the return on investment, and also the presentation of the results to our customer. The presentation of this project to the customer went well and he is very interested.

Keywords :

Robotization / Performance / Safety / Quality



Robotics implantation

Contact(s) : anne-laure.gerus@etu.umontpellier.fr



Side Channels Robustness Evaluation

Impact of the PVT corners on the robustness of integrated circuits



Mathias
GUERY

Mathias GUERY *MEA*

Academic Supervisor : GALLIERE Jean-Marc



Objective / Motivation :

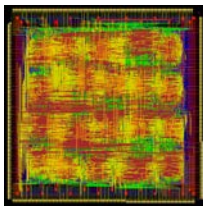
The goal of the project is to study the impact of the PVT (process, voltage, temperature) corners on the robustness of integrated circuits. The first step was to design an AES on the Cadence suite, then to attack it using side channels attack.

Results :

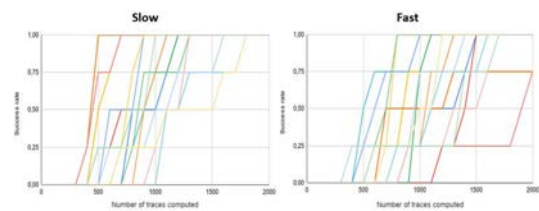
Results seem to show that corners do have an impact on the robustness. If the circuit is quicker, it is also more robust. However, more experiments need to be performed to confirm this hypothesis.

Keywords :

Integrated circuits design, AES, cryptography, side channel attack



Layout of an AES



Success rate on 4 attacks

Contact(s) : mathias.guery@etu.umontpellier.fr



FPGA In The Loop



Camille
HERRMANN

Design of the generic benchmark through Avalon Interface in the
FPGA in the Loop

Camille HERRMANN MEA

Academic Supervisor : BENOIT Pascal



Objective / Motivation :

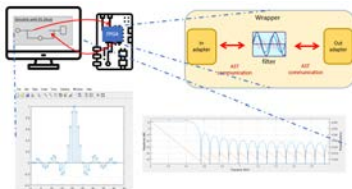
A major goal is to create a generic benchmark around the Avalon Streaming (AST) interface, an internal communication protocol. The benchmark takes the IP to be tested as a component so that many IPs could be tested without having to design new tests. The MathWorks tool "FPGA in the loop" (FIL) represents a solution to mix software environment test simulation and IP prototyping (on hardware) . FIL allows to use a large range of libraries or mathematics tools through MATLAB features therefore to work on applicative test, in real time.

Results :

At the end of the project I have functional benchmark to welcome an IP with AST I/O. The benchmark is a schematic on MATLAB Simulink that communicate in real time with the board and so test and validate it. In Quartus I could have look at the internal signals of AST and on MATLAB look at the outputs. The addition of a filter is one example of the interest to use Simulink graphical tool notably for signal processing. I send a Dirac using an existing block and can store or draw response.

Keywords :

FPGA - validations -Test - FPGA In The Loop - MATLAB

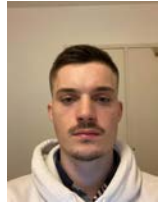


Schematic of the benchmark and its results on a filter example

Contact(s) : camille.herrmann@etu.umontpellier.fr



Monitoring of wine fermentation by impedance measurement



Seven
LEMONNIER

Impedance measurements

Seven LEMONNIER *MEA*

Academic Supervisor : Mariane Comte, Fabien Soulier



Objective / Motivation :

A wine fermentation has to be precisely monitored. According to an article [1] it might be possible to monitor it thanks to impedance measurements. The main objective is to design a system which is able to monitor several alcoholic fermentation at the same time and in real time by using 4-point electrodes and depending on the frequency. [1] Rocio Muñiz V., Carlos C., Luis Miguel C., Raul Crespo M. (2009), Impedance spectrometry for monitoring alcoholic fermentation kinetics under wine-making industrial conditions, XIX IMEKO World Congress.

Results :

Three systems including probes that fit to experimental fermentors and impedance measurement units were designed and characterized. The python code was modified to use several probes in same time. A human-machine interface was developed in Python. A sensitivity analysis to the main environmental factors (sugar, nitrogen and alcohol levels, temperature) was conducted and two series of fermentation were monitored.

Keywords :

Alcoholic fermentation, 4-point electrodes, Human-Machine Interface, STM32, python, Sensor, Impedance, Analysis, Characterization.



Monitoring of three fermentations at the same time with our systems.

Contact(s) : seven.lemonnier@etu.umontpellier.fr mariane.comte@umontpellier.fr fabien.soulier@umontpellier.fr



Cavity Simulator

real-time hardware based emulator



Rafael
BASSO

Rafael BASSO MEA

Academic Supervisor : Comte Mariane



Objective / Motivation :

The main goal of the project is the development of an emulator of resonance cavities for beam acceleration. The emulator should be in a form of stand-alone electronic box which can be connected to a Low Level Radio Frequency (LLRF) system for laboratory tests. Such platform should allow continuous studies of control algorithms and firmware/software of the LLRF systems without disturbing the real cavity operation. Such a platform would also be used for training of on-call duty staff without risk.

Results :

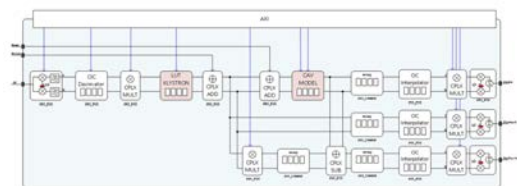
Design of a cavity model in Python, taking into account both floating point and fixed point formats, then using these models for bit-accurate verification over the VHDL design. Create two intellectual properties (IPs): a cavity simulator and an FMC231 interface. The FMC231 interface is responsible for all communication with the FMC (FPGA Mezzanine Card), which contains high-performance ADCs and DACs (up to 1 Gsps).

Keywords :

FPGA, VHDL, particle accelerators, radiofrequency, cavity and simulator



Target hardware



Cavity simulator IP block diagram

Contact(s) : rafael.ogliari-basso@etu.umontpellier.fr



Development of a mock-up to evaluate the usability of a medical device



Imane
RAFI

Microelectronics and Automation

Imane RAFI *MEA* Alexandre JOLY *MEA*

Academic Supervisor : MIRABEL François / ANDREU David



Alexandre
JOLY



Objective / Motivation :

In order to commercialise a medical device HandyGrasp in Europe, the CE certification and the respect of the MDR 2017/745 is mandatory. It includes standards like the IEC 62366-1 that concerns the usability of the device, or the ISO14971 for risks management. Before carrying out final tests in order to obtain the CE certification, it is necessary to carry out preliminary tests. These preliminary tests consist of the simulation of different situations that the user could face during the utilisation of the device, such as low battery, lost

Results :

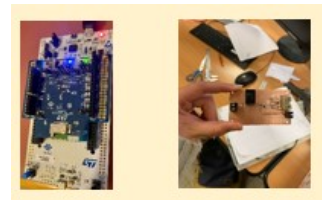
We have developed prototypes of electronic hardware part of the mock-up, and wrote some codes in order to test them

Keywords :

Neurinnov, medical device, mock-up, embedded system



Hardware prototype electronic boards



Contact(s) : imane.rafi@etu.umontpellier.fr alexandre.joly@etu.umontpellier.fr



Canne avertisseuse d'eau



Sébastien Tajan

Microelectronics and Automation



INRAE

Academic supervisors: Fabien Soulier/Laurent Latorre

MEAPolytech Montpellier / INRAE

Objective/Motivation:

The most consumptive irrigation technique in agriculture is the so-called "plank irrigation", which consists of running a thin layer of water over sloping ground. In concrete terms, the irrigator opens a valve that will gradually flood the plot and closes it several hours later when the water has reached the downstream part of the plot. The purpose of the water sensor is to communicate to the waterman when to close the valve (either manually or automatically) and thus make substantial water savings.

Results:

A working prototype equipped with an accelerometer, a water sensor and capable of LoRa communication has been designed. It is battery powered and has a life span of a few months. It is therefore able to detect a fall of the rod and to detect water when it arrives at the end of the plot. Then it sends this information on the LoRa network.

Keywords: Embedded system, LoRa communication, Low power, Water sensor, Fall sensor



Final Prototype

Contact : sebastien.tajan@etu.umontpellier.fr ; Fabien.Soulier@lirmm.fr ; Laurent.Latorre@lirmm.fr



Measurements of displacement of nacra17 sail slats



Vincent
BARRAS

Characterization of the mechanical behaviour of nacra17 sail slats

Vincent BARRAS *MI*

Academic Supervisor : DARIDON Loïc



Objective / Motivation :

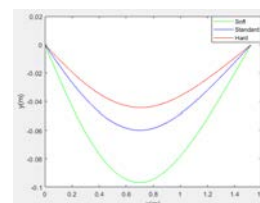
The Nacra 17 is an Olympic series and as a result, all boats are equipped with the same equipment. High-level sports are synonymous with performance. Performance is determined by the athlete himself, the equipment the athlete uses, and how he uses it. The settings and adjustments of the sail battens are crucial for sailing performance. There are three types of sail battens: soft, standard and hard. This study shows how to test these battens to compare them and observe aging. It may help athletes to choose the right batten for different weather

Results :

The mechanical properties of the batten are unknown. The geometry of the batten is special because it is a beam with a non-constant section. The material's resistance provides the expression of the deformed batten, as well as the Young's modulus. These two data make comparing each batten very easy. Two numerical simulations (2D and 3D) confirmed the previous results. This test gives the Young's modulus, the shape of the deformed batten, the position of the maximum displacement and its location.

Keywords :

RDM, nacra17, sail slat, three-points bending test, numerical simulation

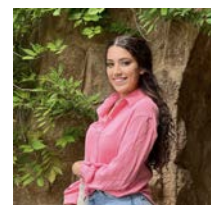


Graphs of the deformed soft, standard and hard slats n°4 for a three-points bending test.

Contact(s) : vincent.barras@etu.umontpellier.fr



In charge of Process improvement and optimization



Professionalization Contract

Nohila
BELKOURCHIA

Nohila BELKOURCHIA *MI*

Academic Supervisor : Franck NICLOUD



sanofi

Objective / Motivation :

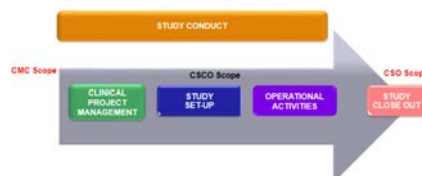
My objective was to develop an interactive map that would enhance the representation of the Clinical Supply Chain Operations (CSCO) department's activities and its interactions with other departments within R&D, as well as the key information related to these processes, such as quality documents, training programs, and involved profiles. The Clinical Supply Chain Operations (CSCO) department is responsible for ensuring the proper packaging and delivery of experimental medications to patients participating in clinical trials.

Results :

So far, I have managed to create draft versions of the Mapping, which will enable me to finalize the structure of the final tool in the future.

Keywords :

-Pharmaceutical, Clinical trials, Supply chain, Processes, Quality documents, Quality, Project Management, Process improvement, Process mapping



Macro Process of CSCO (slide of the Draft Map)

Contact(s) : nohila.belkourchia@etu.umontpellier.fr



Thermal study of hives

Instrumentation and modelling of the climate inside beehives



Léo
FALQUET

Léo FALQUET *MI*

Academic Supervisor : Jullien Dephine / Ruffio Emmanuel



Objective / Motivation :

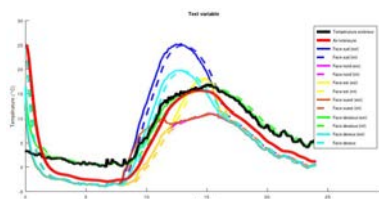
This project compares a digital simulation tool (implemented by the student) with data measured by different sensors concerning the climate in a hive. The first difficulty is to take account in the code all the elements that can influence the temperature. Then a set of sensors has to be placed in the right place and in the right way to correctly measure all the data needed for the comparison.

Results :

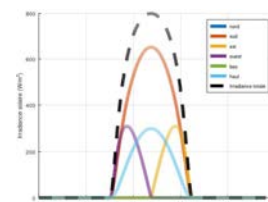
The numerical simulations show that the hive temperature varies a lot during a day. This temperature depends on the external temperature, the solar radiation, or the geometrical and material characteristics of the hive. The second part was the experimental measurements made with sensors. These measurements are slightly different from the numerical model, but show broadly the same trends, which will allow a parametric analysis.

Keywords :

Hives, Temperature, Thermal transfert



Temperatures at different locations in the hive during one day
(numerical simulation)



Solar radiation

Contact(s) : leo.falquet@etu.umontpellier.fr



Putting into Operation of a tensile test bench for pulling out test



Thomas
GERIER

Contrat de professionnalisation

Thomas GERIER *MI*

Academic Supervisor : Marchal Aurélie



Objective / Motivation :

In order to carry out NF quality controls in pulling out test of ISOTECH accessories, a test bench was necessary in the laboratory of the company. The objective was to put an existing bench back into operation and to adapt its use to comply with the protocol of the NF standard.

Results :

The bench is operational, calibrated and tested in controlled laboratory conditions (part whose result is already known). No real-life testing has been done yet.

Keywords :

Mechanics, Research, mechanical designing, quality control



State of the art



First pull out test on the bench

Contact(s) : thomas.gerier@etu.umontpellier.fr



Characterisation of transverse cracks in 3-dimensions



Silas
HUGUENIN

image analysis of 2D/3D connexity

Silas HUGUENIN *MI*

Academic Supervisor : Monerie Yann



Objective / Motivation :

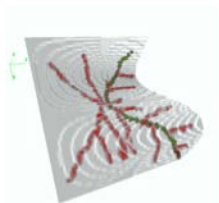
In application to nuclear reactor containments, the objective is to develop a post-processing method to calculate the number of crack disconnections. This work is part of a crack percolation analysis approach. The knowledge of the number of branches composing the crack is an essential data for the use of percolation algorithms. This method tends to identify the number of branches that composed the crack path.

Results :

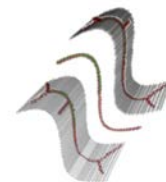
In the examples, the crack is shown in grey, its skeleton in red and the longest of the shortest paths in green. The analysis shows that in the first case, the crack is in one piece, while in the second case it is in three pieces. Further work would be to answer the question : are some of these paths through?

Keywords :

nuclear civil engineering ; mathematical morphology ; image processing ; concrete analysis



3D representation of a crack generated by the function $f(x, y) = \sin(y)*x$, with her skeleton (in red) and the longest shortest path (in green)(en vert)



3D representation of a crack generated by the function $f(x, y) = \sin(y)+\text{sign}(x-0.5)$, with her skeleton (in red) and the longest shortest path (in green)

Contact(s) : silas.huguenin@etu.umontpellier.fr



Design and realization of a test bench for the characterization of complex structures



Louis
JALLIER

Model-experiment registration by image stereo correlation

Louis JALLIER *MI*

Academic Supervisor : WATTRISSE Bertrand



Objective / Motivation :

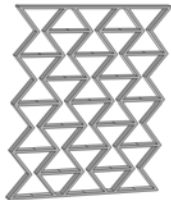
The objective of this project is the implementation of a practical work addressed to the final year students of the mechanical and interactive design department illustrating the course of solid mechanics in large deformations. The aim is to allow the students to study a metamaterial through a model-experimental registration in order to observe the effects of the non-linearity of the equations in large deformations and to acquire knowledge on the image registration and metamaterials.

Results :

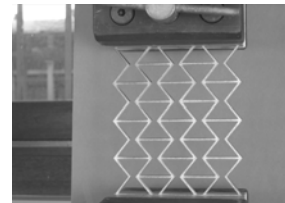
The numerical model developed to represent the 1D tensile test performed on the complex 3D printed structure shows results consistent with the experiment. This model could be recalibrated more precisely thanks to improvements such as the implementation of an optimization algorithm of the material parameters allowing to find the couple of material parameters the most adapted to the experiment.

Keywords :

Metamaterials - Numerical simulation - 3D printing - Stereo image calibration - Tensile test



Auxetic structure



Auxetic structure subjected to a tensile test and captured by the acquisition system of the stereovision bench

Contact(s) : louis.jallier@etu.umontpellier.fr



Instrumentation of a visualization wind tunnel

Study conducted on the wind tunnel of the Department of Mechanics of the University of Montpellier



Maxime
JUNG-DUPOUX

Maxime JUNG-DUPOUX *MI*

Academic Supervisor : Julien LAGET / Franck NICLOUD



Objective / Motivation :

The department of mechanics of the University of Montpellier has acquired an industrial wind tunnel in order to carry out practical work to visualize and study the air flows around different shapes. However, this wind tunnel does not have a device allowing to quantify the airflow inside the test section. The objective of this project is to design a system to measure the velocity inside an industrial wind tunnel. Thus, the system will allow to study the boundary layers and wakes around the profiles already used for visualization purposes.

Results :

After analysis, a Pitot tube equipped with proper pressure sensors has been selected to measure the velocity within the wind tunnel. To guide the Pitot tube in the test section, a direct prismatic type contact guidance system using a sliding plate is used. A manual translation system of screw/nut type is used to translate the Pitot tube. All the pieces have been designed and manufactured during the project, and preliminary measurements have been performed to establish the operability of the whole system.

Keywords :

Wind tunnel, Pitot tube, air flow, flow visualisation, fluid mechanics, translating system, conception, mechanics, CAD, pressure, speed



System design



System mounted on the wind tunnel

Contact(s) : maxime.jung-dupoux@etu.umontpellier.fr julien.laget@umontpellier.fr



Comportement dynamique de structures creuses remplies de matériaux granulaires



Réponse vibratoire

Bryan
KAMGA NONO

Bryan KAMGA NONO *MI*

Academic Supervisor : Renouf Mathieu / Le Goff William



Objective / Motivation :

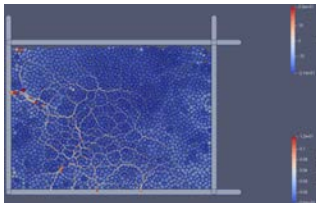
The vibration behaviour of hollow structures is of great importance in many sectors of industry (aeronautics, naval,...). Filling these structures with a lower density material can change their oscillatory behaviour. Granular materials are of great interest for this type of system because their multi-contact nature ensures a highly dissipative behaviour. The aim of this study is to contribute to the understanding of this behaviour by studying the effect of the grain shape on the dynamic response of the structure.

Results :

The results obtained remain quantitatively and qualitatively debatable, as the simulations must be repeated several times in order to obtain better statistics. Nevertheless, we have observed, among other things, that with the same number of particles between two boxes, the damping is a priori more important in the box with the greater filling rate and that the more the amplitude of the excitation increases, the more the evolution of the force as a function of time moves away from the shape of the solicitation.

Keywords :

Particle damper, Dissipated energy, Filling rate, Granular materials, Discrete Element Method (DEM), Kinetic energy, Hysteresis, Vibration, Contacts, Friction.



Vibrated sample with tangential contacts



Evolution of the kinetic energy as a function of time and particle shape after 40 periods

Contact(s) : bryan.kamga-nono@etu.umontpellier.fr



Numerical simulation of the dynamics of red blood cells (RBCs)



Asma
MACHHOURI

Partnership: HORIBA Medical

Asma MACHHOURI *MI*

Academic Supervisor : Nicoud Franck



Objective / Motivation :

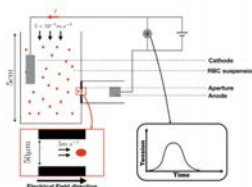
The number and volume of the RBCs can be indicative of disease. They can be determined when they pass through the sensing zone of a cytometer and generate an electrical pulse whose amplitude is related to their volume. Some pulses are distorted by RBCs flowing near the walls of the aperture or by the presence of RBC doublets in the aperture. This project allowed to have the probability of a RBC circulating near the walls and the probability of obtaining an RBC doublet in the aperture.

Results :

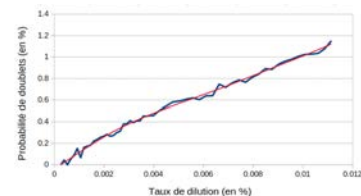
The probability of a RBC circulating at 9 micrometers or less from the aperture walls was estimated in different ways and was found to be of order 41%, although some inconsistencies between the methods remain to be understood. The evolution of doublet probability with respect to the blood sample dilution was also assessed. These results could be used in the future to reduce the duration of the blood testing while accepting a predefined doublet probability.

Keywords :

Red blood cells, aperture, doublet, probability



Functioning of the cytometer used to count the number of red blood cells and to measure their volume



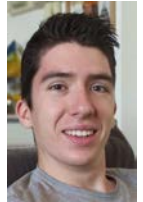
Evolution of doublet probability with respect to the blood sample dilution

Contact(s) : asma.machhoury@etu.umontpellier.fr franck.nicoud@umontpellier.fr



Mechanical optimization of a zither modulator

Size and cost reduction of a zither modulator



Hugo
MÉNARD

Hugo MénARD *MI*

Academic Supervisor : DUHAMEL Yvan



Objective / Motivation :

A zither is a plucked musical instrument. It is possible to modify the sound of certain strings by changing the tension and vibrating length of the strings in order to play a minor or major chord. The company Zither has created a modulator that does not change the vibrating length but only the tension of the string. The goal of this project is to optimize this system by reducing its size, making it easier to adjust, and reducing production costs.

Results :

The new system created keeps the principle of eccentric wheel from the Zither's modulator. The tension of the string is modified by the wheel that pushes it. The precise adjustment of the tension while the wheel pushes the string is done by a screw and pivot. The new modulator has less pieces. The wheel is made of POM (Delrin) material and the other parts of Aluminium FORTAL® and can be machined with a milling machine.

Keywords :

mechanical, CAD, MI, Zither, design



Modulator system created by Zither company



New modulator system designed

Contact(s) : hugo.menard@etu.umontpellier.fr



Qualification of ventilation grilles.

Efficiencing of a ventilation grille on an air flow by numerical simulation.



Alban
NICOLAS

Alban NICOLAS *MI*

Academic Supervisor : Yann MONERIE



Objective / Motivation :

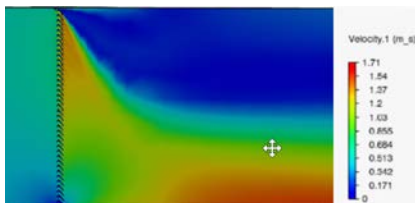
Set up a qualification procedure for ventilation grilles by fluid simulation. The objective is to collect characteristics such as the relationship that governs the pressure loss induced by the grille as a function of the speed of the air passing through it. The purpose is to use a component in the simulations that mimics the behavior of grids with low as possible computation time.

Results :

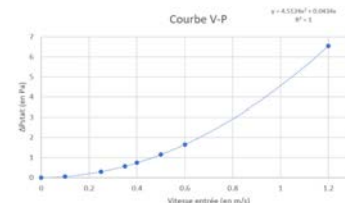
The convenient wind tunnel conditions have been determined, The component has been created and tested under the same wind tunnel conditions and gives the expected results. It remains to determine the reliability of the component in a more complex situation, ie as part of a ventilation system in the context of thermal heating.

Keywords :

Simulation, thermal, fluidic, finite volumes, ventilation grilles, wind tunnel.



Velocity field of a grid in a wind tunnel configuration.



Pressure/velocity jump curve measured in a simulated wind tunnel.

Contact(s) : alban.nicolas@etu.umontpellier.fr



Design of a mobile electrode mechanism to extract ions from an aqueous solution



Alexis
ROGER

In partnership with the IEM

Alexis ROGER *MI*

Academic Supervisor : Yvan DUHAMEL / André CHRYSOCHOOS



Objective / Motivation :

Capacitive deionization is a method of water desalination using a pair of porous carbon electrodes placed under voltage. However, a desorption phase is necessary to desaturate the electrodes, which requires dismantling the system. A new configuration is therefore proposed, in which the electrodes are mobile and move between two tanks of water for adsorption and desorption. At the end of the operation, a part of the spent energy is recovered.

Results :

The system chosen is a motorized chain and sprocket mechanism, where the electrodes are attached to certain links of the chain and dip alternately in the solutions. The design is made on SolidWorks and the parts are 3D printed or manufactured from ordered materials. After some tests and corrections, most of the system is functional and meets expectations, but some parts must be remanufactured and integrated to correct the last problems.

Keywords :

Mechanical design, CAD, Manufacturing



CAD Model



Assembled real system

Contact(s) : alexis.roger@etu.umontpellier.fr



contrat pro

4CAD PLM

**Quentin
RONJON****Quentin RONJON** *MI*

Academic Supervisor : Aurelie Marchal

**Objective / Motivation :**

Participer à la création de supports de formation et former les clients à l'utilisation d'outil (creo)

Results :

Contrat pro en cours

Keywords :

Contrat pro

*Drone 4CAD***Contact(s) :** quentin.ronjon@etu.umontpellier.fr

work-study program : work as a calculation engineer



ROUGE Pauline

Mechanical Engineering and Interactive Design

Pauline ROUGE

SIGEDI



Academic supervisors: Y. MONERIE

SIGEDI (ALBATROS Group)

Objective/Motivation:

My End of Study Project (PFE) carried out during a work-study program which started on September, 2022 in the SIGEDI company in Marseille. The objective of this work-study program is to participate in the activity of the company by integrating me in practical projects. The SIGEDI company is working on designing pipe for the french nuclear plants.

Results:

I was given the opportunity to work as a calculation engineer on a concret project : the designing of a short piping line on a nuclear power plant. This first experience as a mechanical engineer in a design office is a good first application of what was learned in school.

Keywords: calculation/engineer/nuclear/pipe



Contact : pauline.rouge@etu.umontpellier.fr



Sizing of a ventilation network of glove boxes

Graduation project



Tristan
ARNAUD

Tristan ARNAUD *MSI*

Academic Supervisor : Andrea PIARRISTEGUY



Objective / Motivation :

This project aims to dimensioned a network of ventilation of glove boxes. Its function is to ensure a dynamic confinement for different glove boxes and airlocks with a certain rate of renewal in nominals and rescued conditions.

Results :

The glove box ventilation network has been sized to meet the customer's expectations, which are implementation constraints but especially loss of loads. These limit load losses were met for all operating conditions and the final network dimensions were validated. The project is therefore awaiting drawing for manufacturing.

Keywords :

Ventilation, glove box, calculations, sizing, pressure drop, aerolic, network, mechanical, fluid, gaz



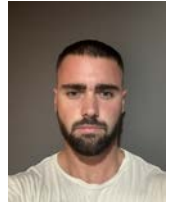
Ventilation network

Contact(s) : tristan.arnaud@etu.umontpellier.fr



Marckolsheim - DN100 gas line substation

Presentation of the management of a DN100 gas substation project
for our customer GRT GAZ



Arthur
BARDY

Arthur BARDY *MSI*

Academic Supervisor : Cervellin Denis



Objective / Motivation :

The aim of this project was to build a gas substation from A to Z for the customer GRT Gaz. During the course of this project, I produced numerous technical documents and met with all the departments involved in the project. My missions were diverse and varied, from drawing up calculation notes and welding specifications, to monitoring supplies and budgets, as well as site supervision.

Results :

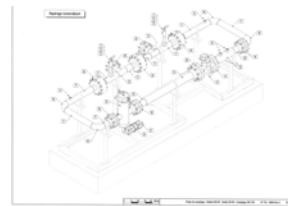
This project enabled me to diversify my skills in areas that are different from project management, control, quality, HSE, etc... But it also enabled me to understand the issues at stake and the various problems that can arise in the smooth running of a project due to unforeseen circumstances. As a result, I've gained in autonomy, practical skills and anticipation in my task management.

Keywords :

Gaz / pipeline / welding book / project manager / standards / GRT GAZ



Marckolsheim - DN100 gas line substation



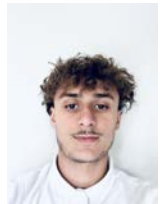
Pre-study plan before the start of the project

Contact(s) : arthur.bardy@gmail.com



Production management

Transport & storage casks for nuclear waste



Yohan
BONNEFILLE

Yohan BONNEFILLE *MSI*

Academic Supervisor : MURACCIOLE Jean-michel



Objective / Motivation :

ROBATEL Industrie's field of activity means that projects are developed over several years. My project is illustrated by the production's managing of one of them, and by taking on amount of responsibility over time. Initially, I was just an assistant, but the aim was gradually to take ownership of the project, gain autonomy and responsibility by independently managing the production of several sub-assemblies and eventually the entire project.

Results :

My assumption of responsibility was done gradually, in several phases. Document management allowed me to take ownership of the project, and its technical specificities. Gradually, I exercised the role of technical support in the daily management of hazards. I was then entrusted with the production management of different sub-assemblies, this involves team management, management of equipment, supplies and subcontractors. I was thus able to exploit my technical and human skills.

Keywords :

Nuclear, Production, Technical skills, Management skills, Quality, Objective, Deadlines, Manufacturing procedure, Welding book, Welding follow-up book, Hazard, Workload plan, Supply, Resources, Material, Subcontractor, Meeting



Emballement type B "R85"

Contact(s) : yohan.bonnefille@etu.umontpellier.fr



Study, design and supervision of a project consisting of a residential building and an industrial building



Charly
CLUCHIER

Presentation of the management of a construction project and its engineering phase, including two steel structures, roofing and cladding.

Charly CLUCHIER *MSI*

Academic Supervisor : Cervellin Denis



Objective / Motivation :

My final-year project involves the follow-up of a project we're currently working on. It involves two buildings. The first is industrial and will be used by the customer for his professional activity. The second building is for his home. I was involved in this project from the outset, handling the pre-study (preliminary design phase), purchasing management, information transmission, manufacturing and installation. I decided to concentrate on the residential building in my memoir, as this is the one with the most subtleties.

Results :

The aim is to design, make and install these two buildings. We're responsible for the structural steelwork, roofing, and cladding. Our intervention will enable the trades working inside the buildings to intervene afterwards. This type of service is at the heart of our business, so the aim is, as always, the same: to deliver quality work, free from imperfections, while guaranteeing our customer the lowest possible costs. This is made possible by the engineering phase. The project is currently in the manufacturing phase.

Keywords :

- Structure - Roofing - Cladding - Flooring - Business management - Team management - Cost management - Structural sizing - Calculation note - Load distribution - Eurocodes - Strength calculation - Structural instabilities - Spill-over - Warping



Architectural view - Assembly phase



Architectural view - Finished construction

Contact(s) : charly.cluchier@etu.umontpellier.fr



Monitoring of subcontractors

Monitoring and management of subcontractors, insulators and painters, on a pipe site



Robin
COSTE

Robin COSTE *MSI*

Academic Supervisor : PAPT Philippe



MSI

FOSELEV AGINTIS



Objective / Motivation :

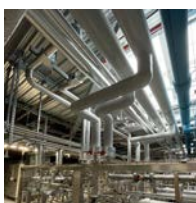
The objective of my final project is to monitor and manage three subcontracting companies that we have on site. The lot obtained by my company FOSELEV Agintis on the LFB site is a "general utility, industrial pipeline" project at a cost of €7 million. Within this, the financial envelope for the insulation and painting subcontractor is 650 k€. There is a little more than 5 kilometers of piping insulation and 1.3 kilometers of piping to be painted. These are subcontracting operations that I will have to monitor and manage.

Results :

The results of this project are in fact very satisfactory, both humanly and professionally. Despite the difficulties encountered, we managed to complete the painting and insulation operations with the exception of a few remaining reservations. However, there are no major or significant issues that could lead to additional costs. On a personal level, I learned a lot, because I had to get involved in the management to link the technical, human and relational aspects, as well as a calculation part, in this project which was something very complete

Keywords :

#heat insulation #paint #piping #project management #planning #progress #reserves #technical meetings #worksite #FOSELEV Group #FOSELEV Agintis #LFB

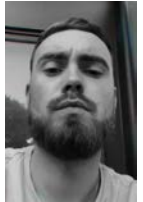


Insulation of pipes on site (two types on the picture)

Contact(s) : costerobin07@gmail.com



FLEXIBILITY STUDIES AND CALCULATION OF SEG NETWORK SUPPORTS WITH BUSINESS MANAGEMENT



Antoine
DANJOU

Antoine DANJOU *MSI*

Academic Supervisor : Soulié Fabien



Objective / Motivation :

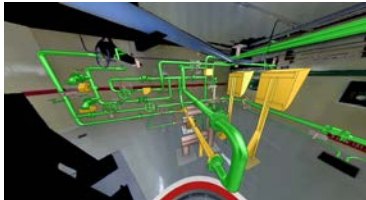
Following the Fukushima accident, EDF has decided to further secure its nuclear power plants. Many modifications will be made, but it's the SEG piping that interests us. These pipes will supply the steam generator in the event of a main system failure.

Results :

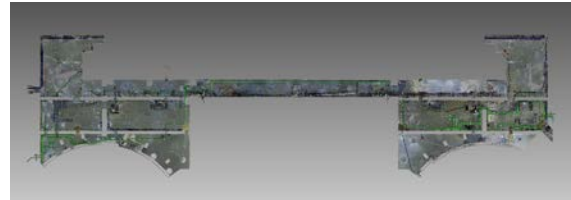
Altrad Endel has been awarded a contract for a number of nuclear power plants. The results we were able to deliver included calculation notes and drawings for SEG piping lines and supports. But also the 3D modeling of the PDMS model of the network.

Keywords :

Nuclear, Tricastin, piping, flexibility, Altrad Endel



Hybrid Assembly



Complete SEG piping network, Tricastin 3 and 4

Contact(s) : antoine.danjou@etu.umontpellier.fr



End of Studies Dissertation

Implementation of the EN1090 quality standard for steel frame



Lucas
DIETRE

Lucas DIETRE *MSI*

Academic Supervisor : BENOIT Jean-Marc



Objective / Motivation :

The project involved implementing the EN1090 quality standard at DEBARD in Arbouans, Franche-Comté. The aim was to create a quality management system for the design office and workshop production. It was necessary to create a list of documents relating to EN1090 and to determine the company's new practices. It was also necessary to change the attitudes of the various employees as well as management. The main changes concerned determining the level of quality requirements, material traceability and welding monitoring.

Results :

The aim was to pass the certification audit during my 3-year work-study period. After completing all the documentation and changing everyone's habits in the company, a pre-audit was scheduled, followed by an audit on 13 September 2022. A few details had to be reviewed after the pre-audit, but once the final changes had been made, DEBARD was certified to EN1090 execution class 3 in the design and manufacturing departments. Since this audit, particular attention has been paid to monitoring and maintaining the level of quality.

Keywords :

Standard, Metal framework, Execution class, Quality, Welding, Quality control, Material traceability, Certificates, Procedure, Instruction, Registration, Audit, Certification, Non-compliance.



EN1090 certificate for DEBARD

Contact(s) : lucas.dietre@etu.umontpellier.fr



Dimensioning of a piping network

Flexibility analysis and support system



Basile
GARCIA

Basile GARCIA *MSI*

Academic Supervisor : MARCHAL Aurélie



Objective / Motivation :

This dissertation concerns the design and dimensioning of a piping network on the military naval base of Toulon as part of the ASBIII (Accueil et Soutien Barracuda III) program. The work consisted in validating the dimensions and routing of the network by means of a flexibility analysis, as well as the layout of the support system selected during the detailed preliminary design studies, in order to meet the various requirements demanded by the customer.

Results :

The document presents the various tasks carried out in this respect, enabling us to propose a model that satisfies both the customer's requirements and the French and European regulations covered by the various calculation codes used (CODETI, CODAP, Eurocodes 0, 1 & 3). • Analysis of customer requirements • Gathering of input data and determination of acceptance criteria • Numerical modeling of the network and analysis of the results • Modifications and solutions • Proposal of a model meeting requirements and drafting of calculation notes

Keywords :

Study, Calculations, Dimensioning, Piping, Flexibility, Supporting



East piping network overview

Contact(s) : basile.garcia@etu.umontpellier.fr



Hydromobil structures quotation database



Michel
HATCHIKYAN

Michel HATCHIKYAN *MSI*

Academic Supervisor : Cambon Martine



Objective / Motivation :

The objective is to create a specific quotation database for pumping stations using the Hydromobil technologies. The idea is to make a simple and efficient work tool that can quote a preliminary draft project. It will include: sizing of the installation or detailed analyses, prefabrication, shipping, installation, commissioning, tests and start-up support.

Results :

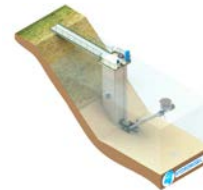
-

Keywords :

Quotation database quote specific project costs analysis studies draft project Hydromobil water pumping station water intake



3D model of a Floating Water Intake



3D model of an Immersed Oscillating Boom

Contact(s) : michel.hatchikyan2018@gmail.com



Design, construction and installation of a roof access footbridge for bus maintenance



Alexis
JUIN

Management of business n°A-22035: Installation of a roof access footbridge for bus maintenance

Alexis JUIN *MSI*

Academic Supervisor : ANGLARET Eric



Objective / Motivation :

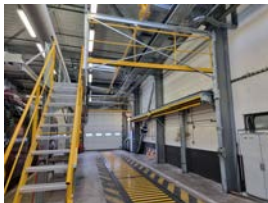
The aim of this project is to deliver and install a bus roof access footbridge. This footbridge will have to meet all the requirements of the specifications and comply with user safety standards. The 3 key features of this footbridge are a retractable staircase, a sliding floor and removable railings.

Results :

The result of this project is the end of this business with a footbridge that meets all the customer's expectations. To illustrate the customer's satisfaction, he asked us to quote for a batch of 4 additional footbridges with characteristics close to those of the one delivered.

Keywords :

roof access footbridge for bus maintenance, design, manufacture, installation, sliding platform, removable guardrail, retractable staircase



Overall photo of the completed project

Contact(s) : sgralexisjuin@orange.fr



Project management – Construction of a hydrocarbon storage tank



Pierre
KOOBUS

Construction of a fixed roof and internal floating-roof tank

Pierre KOOBUS *MSI*

Academic Supervisor : Perrin Claude



Objective / Motivation :

My objective was to manage and monitor the construction of a storage tank for Petroineos, a global chemical company. My work was indeed to supervise all activities relating to the implementation of this project such as careful scheduling of construction stages, liaising and coordinating with suppliers and subcontractors, ensuring human and material safety as well as overseeing adherence to timelines and compliance with quality standards.

Results :

By closely monitoring each stage in the hydrocarbon storage tank construction process, my project aimed to ensure operational efficiency, cost control and successful project delivery within the specified timeframe, while adhering to safety and quality standards. I was also in charge of communication among the various stakeholders and, as such ensured that all client requirements were met. This allowed me to ensure customer satisfaction by delivering the tank within the specified timeline and costs.

Keywords :

Storage tanks, monitor project, safety, regulations, product quality, communication



Tank position in refinery

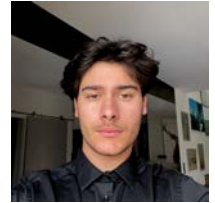


Construction of the hydrocarbon storage tank "A005"

Contact(s) : p.koobus@outlook.fr



Internalization of our subcontractors know-how in order to a certification on the Chinese market.



Edgar
MENZILDJIAN

Internalization of technical know-how on single and multi-walls bellows welds in austenitic stainless steel and inconel 625

Edgar MENZILDJIAN *MSI*

Academic Supervisor : Jean-Michel Muracciole / François Bertrand



VELAN

Objective / Motivation :

This project concerns the internalization of technical know-how (currently carried out by foreign subcontractors) required for several of our businesses, particularly in China. This know-how concerns single and multi-wall bellows welds in austenitic stainless steel and inconel 625. This internalization is required by the Chinese nuclear safety authority, and VELAN SAS' vision is to remain a major player in the design and manufacture of valves and fittings for the nuclear, defense and cryogenic sectors worldwide.

Results :

The results of this project will be all the physical elements (WPQR, WPS, documents, production parts) that will enable us to define the progress of the project. In addition, we will report on the economic, technical and ecological challenges overcome during the project's implementation in the company. The results are fairly conclusive, and suggest that the process has been mastered in these parts, although further improvements are still under discussion.

Keywords :

Bellows, Weld, Velan, HAF-604, In-house processes, Manufacturer and subcontractor relations, Internalising, Standards compliance.



Production and welding of a "bellows/ring" qualification assembly.

Contact(s) : menzildjian@gmail.com



Development of a narrow gap welding process for the welding of stainless steel pipes



Damien
MIRANDA

RCC-M Level 1

Damien MIRANDA *MSI*

Academic Supervisor : SOULIE Fabien



Objective / Motivation :

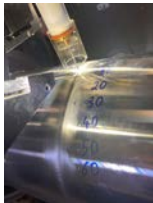
The main objective of this project is to develop an optimized and robust welding process that reduces residual welding stresses and that can be applied to nuclear power plant sites in France. This welding procedure will have to take into account the constraints associated with its implementation, such as fitting tolerances, welding time and the time required for an operator to work on the machine. Dosimetry constraints must also be taken into account.

Results :

An automatic orbital narrow gap TIG welding process was developed from the second half of 2022. An initial qualification of the welding process was passed, but it was not robust enough to be used. A second, more optimized welding process, correcting all the problems of the first, was developed and qualified in 2023, before being tested in different welding configurations to demonstrate its robustness.

Keywords :

Welding, welding procedure, welding process, Narrow Gap, TIG, Orbital, Nuclear, research and development, RCC-M, EDF, nuclear power plant, welding stress, stress corrosion cracking.



Liburdi orbital welding machine

Contact(s) : damien.miranda01@gmail.com



ACTIVITY FOLLOW-UP ON NUCLEAR SITE

Modification of piping installation in controlled area



Yann
MORIN

Yann MORIN *MSI*

Academic Supervisor : LE PARC Rozenn



Objective / Motivation :

Following post-Fukushima studies on the 1300MW reactors, piping modifications must be made to ensure safety and meet new requirements. This concerns pipes in the same building. These new requirements are to have a faster flooding flow rate of the reactor building in the event of a serious accident and to supply water to other mechanical safety pumps.

Results :

The activity carried out and explained in this report is located in the Belleville-sur-Loire nuclear power plant, on the first reactor. A new sump was created, existing piping lines was dismantled, a new 25-meter piping line was laid with 70 welds and a mechanical pump was installed. The work carried out enables the operator of this plant to comply with the new requirements.

Keywords :

RCC-M, NF EN ISO 13480, Piping, Welding, Mechanic, Nuclear, Pressurized Water Reactor, Controlled Area, Radioactivity, Suction pump, Stainless Steel, Management, Site Team, Quality, Planning, Subcontractors



Mechanical pump installation



Welding of the new safety circuit line

Contact(s) : yann.morin@etu.umontpellier.fr



Rehabilitation of AVM Welding machine

Engineering master degree in Mechanical Industrial Structures
2020/2023



**Baptiste
PIBAROT**

Baptiste PIBAROT *MSI*

Academic Supervisor : **CERVELLIN Denis**



Objective / Motivation :

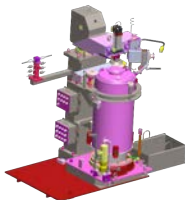
The aim of my final year project is to assist the project manager in the following areas: Design reviews / Material procurement / Document drafting / Workshop production follow-up / Workshop test follow-up. This project is destined for the CEA Marcoule site in the Gard department (30)

Results :

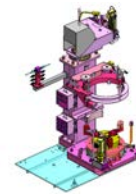
During the realization of the project we had several difficulties, in particular in the studies. After correcting the design errors, we had some problems with manufacturing due to the customer's limited requirements. Finally, we succeeded in manufacturing the welding machine.

Keywords :

Assembly, Welding, Project management, Technical solutions, Schedule follow-up, Consulting, Studies



First view of the Welding machine



Second view of the Welding machine

Contact(s) : baptiste.pibarot@etu.umontpellier.fr



End of studies dissertation

Supplying of a S605 brine filter for the Mechanical Vapour Recompression (MVR) unit



Antoine
PRESTEL

Antoine PRESTEL *MSI*

Academic Supervisor : **BENOIT Jean-Marc**



INEOS | **Inovyn**

Objective / Motivation :

The project involves supplying a S605 brine filter for the MVR unit at the INEOS Inovyn chemical platform in Tavaux. Filter characteristics: - Outside diameter of 4200mm - Height of 8500mm - Material: carbon steel P265GH - Internally coated with glassflakes for corrosion barrier. Monitoring of the supply: - Technical specification of the equipment - Call for tenders and ordering - Verification of design documents - Monitoring of manufacturing by the supplier - Verification of the manufacturer's regulatory file

Results :

A few problems occurred during manufacture, particularly during the glassflake application phase, but everything was finally sorted out and the filter was delivered to our Tavaux site on 13/07/2023. The filter has since been installed in the MVR unit and is awaiting start-up, which will take place when construction of the MVR unit is completed.

Keywords :

Brine filter, Tank, Pressure Vessel equipment, Chemical, Glassflakes, Coating, Carbon steel, Manufacturing monitoring, Pressure Equipment Directive, INEOS Inovyn, Chemical Platform, Recognized Inspection Service,



S605 filter in manufacture



S605 filter installed in the MVR unit

Contact(s) : antoine.prestel@etu.umontpellier.fr



Development of a numerical chain for the WAAM (Wire Arc Additive Manufacturing) process



Graduation Project

Jules
ROBIN

Jules ROBIN *MSI*

Academic Supervisor : SOULIE Fabien



Objective / Motivation :

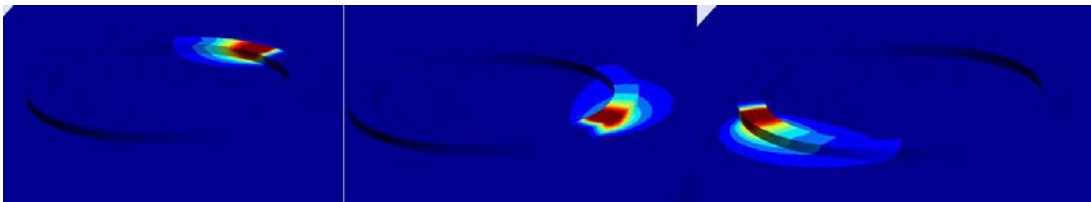
As the main energy producer in France, EDF must maintain the highest level of safety. Moreover, new manufacturing technologies allow fast and cost-effective production of parts. We will focus on the Wire Arc Additive Manufacturing process, which combines additive manufacturing and welding. In this project we will establish a digital process chain to manufacture parts with the WAAM. In this digital process chain we will create trajectories, make numerical manufacturing simulation and monitor the interpass temperature and the welding parameters.

Results :

The project has successfully established a digital chain for the WAAM process by finding solutions for each of the steps. For trajectory creation, the selected software is PowerMill. For the numerical simulation of welding, we utilized Code Aster. We were able to model the manufacturing operation as well as the cooling between each pass. A laser pyrometer was employed to measure temperature remotely and trigger the robot. For the parameters monitoring, we developed our own solution with Python code.

Keywords :

Welding, additive Manufacturing, robot, Code Aster, Welding simulation, welding monitoring, digital chain, WAAM.



Numerical simulation of a fabrication.



Finished fabrication.

Contact(s) : jules.robin@etu.umontpellier.fr



Contribution to the development of analytical calculation rules for jacketed vessels



Alan
SAMBUGARO

New calculation rules for the CODAP

Alan SAMBUGARO *MSI*

Academic Supervisor : BORDREUIL Cyril



Objective / Motivation :

Until recently, CODAP, the french pressure vessel code, could be used to design jacketed vessels, but only by Finite Element Analysis (FEA). The project involves providing new analytical calculation rules for cylindrical jacketed pressure vessels, testing them using FEA, and validate them. Then, these new rules will be introduced in CODAP. The project also considers the preparation of an application example, in order to help pressure vessels manufacturers to design this type of vessel.

Results :

A set of diverse configurations was defined, including conical and annular connections between jacket and main shell, static strength and fatigue, pressure and temperature. These new rules were first implemented on Mathcad. Results were compared to FEA, and revealed a sufficiently conservative agreement. This enabled the new rules to be validated and integrated into CODAP v2022. The application example detailed the global process of calculation.

Keywords :

Pressure vessel, calculation rules, cylindrical jacket, conical connection, annular connection, CODAP, finite elements, mathcad, analytical calculation, static strength, fatigue strength, example of an application, design.

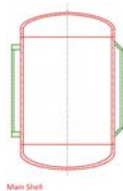


Illustration of the two types of connection for cylindrical jacketed pressure vessels.

Contact(s) : alan.sambugaro@hotmail.com



Revamping of the fire-fighting network at the Oudalle oil depot



Nicolas
SPRYNSKI

Optimizing fire safety: modernizing the network at the Oudalle oil depot

Nicolas SPRYNSKI *MSI*

Academic Supervisor : MARCHAL Aurélie



Objective / Motivation :

This end-of-study report deals with the project to upgrade the fire-fighting system at the oil depot of Oudalle. This is Total Energies Fluids' oil terminal in the Seine-Maritime department of Normandie. In order to comply with regulations and customer requirements, an analysis of fire scenarios and head loss calculations were carried out to design the site's fire fighting network. This document presents the feasibility and preliminary design studies that led to the final design choices.

Results :

Studies of fire scenarios have shown that existing facilities are unable to meet the flow requirements of the fire fighting scenarios. Head loss calculations have been carried out to verify that the fire fighting network was in good condition. New installations to meet with the required flow rates are designed in accordance with the fire fighting protection and extinguishing base design.

Keywords :

Project, Studies, Design, Fire fighting, Scenarios, Head Loss, Results, AFT PHATOM, Decisions, Oil terminal



Picture of the oil depot of Oudalle

Contact(s) : nicolas.sprynski@etu.umontpellier.fr



End of Studies Dissertation

Management of the manufacture and installation of a pharmaceutical pressure vessel



Sébastien
TAMINI

Sébastien TAMINI *MSI*

Academic Supervisor : PAPET Philippe



Objective / Motivation :

At our client VIRBAC, located on the "Côte d'Azur", I was given responsibility for the project to build and install a pharmaceutical pressure vessel. This new pressure vessel had to incorporate the required modification in the design of the recesses to limit the temperature constraints and avoid the appearance of cracks in these areas. I had to manage budgets, subcontractors, additional labor costs, technical problems, safety and security, the customer, etc

Results :

The pressure vessel was manufactured, delivered and installed on time, despite a number of issues. Our client appreciated our involvement in resolving the problems encountered. My personal goal of becoming self-sufficient in this type of pressure vessel manufacturing project has been achieved. However, we were unable to maintain the cost initially planned, mainly due to excess working hours. The professional objective of obtaining good customer satisfaction was partially achieved.

Keywords :

Project management, Pressure vessel, Manufacturing , Installation, DESP, CODAP, Welding, Budget, Pharmaceutical, Stainless steel



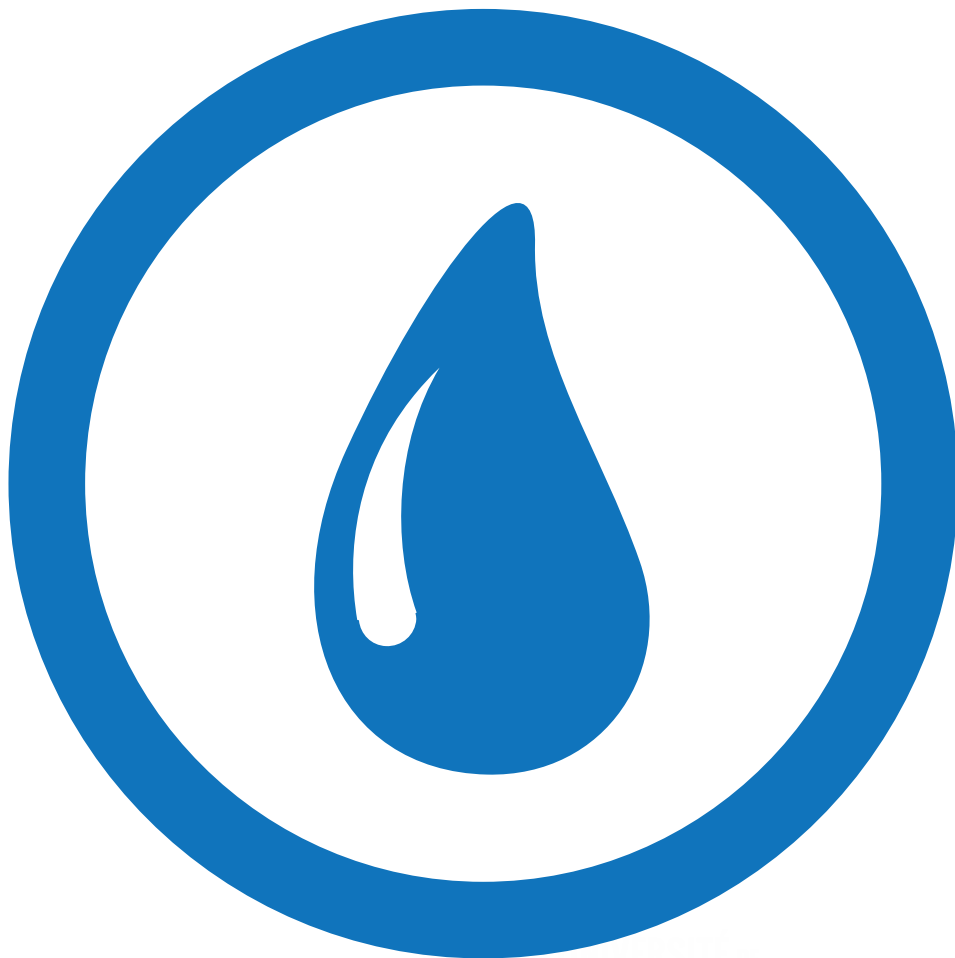
3D Model of the C401 pressure vessel



C401 pressure vessel on customer site

Contact(s) : sebastien.tamini@etu.umontpellier.fr





Water quality modeling of the drinking water network of the Nice metropolis



Margaux
BOURGEOIS

Construction and calibration of a chlorine model on the network

Margaux BOURGEOIS *STE*

Academic Supervisor : Denis BOUYER



Objective / Motivation :

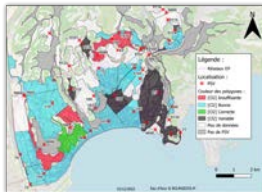
The objective of the study is to provide quantified elements to better implement a rechlorination strategy in areas vulnerable to chlorine. The modeling of a chlorine model allows to better locate the sectors which lack chlorine to then optimize the places of rechlorination. To build this model, it is necessary to know the dynamics of chlorine in the network and therefore analyze the available data. It is also important to carry out a field measurement campaign in order to obtain values to build and calibrate the chlorine model.

Results :

This first step allowed us to identify four distribution sectors that are often below the recommended limit of 0.1mg/L and to show that the source of water supply (groundwater or surface water) is very important for its quality. The rest of the project will present the realization of the field measurement campaign, the implementation of the chlorine model for the modeling of chlorine in the network and the presentation of rechlorination scenario in order to optimize the location of the rechlorination stations.

Keywords :

network ; water quality ; drinking water ; chlorine ; modeling ; rechlorination station



Summary map of the median free chlorine concentration between 2016 and 2022 in the Nice area

Contact(s) : margaux.bourgeois01@etu.umontpellier.fr



Professionalization contract at Veolia Eau

Quality reporting missions on the network of distribution of drinking water in Aveyron

Raphaël BRIANES-GANTOU *STE*

Academic Supervisor : Brosillon Stéphane



Objective / Motivation :

Vinyl Chloride Monomer (VCM) is the main raw material for Polyvinyl Chloride (PVC), a material frequently used to manufacture drinking water distribution lines. This substance is classified as a carcinogenic and its quality limit in water intended for human consumption is set at 0.5 µg/L by the Order of 11 January 2007. Exceedances of this quality limit are likely to be observed in the distributed water as a result of a migration of residual VCM contained in the walls of some PVC pipes produced before 1980.

Results :

Ensure the identification of risk pipelines before April 29, 2023: this identification consists of identifying pipes made of PVC or unknown material installed before 1980 or at an unknown date, then to define the contact time of the water with the suspected pipe. Define a multi-year sampling program where the most risky sections are to be investigated. For each sampling point, the ARS prescribes 4 measurements (2 summer, 2 winter) to account the variability of VCM concentrations in water under the influence of temperature and contact time.

Keywords :

Vinyl Chloride Monomer, Polyvinyl Chloride, drinking water distribution network quality limit, risk pipelines, multi-year sampling program



Plan of the at-risk pipes on the Salindres drinking water distribution network

Contact(s) : raphael.brianes-gantou@etu.umontpellier.fr



Updating of hydrological methods

Use of HD LiDAR data



Arnaud
DELORME

Arnaud DELORME *STE*

Academic Supervisor : Salles Christian



Objective / Motivation :

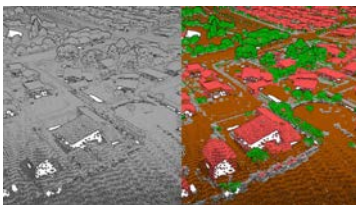
The hydraulic engineering company ABC INGÉ is looking to improve its tools used for hydrological studies. These studies require reliable and precise input data. The knowledge of the topography surrounding the site of a project is essential. The possibility of using LiDAR HD data to determine the digital terrain model has been developed for this purpose.

Results :

These data allow for the creation of rasters with a resolution of 50 cm and extremely fine vertical precision. This represents a significant improvement over the previously used RGE ALTI database. It is now possible to directly consider the details of the terrain that are important for the water course.

Keywords :

Lidar, DEM, Hydrology, Modeling



LiDAR HD points cloud before and after classification



Comparison map of topographic shadings of the raster produced by LiDAR HD and the RGE ALTI database

Contact(s) : arnaud.delorme@etu.umontpellier.fr



Rainfall-runoff hydrological modelling on the River Severn

Testing the influence of time step and calibration time on a SUPERFLEX hydrological model

Julien FREYCHET *STE*

Academic Supervisor : Delenne Carole / Hostache Renaud



Objective / Motivation :

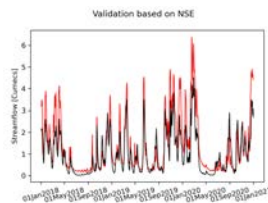
The goal of this project is to compare results from a hydrological model called SUPERFLEX with machine learning from a neural network. This model uses rain and potential evapotranspiration as entry data, and finally compare the simulated flow with an observed one. The study takes place in England at Saxons Lodes watershed. We used this data to search for influence from the length of the calibration and also the time scale of model (hour and daily). Nash-Sutcliffe and Kling-Gupta criteria are used to judge the effectiveness of the results.

Results :

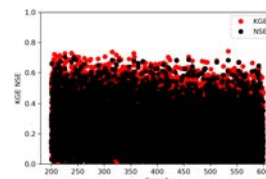
We used Monte Carlo method for the calibration, results are different depending on the time's scale. More simulations are needed to ensure the difference is not due to the choice of parameter ranges. The length of the calibration period seems to have no effect. This is probably due to the climate of the study area, where the hydrological years are very similar. The model is now ready to support more different simulations in order to be compared with the neural network approach.

Keywords :

Hydrological model, SUPERFLEX, Monte-Carlo, Severn



Result of a validation based on the best parameters from NSE, for 13 years of calibration

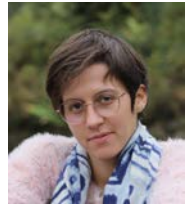


Example of a parameter's criteria graph showing the NSE obtained during 10000 simulations of the model (parameter=Maximum stockage underground)

Contact(s) : julien.freychet@etu.umontpellier.fr



Ecological trajectories in 20 years of four Corsican lagoons



Evalie
GOUDARD

Study of the spatio-temporal dynamics of macrophytes in four Corsican lagoons in order to understand their ecological trajectories over the last twenty years

Evalie GOUDARD STE

Academic Supervisor : Bec Béatrice



Objective / Motivation :

Macrophytes are macroscopic aquatic plants, visible to the naked eye. Their growth and development are influenced by many biotic and abiotic factors, which makes them excellent ecological bioindicators of lagoon environments. The study of the composition of macrophytic populations in four lagoons over a period of 20 years allowed us to have a global view of their respective evolution.

Results :

The study was thus able to characterize and understand the spatio-temporal dynamics of macrophyte populations in response to variations in hydrological parameters. The resilient character of lagoon ecosystems has been studied in the light of the evolution of the pressures to which lagoon ecosystems are subjected, and the relevance of the current bioindication metrics for macrophytes was examined.

Keywords :

Lagoons - Macrophytes - Pressures - Bioindicators



Etang de Palu - Corse



Herbiers de Zostères

Contact(s) : evalie.goudard@etu.umontpellier.fr



Reuse of human urine nitrogen

Definition of optimal operating conditions



Alison
LACOULONCHE

Alison LACOULONCHE *STE*

Academic Supervisor : Hérán Marc



Objective / Motivation :

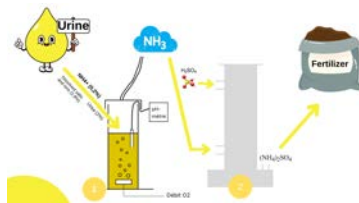
The purpose of the PFE was to define the optimal operating conditions of a human urine nitrogen selective extraction step, followed by a nitrogen recovery step at a pilot scale. Thus, air flow, pH and nitrogen concentration were tested.

Results :

Nitrogen transfer rates were calculated for each of the two steps separately then coupled. Results show a higher transfer rate for the recovery step compared to the nitrogen extraction. Finally, the higher nitrogen transfer rate is when the two steps are coupled.

Keywords :

urine, nitrogen, extraction, recovery



Schema of the two stages : nitrogen selective extraction followed by its recovery

Contact(s) : alison.lacoulonche@etu.umontpellier.fr



Diagnostic et traitement des sulfures sur les réseaux d'assainissement



Léna
LEENHARDT

Projet de fin d'étude 2022-2023

Léna LEENHARDT STE

Academic Supervisor : Jean-Pierre Mericq



Objective / Motivation :

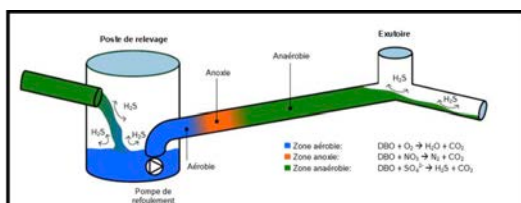
The « permanent diagnosis », is made mandatory for sewage systems with more than 2,000 pe since 2020, aims the monitoring of the state of the sewage system, prevention malfunctions, assessment of preventive and curative solutions, in a continuous improvement of the operation of the sewage systems. In this context, the study of H₂S, a very harmful gas for installations and people, represents a real challenge.

Results :

This gas is formed in the sewage system by sulfate-reducing bacteria under anaerobic conditions. The gas is then transferred into the air in areas of turbulence. To be able to assess the presence of H₂S in the sewage system, there are different measurement methods: qualitative and quantitative. These studies make it possible to define the risk due to the presence of H₂S and thus to propose solutions to reduce it. There are preventive and curatives solutions based on the precipitation of sulphides for example.

Keywords :

Sulphides H₂S Bacteria Corrosion Toxic Sewerage network



Production of H₂S on the sewerage network



Treatment of H₂S with ferrous and ferric chloride

Contact(s) : lena.leenhardt@hotmail.com



Monitoring of Vinyl Chloride Monomer concentration in drinking water networks

Study of the South Region's drinking water networks



Tom
LELEU

Tom LELEU *STE*

Academic Supervisor : Faur Catherine



Objective / Motivation :

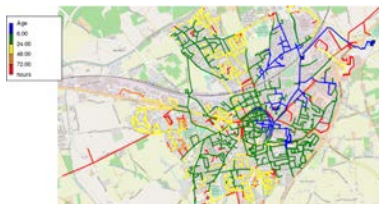
Vinyl Chloride Monomer is a synthetic chemical compound known as a human carcinogen since 1987. It is used in the polymerization process of PVC, which is used in the manufacture of drinking water pipes. PVC networks dating from before 1980 are two thousand times more likely to release VCM into drinking water than PVC networks from after 1980, which may create health problems. To monitor the concentration of VCM in municipal drinking water pipes, multi-year sampling plans are commissioned by the Regional Health Agencies.

Results :

With the help of the GIS software Canopée, we find an average between 9% (Hérault) and 39% (Aude) of drinking water networks at risk in the different departments of the southern region, i.e. PVC networks dating from before 1980. This represents several thousand kilometers at risk in each territory. Even though 2023 campaigns did not begin yet, from the previous VCM measuring campaigns, we can tell that most of the "at risk" pipes (97%) don't necessarily represent a health risk.

Keywords :

VCM, vinyl chloride monomer, PVC, polyvinyl chloride, drinking water networks, health, water quality



Modelling of the hydraulic residence time (HRT) per section in the commune of Lunel



Plan of the pipes at risk on the drinking water distribution network of the commune of Lunel (Canopée software).

Contact(s) : tom.leleu@etu.umontpellier.fr



Wastewater treatment of the brewery "Les Brasseurs Savoyards"



Coline
MASSUEL

Feasibility study

Coline MASSUEL *STE*

Academic Supervisor : Montigny Chrystelle



Objective / Motivation :

Currently, there is no treatment for the brewery's wastewater at « Les Brasseurs Savoyards ». In order to connect to a new municipal treatment plant, the SILA (Syndicat Mixte du Lac d'Annecy) requires the industrialist to pretreat this wastewater on site before discharge into the municipal sewerage system. Moreover, the brewery plans to increase its production about 8% per year, from around 23 000 hl of beverages in 2022 to about 45 000 hl in 2030 and 61 000 hl by 2035.

Results :

Given the high BOD/CDO rate in effluents, and with the very important released volume, two scenarios were proposed to the client : a first scenario with the implementation of simple separation procedures for effluent at the source before discharge to the municipal wastewater system, and a second scenario with extensive separation procedures for effluent. The two scenarios are similar, only size of the structures varies. Indeed, the yields to be achieved are lower in scenario n°2, and therefore the footprint of the structures is lower.

Keywords :

Brewery ; Wastewater



Example of implantation with semi-buried rectangular structures

Contact(s) : coline.massuel@etu.umontpellier.fr



Development of a tool for analysing input data and generating a synthetic visualization of the results as part of a study of a drinking water supply master plan



Anthony
MATHIEU

Follow-up of a study within the framework of a master plan for the supply of drinking water to the Syndicat de cance doux

Anthony MATHIEU *STE*

Academic Supervisor : MAJDALANI Samer



Objective / Motivation :

To achieve digital processing on a large number of accumulated volumes heterogeneous obtained by remote management. In order to obtain flow rates and to be able to perform yield calculations. At the same time, make explanatory diagrams of the operation of a drinking water supply system. As well as cartographies to better appreciate this rural water network (850km).

Results :

Perform a functional VBA code Get consistent flows Get a start of statistical processing (min, max...) Perform a leak search on to calculations on distribution units Making organ sheets following visits to structures Make a synoptic altimeter of a large network Transcribe land information into GIS data

Keywords :

Data treatment / digital processing / VBA / flows statistical processing / synoptic altimeter / SIG data



Cance-doux water network with distribution units in color



synoptic altimeter of Cance Doux syndicate

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Urban rainwater management

Implementation of compensation measures for soil urbanization



Flavy
PASTOORS

Flavy PASTOORS STE

Academic Supervisor : Vincent GUINOT



Objective / Motivation :

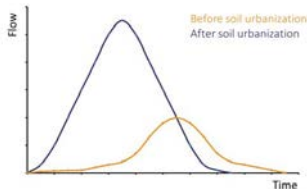
Soil urbanization has direct effects on rainwater runoff with an increase in runoff volumes, an acceleration of flows and therefore an increase in peak flows (Picture 1). This is why any urban project must integrate a rainwater management method designed according to the different constraints and orientations of the project.

Results :

The effects of urbanization were studied for an urban redevelopment project in Montpellier, France. Regulatory, environmental and hydraulic studies established for the development permit led to the proposal of a rainwater management method adapted to the project. The solution chosen is the installation of vegetated retention basins (Picture 2) and retention devices on flat roofs. These retention devices will play a role in capping the water, which will be returned to the receiving environment with a controlled flow.

Keywords :

Urbanization, rainwater management, retention devices, controlled flow



Picture 1 : Urbanization effects on rainwater runoff



Picture 2 : Vegetated retention basin

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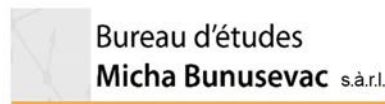
Introduction to spatialisation in hydrologic modelling on a luxembourgish watershed



Antoine
PRINTZ

Antoine PRINTZ *STE*

Academic Supervisor : NEPPEL Luc



Objective / Motivation :

Spatialisation is a concept linking a piece of data to a geographical place. Such data are qualified of georeferenced. This notion is underlying in hydrology, in which spatial variability of data is essential. A methodology of hydrologic modelling has been set up in order to build spatialised models. An example has been carried out as part of a feasibility study conducted by « Bureau d'études Micha Bunusevac ». The study's goal is to reduce the outflow for a 100-year flood at the outlet of a luxembourgish watershed.

Results :

A spatialised hydrologic model has been set up. It has been used for designing retention basins on an ungauged catchment. Retention basins' design is based on the 100-years return period flood. This flood has been modelised with a 2.4% gap compared to the initial estimation.

Keywords :

hydrologic modelling, floods, luxembourg, HEC-HMS, Rain, River, Forecast, retention basin, spatialisation, spatialised model, Curve Number, Gridded watershed



*Damages due to flood of the Petrusse in Bertrange (Luxembourg)
on 14th July 2021*

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Phenotypic divergence and pollution tolerance of an invasive fish, the gambusia *Gambusia holbrooki*



Orianne
REBOUD

A focus on reproductive-related biomarkers

Orianne REBOUD *STE*

Academic Supervisor : FARCY Emilie



Objective / Motivation :

Aquatic ecosystems are increasingly threatened by chemical pollution and environmental condition. This report studies the effects of these multiple stress factors on the reproduction of several *Gambusia holbrooki* fish populations, an invasive fish, sampled in various environments associated with different types of stressors factors. More specifically, sexual biomarkers (gonopod size, RGS gonadosomatic index) were measured to describe the effects of stress factors on *Gambusia* reproduction.

Results :

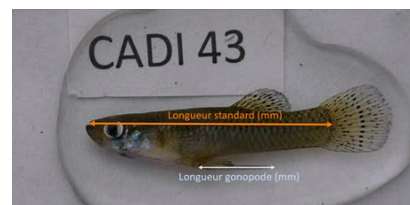
Correlation tests showed that environmental conditions and pollution had an influence on the studied sexual biomarkers. The gonopod is particularly sensitive to agricultural and metallic pollution, while the RGS gonadosomatic index is extremely dependent on time, and therefore sexual maturity.

Keywords :

gambusia, pollution, endocrine disruption, gonopodium



Referenced sample sites



Biometric measurements carried out

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Treatment of effluent contaminated by PFAS using electrochemically reactive membrane



Mathilde
ROLLET

Use of an electrochemical oxidation process

Mathilde ROLLET *STE*

Academic Supervisor : François Zaviska



Objective / Motivation :

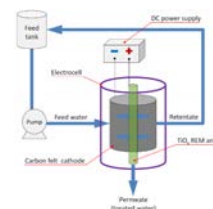
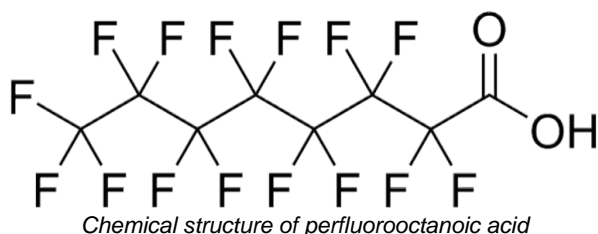
This study focuses on the application of an advanced electrochemical oxidation process for the treatment of a biorefractory organic micropollutant: per- and polyfluoroalkyl substances (PFAS). The process is based on the direct transfer of electrons from organic compounds to the anode surface and on the generation of hydroxyl radicals from the oxidation of water on the surface of high-voltage oxygen electrodes. Hydroxyl radicals are capable of oxidizing many organic pollutants up to the mineralization stage.

Results :

A high-voltage anode of O₂ such as a titanium phase sub-oxide electrode (Ti₄O₇) was used throughout this study. The results showed that perfluorooctanoic acid (PFOA), which has an 8-carbon chain, is 94% degraded to a 3-carbon chain compound, pentafluoropropionic acid, a less toxic and less persistent compound in the environment. PFAS degradation could be improved by coupling the electro oxidation process with another upstream adsorption process.

Keywords :

Advanced oxidation process, anode, hydroxyl radicals, biorefractory organic micropollutant, per- and polyfluoroalkyl substance



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Nanofiltration for the reuse of treated wastewater

AQUIREUSE research project



Célia
TERRATS

Célia TERRATS *STE*

Academic Supervisor : MENDRET Julie



Objective / Motivation :

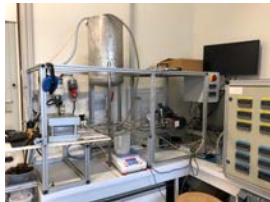
This study, conducted at the IEM and part of the AQUIREUSE project, involves a nanofiltration (NF) pilot unit that filters secondary effluent from a wastewater treatment plant (WWTP) and eliminates micropollutants in order to recharge an aquifer. Two conversion rates and two membranes were tested. The aim was to study different global parameters (pH, conductivity, COD, TOC, anions and cations, organic compounds, permeate flux).

Results :

It was found that the NF-270 membrane has good removal rates for ions, organic matter and organic pharmaceutical molecules. However, it doesn't remove all molecules in the same way. No real clogging of the membrane could be observed, but the acidic and then basic washing increased its permeability. The test with the NF-90 showed that this membrane had a lower permeability than the NF-270.

Keywords :

Treated wastewater REUSE, Membrane processes, AQUIREUSE, Nanofiltration (NF), Secondary WWTP effluent, Micropollutants, Aquifer recharge, Conversion rate, Removal rate, Permeate flow.



Mobile nanofiltration pilot unit

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