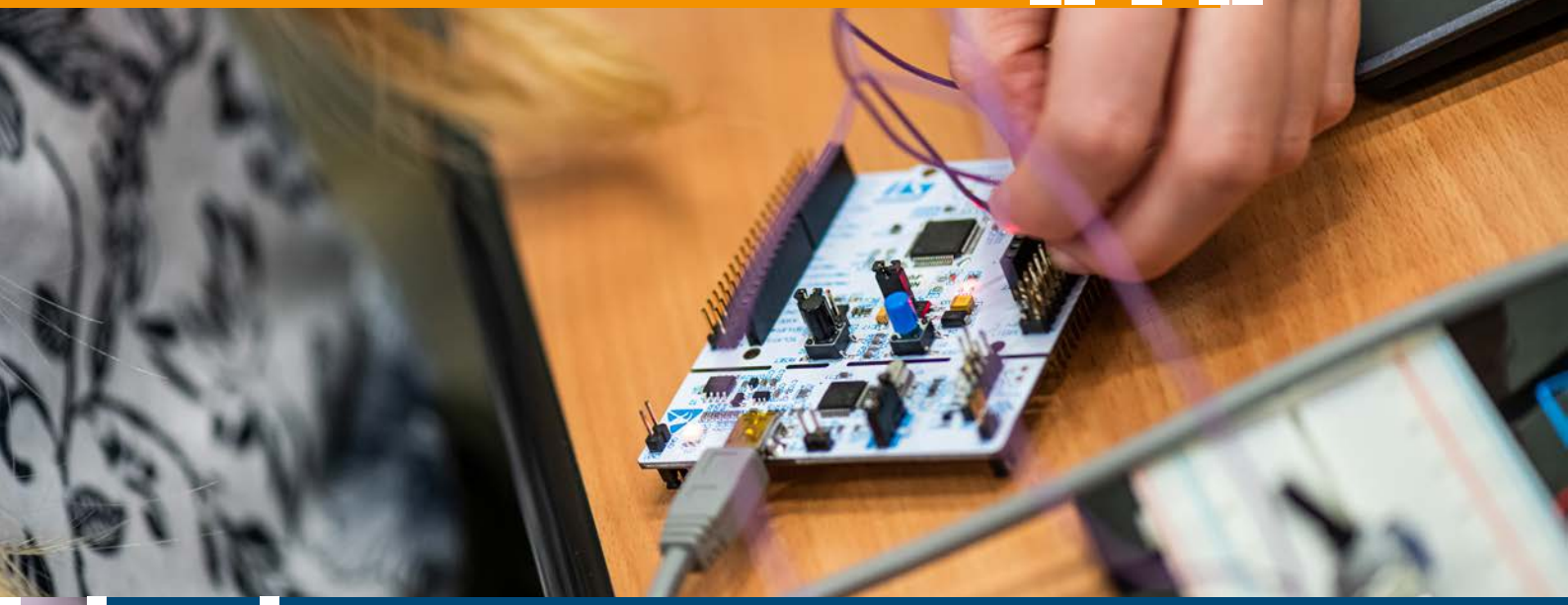
POLYTECH
MONTPELLIER

2021–2022

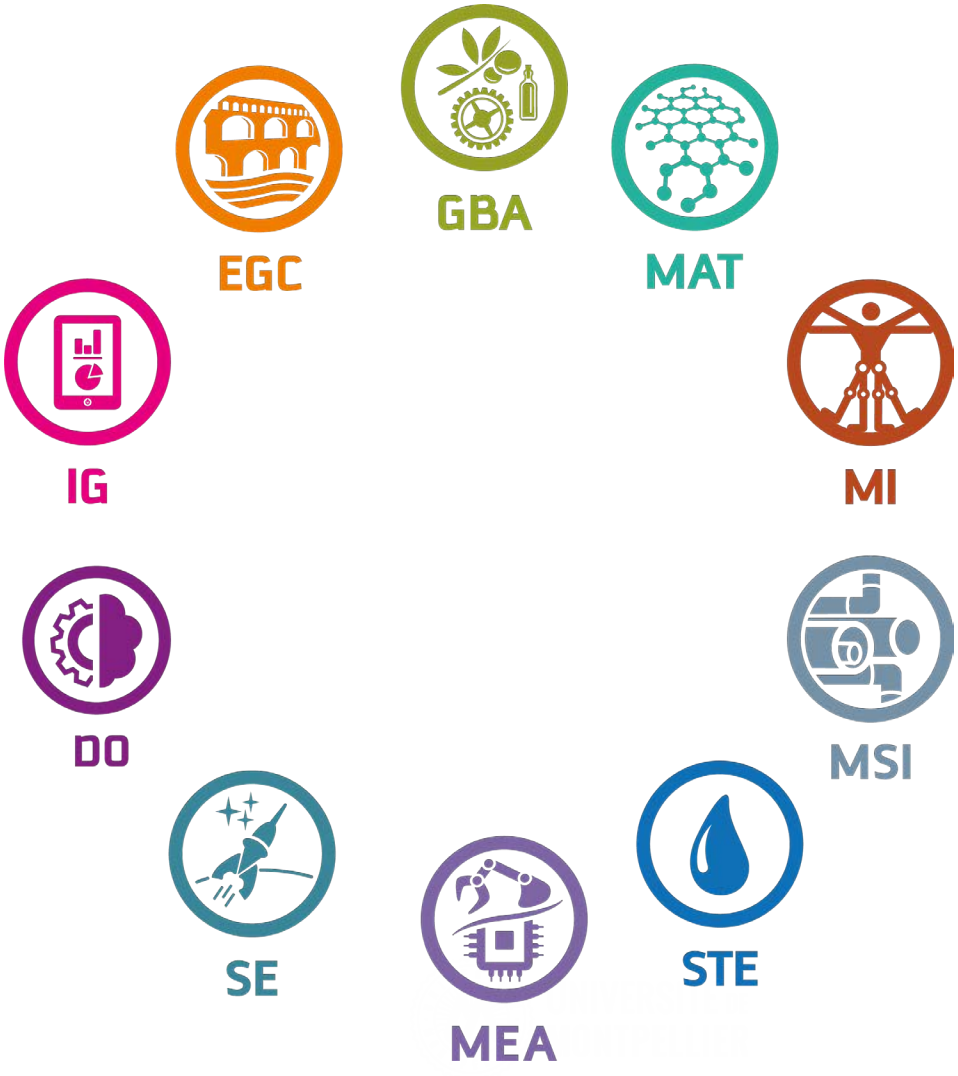


STUDENTS PROJECTS CATALOGUE

UNIVERSITÉ DE
MONTPELLIER

POLYTECH
MONTPELLIER

TRANSVERSAL PROJECTS



Conception et étude d'un contacteur membranaire

Elimination de solvants organiques (type alcool) de solutions aqueuses

Pablo LECOUTRE *STE*

Academic Supervisor : MERICQ Jean-Pierre

Objective / Motivation :

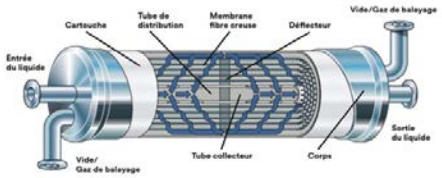
Various industrial sectors use organic solvents for their production, their washing. As a result, these substances are found in large amount in wastewater. In an economical and ecological approach, it is now suitable to develop innovative methods allowing to extract these solvent to recycle them.

Results :

This study permitted to observe the efficacity of air stripping humidification to lower the water vapour flow when feed does not contain ethanol. Concerning water-ethanol solutions, air humidification also seems to improve the ethanol transfer. Same result for the air stripping flow that might also affect the ethanol transfer.

Keywords :

Membrane distillation, membrane contactor, dealcoholization, water-ethanol, refractometry



Contacteur membranaire

Contact(s) : pablo.lecoutre@etu.umontpellier.fr

Monitoring de Salle de serveur

Création d'une solution évolutive

Guillaume COSTES

Guillaume COSTES *MEA*

Academic Supervisor : DUBREUIL Eric

Objective / Motivation :

The objective of the project was to propose a sensor system capable of measuring temperature and humidity in a server room. The solution developed had to be scalable and usable in different conditions.

Results :

To do this, I chose to develop an intelligent sensor based on STM32 equipped with Ethernet and Wifi connectivity on which were added different modules to measure different parameters. By placing these sensors in different places in the room, it is possible to monitor the evolution of the different parameters in time and space. These data are then sent to a local server which centralizes them and allows them to be displayed in graphic form. At the end of the project, I managed to produce a working sensor as described. However, I didn't have time

Keywords :

MQTT Monitoring Server STM32 Ethernet Wifi Sensor InfluxDB Grafana

Boitier du capteur

Page web Grafana

Contact(s) : guillaume.costes@etu.umontpellier.fr

Assistant manipulator robot

Louis BRUSCHET

Assistant manipulator robot

Louis BRUSCHET *MEA* **Corentin VERNAC** *MI*

Academic Supervisor : Fraisse Philippe/Crosnier André

Corentin VERNAC

Objective / Motivation :

Nowadays, we are creating more robots of different kind and we integrate them in our environment. And increasing the number of robots in our environment, increase also the number of physical human / robots' interaction (pHRI). To avoid accidents, they have to be as safe as possible.

Results :

Finally, with the interaction of mechanical design and control systems, a prototype of an assistant robot has been done. That needed to use different kind of software like SolidWorks, Ansys, Matlab and Simulink. The next objetive is to work on the pHRI part and improve the control.

Keywords :

Mechanical design, robotics, control system

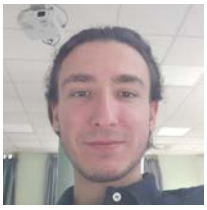
Prototype of the assistant robot

Contact(s) : louis.bruschet@etu.umontpellier.fr corentin.vernac@etu.umontpellier.fr

Design and prototyping of a device for measuring the muscular efforts of a hand under electrical stimulation

Bastien MURACCIOLI

For the rehabilitation of paralyzed patients



Xavier DUPEYROUX

Bastien MURACCIOLI *MEA* **Xavier DUPEYROUX** *MI*

Academic Supervisor : Andreu David / Fraisse Philippe

MEA MI Neurinnov

Objective / Motivation :

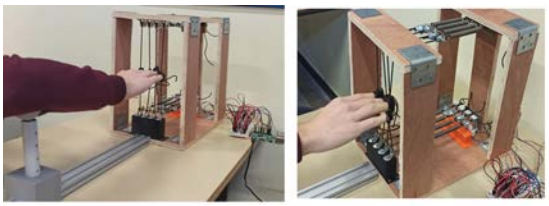
The goal of this project is to develop a way to measure the efforts generated by a patient's hand when it is subjected to electrical stimulation. The quantification of these efforts will then allow doctors and Physicians and physiotherapists, to define a list of electrical impulses allowing different controls of the hand. This project represents a proof of concept for hand force measurement and is focused on the measurement of except for the thumb which has a particular geometrical configuration.

Results :

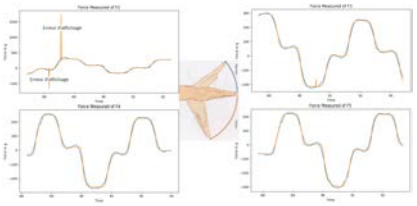
The current prototype works for four fingers. It measures the force at the fingertips with a relative error below 5 %. However, it doesn't measure the joint angles.

Keywords :

Biomechanics, design, Medical, prototype, Hand, Sensors



Prototype made for force measurement



Force measurements for four fingers with flexion and extension movements

Contact(s) : bastien.muraccioli@etu.umontpellier.fr xavier.dupeyroux@etu.umontpellier.fr

UNIVERSITÉ DE MONTPELLIER POLYTECH MONTPELLIER

Assistant manipulator robot

Assistant manipulator robot

Corentin VERNAC *MI* **Louis BRUSCHET** *MEA*

Academic Supervisor : Philippe Fraisse / André Crosnier

Corentin VERNAC

Louis BRUSCHET

Objective / Motivation :

Nowadays, we are creating more robots of different kind and we integrate them in our environment. And increasing the number of robots in our environment, increase also the number of physical human / robots' interaction (pHRI). To avoid accidents, they have to be as safe as possible.

Results :

Finally, with the interaction of mechanical design and control systems, a prototype of an assistant robot has been done. That needed to use different kind of software like SolidWorks, Ansys, Matlab and Simulink. The next objetive is to work on the pHRI part and improve the control.

Keywords :

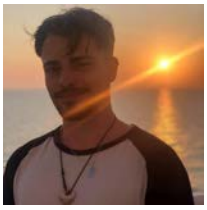
Control system, Mechanical design, Robotic

Prototype of the assistant manipulator robot

Contact(s) : corentin.vernac@etu.umontpellier.fr louis.bruschet@etu.umontpellier.fr

Design and prototyping of a device for measuring the muscular efforts of a hand under electrical stimulation

Xavier DUPEYROUX



Bastien MURACCIOLI

Xavier DUPEYROUX *MI* **Bastien MURACCIOLI** *MEA*

Academic Supervisor : Fraisse Philippe

Objective / Motivation :

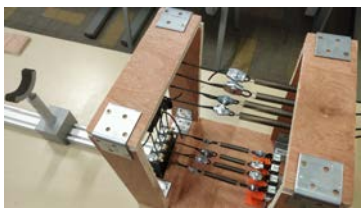
- Mechanically: The objective is to produce a 3D model of a measuring device, allowing the measurement of the forces of each finger, and then to produce a feasibility prototype. - Electronically: Selection and implementation of the force measurement solution, including the sensors and the associated electronic board.

Results :

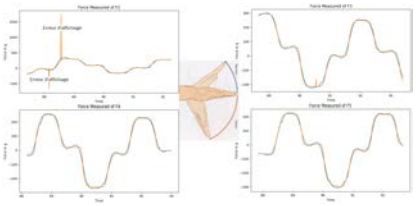
The current prototype works for four fingers. It measures the force at the fingertips with a relative error below 5 %. However, it doesn't measure the joint angles.

Keywords :

Biomechanics, design, SolidWorks, prototype



Prototype made for force measurement



Force measurements for four fingers with flexion and extension movements

Contact(s) : xavier.dupeyroux@etu.umontpellier.fr bastien.muraccioli@etu.umontpellier.fr

Improvement of passive integrative submerged samplers for the monitoring of port water quality

Florian PULL

Improving supports for passive underwater sensors

Florian PULL *MI*

Academic Supervisor : Chrystelle Montigny / Loïc Daridon

Objective / Motivation :

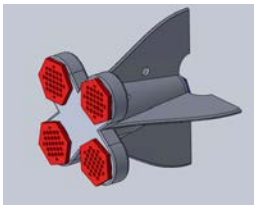
The goal of this project is to upgrade the performance and repeatability of integrative passive samplers measurements in the context of port water quality monitoring of port waters, in the case of this project, in the Camargue and Carnon ports, and their correlation with those laboratory measurements. Moreover, we have to improve the structure of the integrative passive sampler itself, but also to allow control of its positioning in the port environment during measurements (orientation according to the current, etc.).

Results :

3D models will be created to represent and simulate the structures to accommodate the different types of sensors. Then, 3D prints of these models will be made to test them in real conditions.

Keywords :

DDRS - 3D printing - CAD software - Fluid mechanics - Integrative passive sampler

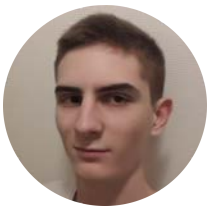


Final assembly of chemcatcher passive sampler structure

3d printed parts

Contact(s) : florian.pull@etu.umontpellier.fr

Development and securing of an antenna adjustment system for AIMD



Development and securing of an antenna adjustment system for AIMD

Valentin LHOSTE

Anna AGOBIAN

Valentin LHOSTE *MAT* **Anna AGOBIAN** *MEA*

Academic Supervisor : Jean-Michel Muracciole

MAT MEA Neurinnov

Objective / Motivation :

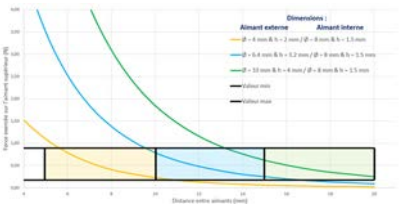
The start-up Neurinnov, created in 2018, is developing an active implantable medical device (AIMD) for quadriplegics. This system will allow patients to partly reuse one of their hands and thus regain a lot of autonomy. This project aims to determine which magnets will be used in the external and internal antennas, taking into account the constraints submitted by the skin. The subject of the PFE is the development and securing of the external antenna adjustment system. Many stresses apply to the antennas, and it is necessary to evaluate them.

Results :

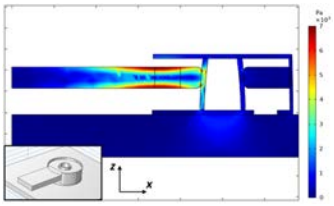
The documentation and the simulations carried out on FEMM made it possible to make a selection of the magnets usable for the antennas, while keeping in mind the unknown which is the thickness of the skin. Finally, the stress simulations on the external antenna and on the skin made us discard certain ideas considered. The hollow base and the tongue-shaped electronic antenna need to be reviewed.

Keywords :

Neurinnov Health Tetraplegic Active implantable medical device Implant Magnet Skin Simulation Antenna Stress Ulcer Bedsore Forces of attraction FEMM Comsol



Force exercée par un aimant en fonction de la distance entre aimants pour les couples d'aimants retenus



Contraintes de von Mises sur l'antenne entière (en 103 Pa), vue de coupe

Contact(s) : valentin.lhoste@etu.umontpellier.fr anna.agobian@etu.umontpellier.fr

UNIVERSITÉ DE MONTPELLIER POLYTECH MONTPELLIER

Les sédiments de dragages

Caractérisations et traitement des matériaux pour évaluer leur impact écologique et leur réutilisation

Antoine GATTO

Antoine GATTO *MAT*

Academic Supervisor : SILLY Gilles / BANCON-MONTIGNY Chrystelle

Objective / Motivation :

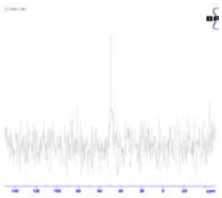
Ability to use NMR method to describe TBT in marine sediments. Study of extracting, treatment, and grinding methods to make the results even more optimal. Adaptating the granulometry, the hydric state, and the global environment.

Results :

Solid NMR unavailable for the moment, so the liquid NMR was used to get the pure products (TBT,DBT,MBT) spectrums. Some visions for the future of the project are evident : planetory grinding established for a long period, melting with acetic acid.. A big stress : make the concentrations of TBT higher. To do it, a protocol review will have to be made.

Keywords :

Sédiments, Tin, Tributyltin, pollution, grinding, NMR, acetic acid



NMR 119Sn of TBT

Sediments in grinding pots. Dry and melt with acetic acid.

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

Study of the dealcoholization of aqueous solutions in a membrane contactor

Florelle CHARRE

Study of the membrane distillation process by gaseous entrainment against the current

Florelle CHARRE *GBA* **Pablo LECOUTRE** *STE*

Academic Supervisor : Belleville Marie-Pierre / Mericq Jean-Pierre

Pablo LECOUTRE

GBA STE iem Institut Européen des Membranes

Objective / Motivation :

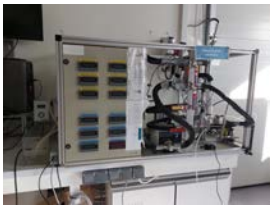
Due to global warming, an increase in the alcohol content of wines has been observed (+ 1° in 16 years). Producers are therefore seeking to lower the alcohol concentration of their wines to maintain it at 12%.This project aims to study the process of partial dealcoholization of wine using a membrane contactor.In order to optimize the process of membrane distillation by gas entrainment, tests were carried out by varying various parameters such as the flow rate of sweeping air, the temperature of the solution as well as the alcohol concentration.

Results :

During this project, we found that membrane distillation is a technic that allows us to partially dealcoholize a hydroalcoholic solution. In particular, it was shown that a temperature of 25°C made it possible to obtain an optimal flow of ethanol and that the variation in the air flow had no influence on the transfer. The concentration should not be too low for transfer to occur, but no significant difference was proven between 8% and 11% ethanol concentrations.

Keywords :

Membrane contactor, dealcoholization, solvent



Membrane distillation pilot

Contact(s) : florelle.charre@etu.umontpellier.fr pablo.lecoutre@etu.umontpellier.fr

UNIVERSITÉ DE MONTPELLIER POLYTECH MONTPELLIER

POLYTECH
MONTPELLIER

Water and civil engineering

Define the devices of waste water reuse after a water treatment plant

Oceane DURAND

The devices have to be in the respect of the legislation

Oceane DURAND *EGC*

Academic Supervisor : BOUYER Denis

Objective / Motivation :

With the water treatment knowledge learned in the EGC class and researches, I will have to choose the most appropriate criterions to define the best device to implement. I will create a decision support system. It will help everyone to choose the waste water reuse technique according to the future reuse of the waste water and the features of the water treatment plant. I will be link to various stakeholders like experts, water treatment plant's managers, suppliers, … They will give me user feedback and will help me to develop my knowledge.

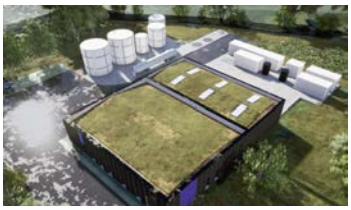
Results :

The final result of this project is to create a decision support system which will define the best device to implement in a water treatment plant to reuse waste water. This device will have to: - Cost as less as possible in terms of equipment and staff; - Make workforce the first choice instead of an external company; - Reduce the environmental impact and the global costs of the municipality.

Keywords :

Reuse ; water ; waste water ; water treatment plant ; environment ; environmental impact

The drought is one example of why we have to think about an alternative solution: the waste water reuse



The project called Vendée EAU will reinject waste water in the river Jourdain (the main potable water resource) after being treated.

Contact(s) : oceane.durand@etu.umontpellier.fr

POLYTECH
MONTPELLIER

Biological and Food Engineering

Ferygood

Rapport technique Concours Ecotrophélia 2022

Fiona BOSSON

Fiona BOSSON *GBA* **Nessie FOUGERAY** *GBA* **Lucie FRANCOIS** *GBA*

Academic Supervisor : Mme CHEVALIER-LUCIA Dominique / Mme MARCHESSEAU Sylvie / Mme BRETON Céline / Mme HOSTACHY Maeva

Nessie FOUGERAY

Lucie FRANCOIS

Objective / Motivation :

The Ferri'Team is a team of 6 students from Food Science and Biology at Polytech Montpellier participating in the ECOTROPHELIA food innovation competition. Sensitive to nutritional deficiencies in the world, the team has developed an innovative food product based on iron-rich legumes adapted to the needs of women and elderly people with deficiencies. The idea of developing a naturally healthy and tasty product made it possible to create a sweet 100% vegetable snack, naturally rich in iron, to relieve iron deficiencies.

Results :

The formulation of our product called Ferygood was carried out and optimized. It consists of a wafer, naturally rich in iron, with a fruit filling rich in vitamin C. Following our marketing study, our target group is urban women aged 25-50 and seniors. After a sensory analysis conducted with 130 potential consumers, 92.7% would be willing to purchase our product. Currently, our Ferri'Team is finalizing the design of the product but also the packaging in order to work on its industrialization plan while finalizing the start-up's business plan.

Keywords :

Iron - snacking - sweet - deficiency

Notre produit "Ferygood"

Contact(s) : fiona.bosson@etu.umontpellier.fr nessie.fougeray@etu.umontpellier.fr lucie.francois@etu.umontpellier.fr

Ferygood

Rapport technique Concours Ecotrophélia 2022

Mathis MICHEL

Mathis MICHEL *GBA* **Fanny MAIGRET** *GBA* **Samia EL OKACHI** *GBA*

Academic Supervisor : Mme CHEVALIER-LUCIE Dominique / Mme MARCHESSEAU Sylvie / Mme BRETON Céline / Mme HOSTACHY Maeva

Fanny MAIGRET

Samia EL OKACHI

Objective / Motivation :

The Ferri'Team is a team of 6 students from Food Science and Biology at Polytech Montpellier participating in the ECOTROPHELIA food innovation competition. Sensitive to nutritional deficiencies in the world, the team has developed an innovative food product based on iron-rich legumes adapted to the needs of women and elderly people with deficiencies. The idea of developing a naturally healthy and tasty product made it possible to create a sweet 100% vegetable snack, naturally rich in iron, to relieve iron deficiencies.

Results :

The formulation of our product called Ferygood was carried out and optimized. It consists of a wafer, naturally rich in iron, with a fruit filling rich in vitamin C. Following our marketing study, our target group is urban women aged 25-50 and seniors. After a sensory analysis conducted with 130 potential consumers, 92.7% would be willing to purchase our product. Currently, our Ferri'Team is finalizing the design of the product but also the packaging in order to work on its industrialization plan while finalizing the start-up's business plan.

Keywords :

Iron - Snacking - Sweet - Deficiency

Our product

Contact(s) : mathis.michel@etu.umontpellier.fr fanny.maigret@etu.umontpellier.fr samia.el-okachi@etu.umontpellier.fr

Creation of a formation's materials


Emilie ARDIET

Biological and Food Engineering

Emilie ARDIET

Company supervisors: Mme Laura MALINGREY
Academic supervisors: M Colas de la Noue

Pôle Sud - La compagnie des Desserts

Objective/Motivation:

As an ice cream specialist, Pôle Sud has several product lines and specificities of manufactures at the request of customers such as the vegan, organic or gluten-free range. Some fabrications must not contain certain allergens. Each production therefore requires special requirements in terms of good practices, cleaning, flow, organization, controls and sometimes liberating analyses. Employees may find it difficult to grasp the meaning and risk associated with each range or name listed below, there may be confusion between one mention and the other.

Results:

The interest is to present the ins and outs of the meaning of each mention. An important outcome of this project is the training materials that included several parts : Definition of an allergen, symptoms, the 14 mandatory allergens, the definition of the gluten free, vegan and biologic products and of course the mesures put in place. The objective is to avoid confusion between everything and give all the elements to do that by creating a visual materials.

Keywords: Allergen / HACCP / No gluten / Vegan / Bio

Presentation of the training

Contact : emilie.ardiet@etu.umontpellier.fr

Support in setting up the quality system of WeMed

Biological and Food Engineering

CAMEL Clara

Clara CAMEL

Academic supervisor: Delphine ESPI

WeMed (Company specialised in Medical Devices)

Objective/Motivation:

The missions I tried to accomplish were offered by Emmanuel SAINT MARTIN, an associate of the start-up WeMed. He was in need of someone that would work full-time on implementig the quality system of the company. In 2019, Cyrille LECROQ, the CEO, designed an innovative 3D-printed and connected stethoscope. The associate set an ambitious goal : to launch the Skop in early 2021.

Results:

Starting from scratch, I drafted the basis of the documentation system and achieved my main objective which was wirting the Quality Manual. I also took part in various tasks from project management with establishing the planification (Gantt) for market autorisation to the drafting of human factors test protocols.

Keywords: Medical Device, Quality, QMS (Quality Management System), Start-up

Reporesentation of The Skop - 3D-printed connected stethoscope

---

Contact : claracamel@yahoo.com

POLYTECH MONTPELLIER

UNIVERSITÉ DE MONTPELLIER

POLYTECH
MONTPELLIER

Computer Science and Management

Development of the web application eStory

Improvments of the existing application

Emilie JEAN

Emilie JEAN *IG* **Pierre PERRIN** *IG*

Academic Supervisor : Stratulat Tiberiu

Pierre PERRIN

IG

Objective / Motivation :

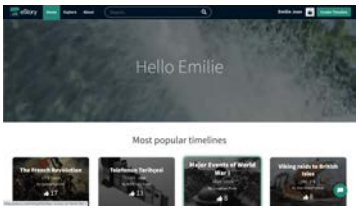
Our missions were to improve the existing application eStory. We had a lot of new functionalities to do, bugs to fix and tasks to design. The goal was to make the app more attractive for other people to use. Indeed, the business model of the application is to put affiliate links everywhere, and so eStory gains a percentage if someone buys via the link. We needed to add these affiliate links, and to display them in a beautiful way, without letting the user know.

Results :

In the end, we were able to develop all functionalities. We added affiliate links, a new system to enter dates when the user creates a timeline, we improved the recommendation algorithm, made some scraping from wikipedia to have more timelines to display, fixed bugs in the app like bad behavior, and many others. We were proud of us, and we learnt lots of new things like how to manage a project with lots of tasks to do.

Keywords :

React,NodeJS,eStory, timeline, MySQL, Scraping, Timeline, Event, History.



Home page of the eStory application

Contact(s) : emilie.jean@etu.umontpellier.fr pierre.perrin@etu.umontpellier.fr

UNIVERSITÉ DE MONTPELLIER

POLYTECH MONTPELLIER

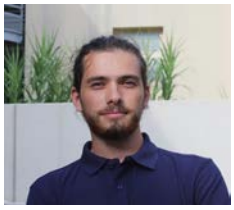
Data visualization dashboard

Widget creation that contains charts

Nicolas GALOIS

Nicolas GALOIS *IG* **Florian AUDIGER** *IG*

Academic Supervisor : Anne Laurent



Florian AUDIGER

Objective / Motivation :

The objective is the creation of a page for the visualization of internal data concerning key management figures. This page should contain modular aspects in order to facilitate the addition of various key figures in the future.

Results :

The dashboard contains widgets that can be resized and can contains various charts : number chart, line chart, pie chart. Those charts can be filled with various sources from an array of configuration, that allows future developpers to implement future needs.

Keywords :

Web development, Charts, Module, Events, Data

Logo of the solution proposed by Camatau

Concrete dashboard

Contact(s) : nicolas.galois@etu.umontpellier.fr florian.audiger@etu.umontpellier.fr

R2Devops - Creation of CI job on Gitlab

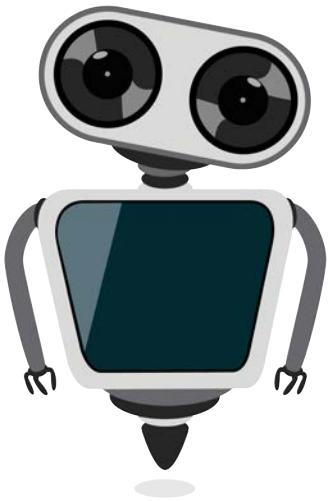
Development of Gitlab jobs and prospection in open-source project

Valentin GUYON

Valentin GUYON *IG* **Alexia OGNARD** *IG*

Academic Supervisor : Castelltort Arnaud

IG



r2devops.io

Objective / Motivation :

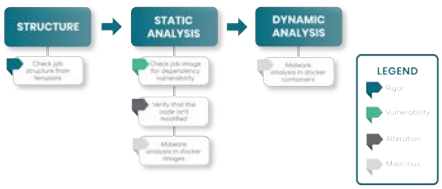
Go2Scale is a startup which develops DevOps services in open-source. R2Devops is their main product, it is a hub containing several jobs, which makes possible the simplified creation of CI/CD pipeline in a few clicks, in order to improve the quality of life of the developers. Our mission is divided into four parts: first, to perform at least three simple jobs to understand how R2DevOps works, then at least three more complex jobs, to prospect Gitlab projects and to propose 5 merge requests, 2 of which are to be accepted.

Results :

We followed our main objectives which were to create at least 6 easy and 6 complex jobs in total, we even updated some jobs from the hub. Our prospection work was a bit more complex even if we managed to propose 10 merge request in total, we struggle to get those accepted by the community.

Keywords :

CI/CD, DevOps, Gitlab, open-source, start-up, Montpellier, IG



Job from R2

Contact(s) : valentin.guyon@etu.umontpellier.fr alexia.ognard@etu.umontpellier.fr

UNIVERSITÉ DE MONTPELLIER

POLYTECH MONTPELLIER

Receipt analysis tools

TRF Retail

Imad LAOUANI

Ayoub MOUJANE

Imad LAOUANI *IG* **Ayoub MOUJANE** *IG*

Academic Supervisor : Esther Pacitti

Objective / Motivation :

We worked at TRF Retail as full stack developers. TRF Retail offers a SaaS solution to companies in the retail sector so that they can optimise and control their assortment and their commercial offer. Within this team, our mission was to set up a tool for analysing sales receipts. We developed several dashboards highlighting indicators from the receipts to help in the decision making process.

Results :

We believe that the expectations of the applicant were all met in time. Our first step was analysis and design. We worked with our client to identify their needs and developed a relevant analysis tool. We focused on 3 axes: analysis of tickets in real time, analysis by store and analysis of customer loyalty

Keywords :

data, graphics, retail, front end, back end, vue js, curves, matrix, analysis, decision, loyalty

Poster : Receipt analysis tools

Contact(s) : imad.laouani@etu.umontpellier.fr ayoub.moujane@etu.umontpellier.fr

Design and development of a data management platform

Applied to an integrated circuit for nervous system stimulation

Keven DVORIANOFF

Solene ISSARTEL

Keven DVORIANOFF *IG* **Solene ISSARTEL** *IG*

Academic Supervisor : Chouki TIBERMACINE

IG

Neurinnov

Objective / Motivation :

The project focuses on a device named HandyGrasp which is a complete system aimed at restoring the function of prehension in tetraplegic patients who no longer have voluntary control of their hands. The large number of internal configurations to be tested coupled with the need to perform these measurements on all the manufactured chips make any purely manual test impossible and require the development of an automated characterization platform.

Results :

The characterization platform, composed of a software part and a hardware part, will contain a database allowing the management, the analysis and the exploitation of the results. Our mission concerns the design and the development of the software part (database and data visualization).

Keywords :

chip - implant - prehension - database - data visualization - design - development

HandyGrasp device diagram

Contact(s) : keven.dvorianoff@etu.montpellier.fr solene.issartel@etu.umontpellier.fr

UNIVERSITÉ DE MONTPELLIER

POLYTECH MONTPELLIER

Sopra Steria

Smart Building

Raphael BOURRET

Raphael BOURRET *IG* **Guillaume CHEBIB** *IG*

Academic Supervisor : Isabelle BOURDON

Objective / Motivation :

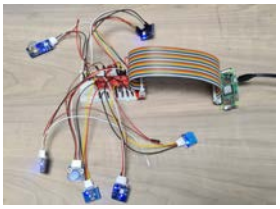
In 2020, the energy consumption of French buildings represented nearly 45% of the overall energy consumption in France. This energy consumption has a strong impact on greenhouse gas emissions, especially in CO2. Our end-of-studies project aims to reach a neutral carbon emission for the buildings before 2050, so it's important to act now in order to provide concrete solutions. That's why Sopra Steria has initiated a project to implement a Smart Building architecture. Specifically, this project intends to install various sensors (temperature, l

Results :

A POC of the system that will be placed in the differents rooms of the building. The system will carry an API to allow users to edit configuration and sensors remotely.

Keywords :

Smart-Building Asset Management Raspberry Pi python cloud Webservices



Installation Pi

Contact(s) : raphael.bourret@etu.umontpellier.fr guillaume.chebib@etu.umontpellier.fr

IOTOOLS

PFE

Aymeric COUPRIE *IG* **Guillaume DUFOUR** *IG* **Marine TEROITIN** *IG*

Academic Supervisor : Gwladys Toulemonde

Aymeric COUPRIE

Guillaume DUFOUR

Marine TEROITIN

Objective / Motivation :

Improve the web application used by managers, administrators and sensor installers in anticipation of the marketing of the product.

Results :

Deliver a functional application : improve its responsivity for mobile users, correct bugs and add new features such as having the possibility to have a spare tire on a vehicle.

Keywords :

Iotools - Sensors - Web - Kuzzle - React - Javascript

Contact(s) : aymeric.couprie@etu.umontpellier.fr guillaume.dufour@etu.umontpellier.fr marine.teroitin@etu.umontpellier.fr

POLYTECH
MONTPELLIER

Materials

Sustainable cargo

Life cycle analysis of a cargo travel

Gaetan MARTIN

Gaetan MARTIN *MAT*

Academic Supervisor : Eric Anglaret / Renaud Metz

Objective / Motivation :

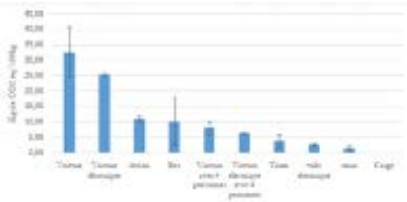
In todays world we tend to visit and travel all around the world. To do that we often use the plane because it's easier and faster. Every year, a lot of students goes in Canada in internship or to study but these travel is responsible for 26% of the green house gases emissions of our school. We tought about crossing the Ocean by cargo instead of plane in order to reduce our emission and this project is to compare the environmental impacts of a travel with these two devices and to find a company that could take us on their boats.

Results :

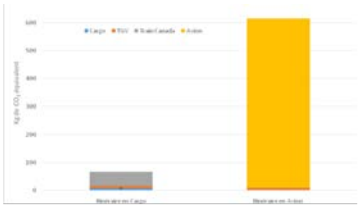
We found out that cargo was way better than plane to cross the ocean. In fact this emits less greenhouse gases but it also reduces the nitrogen dioxyde and the particulate matter emissions. The explanation is that the cargo carry so many goods that the weight of one person doesn't make any difference unlike plane where one more person is a lot. We also found a company to travel but they're close due to covid.

Keywords :

Life Cycle analysis



camparison of greenhouse gases emissions of different transport mode



camparison of greenhouse gases emissions of the two travels

Contact(s) : gaemartin@hotmail.com

Composite material for electrical application

Dispersion and rheology

Hugo DANIS

Hugo DANIS *MAT*

Academic Supervisor : METZ Renaud

Objective / Motivation :

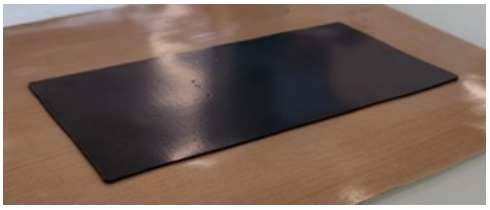
The design and miniaturization of electrical or electronic devices in the medium voltage field have led to the use of SF6 gas. This gas has a global warming potential 22,800 times greater than that of CO2. An emerging alternative consists of using new materials called electric field dimmers. These particulate composite materials have an electrical resistivity which decreases with voltage.

Results :

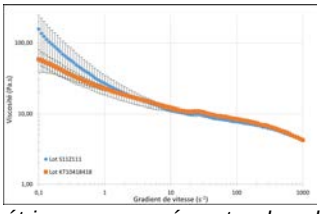
Sedimentation rate measurements, optical microscopy observations and rheology measurements suggest that one of the powder batches has relatively larger aggregate/agglomerate dimensions than the other. Furthermore, the convergence of the high shear rate characteristics suggests that the aggregates are destroyed on the first pass through the rheometer. It can also be concluded that rheology is an indirect technique for characterizing aggregates in a low shear rate domain.

Keywords :

composite, aggregates, agglomerates, silicone, GnP, rheology, field grading material



Composite final obtenu



Profils viscosimétriques comparés entre deux lots de graphite

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

Interaction of spores with guided light

simulation and experimentation

Margot STRABACH

Margot STRABACH *MAT*

Academic Supervisor : Vigreux Caroline / Kribich Raphael

Objective / Motivation :

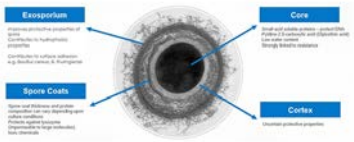
We want to find a way to avoid systematic treatments of crops and this is done through information technologies with sensors in the case of this project. Indeed, knowing that a good part of the treatments are preventive, we were interested in this solution whose stake is the early detection of spores so that only the necessary quantity is used.

Results :

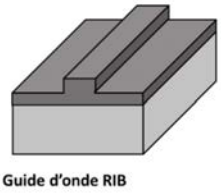
We could put forward a correlation between the signal obtained and the deposit. Indeed, we could observe that the more spores there are on the guide, the more the component responsible for the biggest change between each measurement is important.

Keywords :

Waveguides, spores, deposition, guided light, optics, evanescent field, simulations



Spore

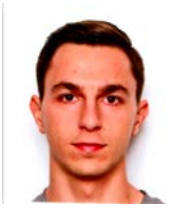


Waveguide

Contact(s) : margot.strabach@etu.umontpellier.fr

Valorization of rice husks in lenses for optics

Industrial Project of End of Studies Polytech



Alexandre MALRIEU

Alexandre MALRIEU *MAT*

Academic Supervisor : PIARRISTEGUY Andrea / MEHDI Ahmad

Objective / Motivation :

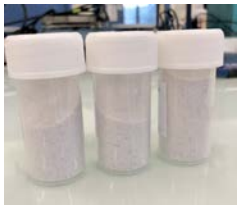
The project is dedicated to the use of a natural source of silica, derived from agriculture, for the elaboration of several glass compositions. For this study, we will use the husks (fibrous shells) of rice grains, which can contain up to 70% by weight of silica as raw material. After extraction of the silica by calcination, the silica will be purified before being used for glassmaking by fusion. This biosourced silica will be compared to commercial silica.

Results :

The silica obtained is an amorphous silica of the same composition as commercial silica. The glasses elaborated from this silica resulting from rice husk are of the same structure and have the same properties as a glass elaborated with commercial silica (sand of Fontainebleau).

Keywords :

silica, rice husks, glass



silica from rice husk

glass from commercial silica on the left and glass from rice husk on the right

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

Coating after chromating

Delay between chromating and coating application

Chloe DI RUGGIERO

Chloe DI RUGGIERO *MAT*

Academic Supervisor : Caroline VIGREUX

Objective / Motivation :

Currently in the company, the maximum time allowed between the realization of the chromating treatment, and the application of the coating is 48 hours. The problem is that this criterion is difficult to meet in production. The purpose of this study is to determine if the delay of coating application can be officially extended, which would allow the production to have more time to carry out the painting application.

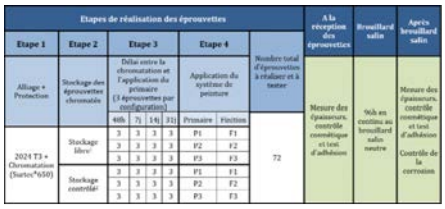
Results :

This subject is part of my work-study year. It is therefore studied over the whole year. So, for the moment, I have no results.

Keywords :

Aeronautic, Coating, chromating

Test system



Test plan

Contact(s) : chloe.di-ruggiero@etu.umontpellier.fr

Bamboo, a sustainable building material ?

Bamboo, a sustainable building material ?

Clemence DUMOULIN

Clemence DUMOULIN *MAT*

Academic Supervisor : Eric Anglaret / Renaud Metz

MAT

Big Bamboo
www.bigbamboo.world

Objective / Motivation :

The Big Bamboo company wishes to develop the bamboo market in France. From an ecological point of view, is it sustainable to import raw materials from Asia and South America? Does the use of bamboo for construction have a greater environmental impact than construction wood? Do the mechanical properties of bamboo depend on the species and the continent where they were produced? Is bamboo a sustainable and promising building material in Europe?

Results :

The life cycle analysis shows that it is viable to import bamboo from Colombia since its production and transport have a lower environmental impact than Swedish pine. In addition, mechanical tests have shown that bamboo has mechanical properties similar to construction wood, which makes it possible to affirm that bamboo can be used as a construction material, as is already the case in Asia or in South America.

Keywords :

bamboo, structure, life cycle analysis, mechanical properties

Bamboo samples for compression

Compression test on bamboo

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

UNIVERSITÉ DE MONTPELLIER

POLYTECH MONTPELLIER

Synthesis and characterization of carbon nanotubes

Optimization of the diameter distribution

Corentin GUITTON

Corentin GUITTON *MAT*

Academic Supervisor : Jourdain Vincent

Objective / Motivation :

During this project, the objective is the characterization and optimization of the synthesis parameters allowing a diameter distribution of carbon nanotubes of between 0.7 and 1.2 nm to be obtained. This dimension has an important application potential as emitters or absorbers in the near IR.

Results :

Observation of the impact of certain synthesis parameters thanks to Raman spectroscopy. Results need more data for the confirmation of this observation.

Keywords :

Carbon Nanotubes / CVD / Diameter / Raman / SEM / Photolitography / Synthesis parameter

SEM picture of carbon nanotube synthesis

Contact(s) : corentinguitton35133@gmail.com

Contrat de professionnalisation : projet photovoltaïque

ACTTE

Elsa MELLON

Elsa MELLON *MAT*

Academic Supervisor : Jean-Louis Bantignies

Objective / Motivation :

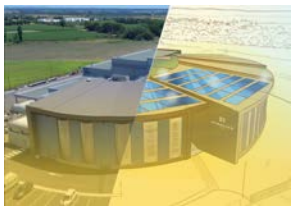
As part of my professionalization contract, I participated in the development of the citizen project called Hécaclès. The Hécaclès project consists of the installation of a photovoltaic plant on the roof of a wine cooperative. In the first phase of the project, the objective was to choose the supplier of the photovoltaic panels. To help the shareholders make this decision, I compared two major panel brands: VOLTEC and LONGI. I compared the economic models and the environmental impacts via a life cycle analysis study for both scenarios.

Results :

VOLTEC panels are made in France, they are much more expensive than LONGI panels made in China. On the other hand, the carbon impact of French panels is smaller than those manufactured in China. The investors of this project have unanimously decided to buy French VOLTEC panels.

Keywords :

Solar panel, Life cycle analysis, business plan, citizen project



Cave Héraclès

Contact(s) : elsa.mellon@etu.umontpellier.fr

Quantification of the environmental impact of the manufacturing process of refractory materials for firing

Life cycle analysis of a ceramic material

Emilie PASQUET

Emilie PASQUET *MAT*

Academic Supervisor : Papet Phillipe / Bantignies Jean-Louis

Objective / Motivation :

The Saint-Gobain Research Provence R&D center of the Saint-Gobain group aims to minimize the carbon impact of all products marketed by the group. To do so, it proposes a study on the quantification of the environmental impact of the manufacturing process of refractory materials: kiln furniture. The aim of the project is to carry out a life cycle analysis, using SimaPro software, by determining the carbon emissions from cradle to gate.

Results :

The simulation reveals that a kiln furniture emits about 12kg of CO2 equivalent. These results should be taken with some hindsight because even if the selected steps are representative of the manufacturing of the kiln furniture, the analysis must be more precise. This will allow us to obtain more reliable results to be able to think about possible ways of improvement.

Keywords :

Life cycle analysis - Ceramics - SimaPro - Saint-Gobain

Photo d'un support de cuisson

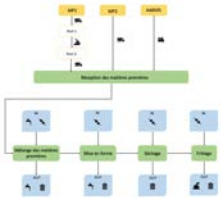


Diagramme de flux

Contact(s) : emilie.pasquet@etu.umontpellier.fr

Mechanical exfoliation of graphite in graphene with ionic liquids

Synthesis of graphene

Eric CERVOS NOGUER

Eric CERVOS NOGUER *MAT*

Academic Supervisor : Mehdi Ahmad

Objective / Motivation :

The main goal of this project is to improve the mechanical exfoliation of graphite for the production of graphene. In fact, graphene is a novel material with many innovative applications due to the very promising properties. The synthesis of this material represents the principal issue for mass production due to the expensiveness and the bad quality. That is the reason why we are investigating mechanical exfoliation, a low-cost method able to obtain high-quality graphene. Ionic liquids will be studied to show the technique improvement.

Results :

Thanks to this study, we found the best configuration to have exfoliation. We optimised the variables of the grindings, for exemple the time of ball-milling, the speed, the molar ratio of ionic liquid and the use of a solvent. Also, we studied and found the best ionic liquids to optimise mechanical exfoliation.

Keywords :

Graphene, Exfoliation, Graphite, Ionic Liquids, Ball-milling.

Ball-mill jars filled with grinding balls and graphite

Different sample tests

Contact(s) : eric.cervos-noguer@etu.umontpellier.fr

Titanium oxo and alcoxo phosphonates for the preparation of materials TIO2 -based hybrids

PFE

Antton ETCHEVERRIA

Antton ETCHEVERRIA *MAT*

Academic Supervisor : Guerrero Gilles

Objective / Motivation :

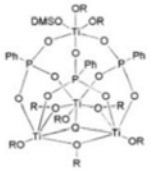
The objective of this PFE is to create an organic-inorganic hybrid material incorporating different metals (Ti, Zr) using a mixed sol-gel route resulting from a reaction between a phosphonic acid, a metal alkoxide and water. The first non-hydrolytic step aimed to prepare and characterize molecular mono or bimetallic oxo-alkoxophosphonate clusters as molecular blocks for the synthesis of the hybrid material.

Results :

Studies of the reactions of phenylphosphonic acid with pure or mixed Ti and Zr alkoxide in controlled ratio using 31P NMR in solution and IRTF spectroscopy confirmed the reaction between the reagents and the formation of a limited number of species. No molecular oxo-alkoxophosphonate clusters were isolated. Hybrid materials obtained after hydrolysis revealed to be amorphous and chemically homogeneous at the micronic level using EDX analysis. Solid-state 31P NMR and the ATG analysis should have been of interest for structural studies.

Keywords :

Cluster, 31P NMR, FT-IR, EDX, titanium and zirconium alkoxide, phosphonic acid, organic-inorganic hybrid material, sol-gel, metallic oxide



Ti oxo-alkoxophenylphosphonate cluster

Contact(s) : antton.etcheverria@etu.umontpellier.fr

Study of the effectiveness of bio-based plasticizers as an alternative to phthalates

Lucas CHERBONNEL

Study of the effectiveness of bio-based plasticizers as an alternative to phthalates

Lucas CHERBONNEL *MAT*

Academic Supervisor : Lapinte Vincent

Objective / Motivation :

For decades, phtalate plasticizers have been used mainly for PVC plastification. These plasticizers, in addition to being petroleum-based, are toxic and their use will gradually be banned. It is within this framework that this project to study the effectiveness of bio-based plasticisers as an alternative to phthalates was undertaken.

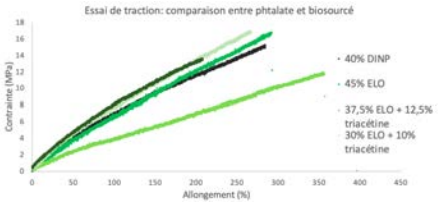
Results :

A number of biobased plasticizers were tested (epoxidized cardanol, epoxidized linseed oil, triacetin) and compared to a reference (a phtalate plasticiser): 40% DINP. The Young's modulus, stress at break and maximum elongation of the specimens showed that biobased plasticizers can perform as well as, or better than, the petroleum-based reference, such as 45% ELO.

Keywords :

Plasticizer, PVC, phtalate, DINP, bio-based, cardanol, ELO, linseed oil, triacetin.

plasticized PVC



tensile curve for comparison with DINP at 40%.

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

Quantification of the environmental impact of the electrofusion refractory materials manufacturing process

Lucas THIERCELIN

Cruciform AZS ER1632

Lucas THIERCELIN *MAT*

Academic Supervisor : Bantignies Jean-Louis / Papet Philippe

Objective / Motivation :

The project is dedicated to the environmental impact of electrofused ceramics designed on the SEPR site in Le Pontet (84). A life cycle analysis was carried out. The scope of the study extends from the extraction of the raw materials to the finished product. This type of life cycle is called "cradle to gate" and includes a number of approximations. The results highlight areas for improvement.

Results :

Based on this life cycle analysis modelling, calculations of the carbon impact have been made: The current production of a 23 kg ceramicvpiece produces approximately 24 kg of CO2 eq. Furthermore, the results of the study highlight the importance of extraction and thevnegligible impact of transport on the overall carbon balance. The company should therefore choose a supplier with a low carbon dioxide emitting electricity mix such as Norway. Indeed, this choice could reduce by 30% the C02 emissions linked to the extraction of zircon.

Keywords :

ceramic process, life cycle assessment, carbon footprint, Simapro software

a cruciform ceramic piece

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

Utilisation des maquettes à eau pour la métallurgie secondaire

Modélisation physique de l'écoulement de l'acier dans une poche

Lucie ANGLADE

Lucie ANGLADE *MAT*

Academic Supervisor : Muracciole Jean-Michel

Objective / Motivation :

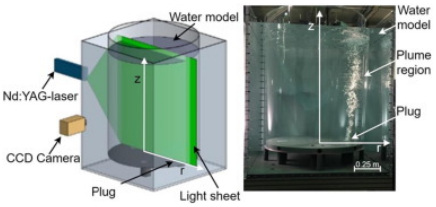
La mise à nuance de l'acier (liquide) a lieu dans une poche lors de l'étape de métallurgie secondaire. A ce stade, l'acier est à 1600°C, opaque et dans des poches de 300 tonnes : les phénomènes hydrodynamiques sont difficiles à caractériser. On va utiliser de l'eau pour simuler l'acier car a 20°C, l'eau a une viscosité dynamique quasi-similaire à celle de l'acier en fusion. Les maquettes avec l'eau garderont les proportions des poches industrielles avec des dimensions réduites pour faciliter la visualisation.

Results :

Création d'une vigie technique regroupant des résumés de 24 articles scientifiques. Ces études portent sur l'élimination des inclusions, la réduction du temps de mélange, l'érosion des réfractaires, la forme des jambes de l'enceinte RH, l'utilisation de différentes huiles pour simuler le laitier ... Toutes ces études utilisent des maquettes à eau. L'ensemble de ces expériences nous seront utiles pour proposer aux usines ArcelorMittal des moyens pour améliorer leur process mais également de nouvelles idées d'expériences à réaliser sur le campus

Keywords :

water model, water modelling, poche, ladle, rh, Ruhrstahl Heraeus, RH, steelmaking, secondary metallurgy, maquettes à eau



Maquette à eau poche

Contact(s) : lucie.anglade@etu.umontpellier.fr

Contract of professionalization

Mario MEGA

SNCF RESEAU

Mario MEGA *MAT*

Academic Supervisor : Frety Nicole

Objective / Motivation :

I carry out a contract of professionalization at SNCF Réseau, in the Establishment which takes care of all the works of maintenance and investment of the tracks and more precisely for the Fine service lines of the territory (LDFT). My position within this pole can be identified as assistant project manager, and consists of preparing, planning and monitoring different projects on these LDFT, managing all material supplies and the presentation of work to companies.

Results :

The objective is to work on an innovation strategy for the ecodesign and reuse of materials to achieve an industrialization of LDFT-specific track renovation processes. I carry out several technical-economic studies on these solutions of renovation of the tracks giving a second life to the materials. In particular on the elements that are too worn out and replaced on high-speed lines but that perform fully for the secondary network.

Keywords :

Reuse of materials is a future for the railway industry

Picture of a construction site with re-use of sleepers from a high-speed line

Contact(s) : mario.mega@etu.umontpellier.fr

Study and optimization of vessels steel for hydrogen transportation

Study and optimization of vessels steel for hydrogen transportation

Mathieu GARCIA DE LAS BAYONAS

Mathieu GARCIA DE LAS BAYONAS *MAT*

Academic Supervisor : Waltz Laurent / Olier Patrick / Retraint Delphine

Objective / Motivation :

The project is the study and the optimization of a steel pipe for the transport of dihydrogen. The study axes considered are to mechanically treat the surface of the steel in order to improve its resistance to hydrogen in order to reduce the quantity of material used. Indeed, the increasing demand for hydrogen requires the development of material solutions to reduce manufacturing costs and increase the quantity of hydrogen transported.We will evaluate the feasibility and the interest of the implementation of a surface hardening treatment.

Results :

The study of API 5L steel grades shows that high yield strength steel grades can be used in the presence of hydrogen. Shot peening, laser peening and SMAT treatments are promising and could increase the resistance to hydrogen embrittlement by creating compressive stresses on the surface of the material. They can even allow a reversibility of the hydrogen diffusion in the material. The objective of the continuation of the study is to obtain homogeneous and flat samples to test the hydrogen permeation and the effect of surface treatments.

Keywords :

hydrogen-steel-SMAT-Shot peening-pipeline-X80

X80 Pipeline

Contact(s) : mathieu.garcia-de-las-bayonas@etu.umontpellier.fr

IPad's Life Cycle Assesment (Polytech Montpellier)

Inter department project

Paul AGUT

Paul AGUT *MAT*

Academic Supervisor : Jean-Louis BANTIGNIES

Objective / Motivation :

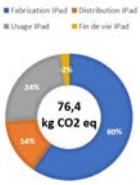
The Sustainable Development and Social Responsibility working group of Polytech Montpellier would like to launch a project in order to carry out a Life Cycle Assesment of the IPad to measure its environmental impact. Following this analysis, the results will be interpreted in order to validate improvement proposals.

Results :

The Life Cycle Assesment was carried out on 4 phases of the product: manufacturing, distribution, use and end of life. The lifespan of the IPad is 3 years, which is how long a student uses it during his or her engineering studies. For a single IPad, the results obtained showed an emission of 76.4 kg of CO2 for all 4 phases. 60% of this emission comes from manufacturing, 24% from use, 14% from distribution and 2% from end of life.

Keywords :

Life Cycle Analysis, IPad, Environmental impact



Environmental impact of the IPad (according to the different phases in percent)

Contact(s) : paul.agut@etu.umontpellier.fr

Material choice for the external antenna of an active implanted medical device.

Thibault BENOIST

Project conducted in the company Neurinnov

Thibault BENOIST *MAT*

Academic Supervisor : Vincent LAPINTE

Objective / Motivation :

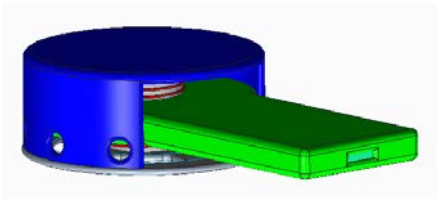
Neurinnov is developing an active implanted medical device that aims to restore the prehension function in a person suffering from high tetraplegia. This device is composed of an implanted part capable of stimulating the nerves of the arm by electrical impulses and an external antenna that transmits energy and information to the implanted part. The purpose of this end of study project is to establish a material choice for the encapsulation of the external antenna.

Results :

The material survey did not reveal any material dependencies that could impact the antenna processing cost. There are two classes of polymers of varying interest: - Engineering polymers: easy to process, lower material cost than high performance polymers, lower thermal and chemical resistance. - High performance polymers: good thermal and chemical performance, more difficult to process, higher material cost.

Keywords :

Medical device, material selection study, Biocompatibility, Standardization



External antenna of Neurinnov medical device.

Contact(s) : thibault.benoist@etu.umontpellier.fr

Development of a superconductor based levitator

Development of a superconductor based levitator

Clémentine FERRARI

Clémentine FERRARI *MAT*

Academic Supervisor : Vincent JOURDAIN/ Gilles GUERRERO

Objective / Motivation :

Analysis of the structure of a commercial levitator: elucidation of the nature of each component, creation of an experimental levitator. - Improvement of the levitation properties of the superconductor YBa2Cu3O7-x. Test of three synthesis routes: a "sol-gel" and two solid state synthesis using reagents in mass or molar ratio. Preparation of a composite material by dispersing the superconductor powder in a polymer matrix in order to lighten the system. Test of different foams in order to evaluate their efficacity to keep the superconductor cold.

Results :

The commercial levitator is composed of a poly(méthylmetacrylate) capsule, a melamine urea formaldehyde foam and a layered structure containing hastelloy, silver, MgO, silicon, aluminum and the superconductor Y123 dispersed in a gel matrix. Y123 superconductor has been by 3 different methods: the sol-gel method and the solid state (using reagents in molar ratio) superconductors have better levitation properties than the one made with reagents in mass ratio. A poly (ether urethane) foam was chosen because of its thermal insulation properties.

Keywords :

HTc superconductors, levitation properties

Different synthesised superconductors

Contact(s) : clementine.ferrari19@gmail.com

Study of the microstructure of AZS refractory materials

Gabriel PONS

AZS : electrocast refractory formed with 3 oxydes : alumina, zirconia, silica

Gabriel PONS *MAT*

Academic Supervisor : Fréty Nicole

Objective / Motivation :

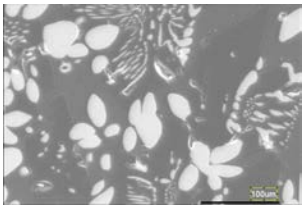
There are 2 objectives in this project. The first is to identify the presence (or not) of mullite seed crystals in the vitreous phase of a raw product by using Transmission Electron Microscopy (TEM). The second objective is to study the growth kinetics of mullite cristals after different heat treatment on samples. This study will be conducted using Scanning Electron Microscopy (SEM).

Results :

We have discovered the existence of mullite seed crystals in the vitreous phase of the native product. These seeds can grow according to the heat treatment conditions applied to the material.

Keywords :

Microstructure, TEM, SEM, crystals, glass phase, mullite, refractory, AZS, alumina, zirconia, silica.



Microstructure of an AZS ceramic observed with SEM using the mode "secondary electrons"

Contact(s) : gabriel.pons@etu.umontpellier.fr

Mechanic and 3D reconstruction

Materials part

Salah-Eddine MOUNTICH

Salah-Eddine MOUNTICH *MAT*

Academic Supervisor : Wattrisse bertrand

Objective / Motivation :

Minimally invasive liver surgery is a surgical technique not very invasive which reduces the risk of complication and the recovery time.The surgeon creates only small openings into which he inserts surgical tools and cameras that allow him to see the liver perform the operation. However, the scope of the endoscope is quite small, the surgeon's visibility is also reduced. 3D reconstruction can solve this issue. The aim of this project is to create a mechanical simulation of the operation, build a phantom organ and, set up a correlation bench

Results :

The 3D reconstruction from monocular images of flexible objects that deform over time is a rather open problem, but could lead to great advances, especially in surgery. In this project, a silicone phantom organ was fabricated and stresses were applied to deform it. This allows the identification of simple mechanical behaviours on the organ. A stereo correlation bench was set up to obtain images of the deformation. In order to complete the data obtained, a 3D scan was performed on the liver to obtain the 3D shape of the designed organ.

Keywords :

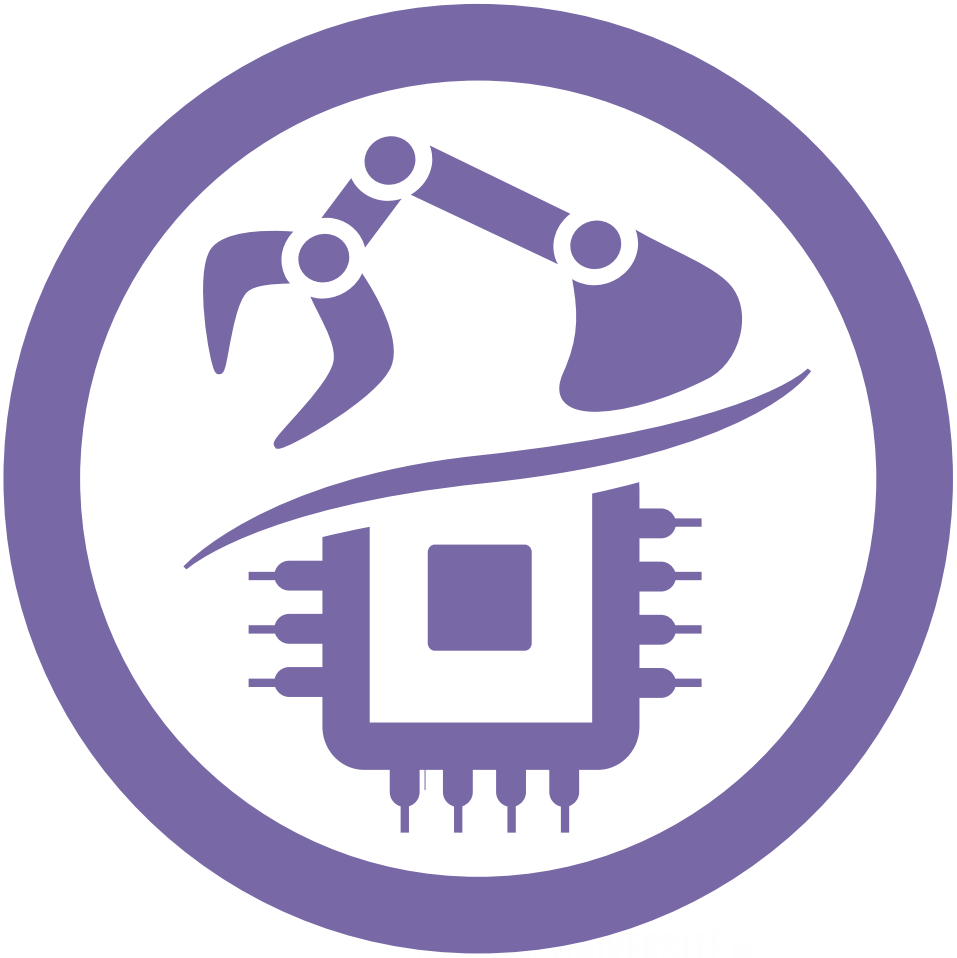
Mechanics 3D reconstruction Organ Phantom Liver Silicone Surgery Correlation bench

Silicone liver

Contact(s) : salah-eddine.mountich@hotmail.fr

POLYTECH
MONTPELLIER

Microelectronics and Automation



Refund of a GUI for a product configuration tool

.NET project in C++/CLI

Simon HURAULT

Simon HURAULT *MEA*

Academic Supervisor : Eric Dubreuil

Objective / Motivation :

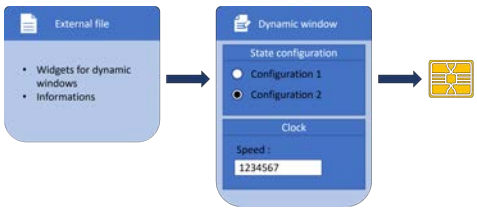
The goal of the project is to refund a GUI for an old product configuration software. The old version was made in borland C++. The main issue is the delay to show the dynamic windows. Dynamic window are forms in which the content is unknown at compile time. The widgets that will be added are described in an external file. After showing the dynamic window, the software needs to get the changes that happened and update it in the external file. The new look must not be too disruptive and be user friendly.

Results :

We use the .NET's framework and we code in C++/CLI to ensure the code can be reused in another framework. We created an algorithm that place the widgets in the form. We created an API that allows us to go through the widget tree and to handle the modification that occurs in the dynamic window. The dynamic windows take less than 1 seconds to appear. The design has changed a lot and is still improving. We also adapted the basics features to the new framework.

Keywords :

C++/CLI, .NET, GUI, STMicroelectronics, Winform, dynamic windows.



Fonctionnement du logiciel

Contact(s) : simon.hurault@etu.umontpellier.fr

Suivi de la fermentation alcoolique par mesure d'impédance

valentin lefebvre mea5 2021/2022

Valentin LEFEBVRE

Valentin LEFEBVRE *MEA*

Academic Supervisor : comte mariane

Objective / Motivation :

Abstract Processing wine must be monitored strictly. We need to watch many parameters one of these parameters is the level of CO2 in the grape must. The publication 'impedance spectrometry for monitoring alcoholic fermentation kinetics under wine-making industrial condition' shows that the impedance of a liquid during fermentation process is linked to the production of CO2. The first purpose of this project was to make a device that can measure the impedance of a liquid during fermentation.

Results :

We studied different devices that are made to measure such impedance and then started designing our product. We programed our device, through an eval-board, and then we made our own board, which is plugged, to a STM32 microcontroller. The second objective was to analyse the data that we obtain thanks to our first measurement with chardonnay grape juice and must that the laboratory SPO gave us. Our analyser thanks to our Python script will store data into a CSV file. We can analyse our data afterwards with a spreadsheet like Excel.

Keywords :

alcool

Contact(s) : valentin.lefebvre01@etu.umontpellier.fr

Development of an Ultra-low Power Radio Communication and Underwater Tracking System for an Exploration Robot

Tianxu LI

Using breadcrumb lines to assist underwater signal transmission

Tianxu LI *MEA*

Academic Supervisor : VENA Arnaud

Objective / Motivation :

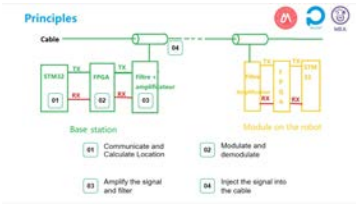
The goal of this research is to solve the problem of underwater exploration robots using electromagnetic waves for communication and localization. Build a module that will allow the robot to communicate underwater.

Results :

Verified underwater communication without hard wiring via underwater cables (breadcrumb lines). The module for injecting the signal into the cable, the modulation module for the transmitted signal, and the filtering and amplification of the received signal are completed.The signal demodulation module is still being perfected.

Keywords :

Underwater Communication, Radio System, Data Transmission



The overall schematic diagram of the system

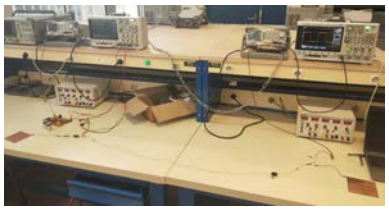


Photo of testing hardware

Contact(s) : tianxu.li@etu.umontpellier.fr

Time Petri nets

Reduction of Time Petri nets

Tatiana DEWILDEMAN

Tatiana DEWILDEMAN *MEA*

Academic Supervisor : Andreu David

Objective / Motivation :

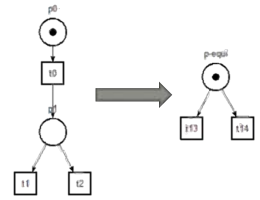
The objective of this project is to reduce time Petri Nets to favor their analysis and validation. Those nets are used to design the digital architecture of an implanted stimulator, dedicated to the restoration of hand grasping for quadriplegic patients. The motivation of this project is the possibility to help people to return to an almost normal life.

Results :

Reduction rules are implemented and validated, they can be selected through a graphic interface. Full documentation of the rules and their programmation is provided.

Keywords :

Time Petri nets, stimulation, tetraplegic



Reduction rule 1 of Sloan rules: Serial Fusion

Graphic interface

Contact(s) : tatiana.dewildeman@etu.umontpellier.fr

Robotisation of a kite wing

Design of a command law on microcontroller

Vincent CAUSSE

Vincent CAUSSE *MEA*

Academic Supervisor : Laurent Latorre/ Loïc Daridon

MEA

LABORATOIRE de MÉCANIQUE et GÉNIE CIVIL

Objective / Motivation :

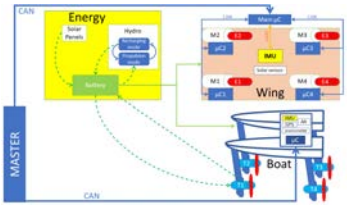
The goal of this project was to control a kite wing, moving it to the desired orientation. The control of this wing is a part of a bigger project of an autonomous sea drone that can sail in the sea or ocean during a long time without human intervention. My goal in this project was to control the orientation of the wing by embedded programming on microcontrollers. The wing is hold by four ropes attached each at an angle of the wing. The ropes are drawn by four winches that are controlled by four motors. I had to control it to give desired angles

Results :

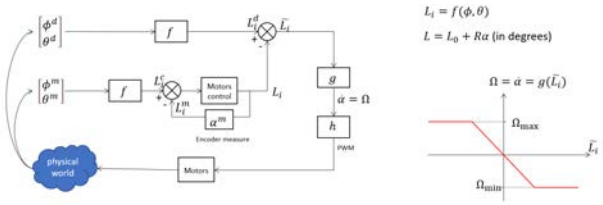
I implemented several command laws in embedded code on little microcontrollers linked to the motors such as an hysteresis command, but the command I implemented wasn't satisfying enough to be kept as the command used in the final prototype. However, it allowed to see how the system responds, and to show the limits of the position sensors data. Moreover, I didn't have enough time to design and implement the global command by the main microcontroller since the command on the lower level wasn't finished. The command that'll be kept is trapeze law.

Keywords :

Kite, trapeze command, hysteresis command, microcontroller programming, register programming, PID corrector, STM32, embedded programming, Kite wing command, autonomous sailing drone.



Drone architecture



Global command law

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

UNIVERSITÉ DE MONTPELLIER

POLYTECH MONTPELLIER

Evaluation de solutions électroniques pour la récupération d'énergie

Microelectronics and Automation

David Jiménez Caballero

David Jiménez

Academic supervisors: Laurent Latorre / Pablo García-Linares

UNIVERSITÉ MONTPELLIER / POLYTECH / MEA

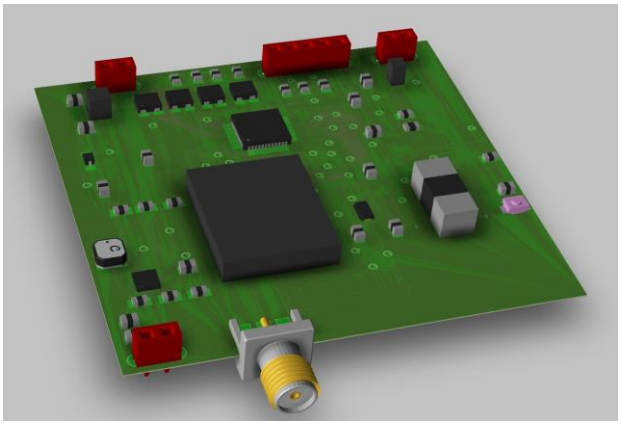
Objective/Motivation:

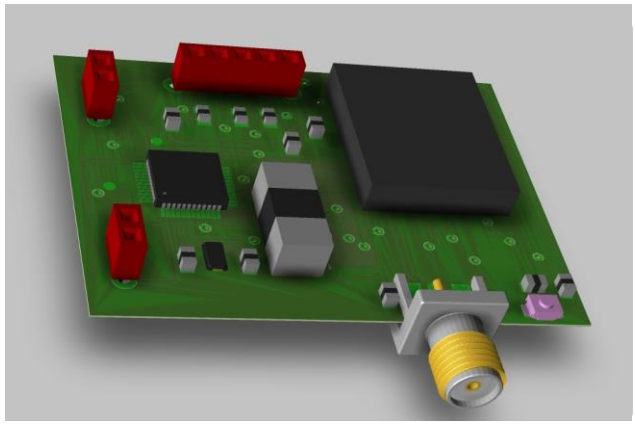
The objective of the project is to be able to develop a PCB that allows to harvest energy from the environment and use it to charge batteries.

Results:

Two PCBs, the main one that harvests and sends the information via RF module and the receptor one that catches that information and delivers to a computer.

Keywords: Embedded Systems, Energy Management, Photovoltaic, Battery, PCB, RF.





PCB Allegro Editor, Friday 29th January 2021

Contact : david.jimenez-caballero@etu.umontpellier.fr

Remote Control

Subject proposed by the spin-off company Neurinnov

Thomas GROSSE

Thomas GROSSE *MEA*

Academic Supervisor : ANDREU David / HIAIRRASSARY Arthur

Objective / Motivation :

This project deals with the restoration of motor functions for individuals who have lost the use of their arm. Everyone don't react the same way to neural electro-stimulation. In order to adapt the stimulation, we offer a specialized remote control. This product will allow the practitioner to modify parameters in real time and in the most intuitive way possible with a set of actuators and a graphical user interface on a computer.

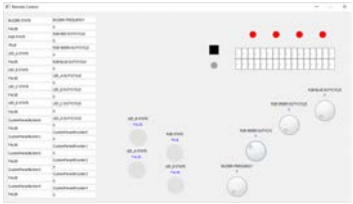
Results :

The result of our development is partially functional. The hardware structure provides a good working basis for the future. The graphic interface could be improved on its functionalities but allows to personalize the remote control and to communicate with. Finally, the embedded software part deserves the most attention for the future. The principle is good but latencies make the system slowing down.

Keywords :

Electro-stimulation Motricity Medicine Neurostimulation AIMD electrophysiology Parameterization

Remote



Graphical User Interface

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

Smart wireless parking spot detector for parking slot guidance

Anthony FERRY

Professionalization contract

Anthony FERRY *MEA*

Academic Supervisor : Dubreuil Eric

Objective / Motivation :

During my professionalization contract at Ineo-Sense, I worked on their Switch-Range product which allows to measure distances. I integrated the ultrasonic sensor CH201 from TDK InvenSense. Entirely based on wireless technologies, this product eliminates wiring problems, significantly reduces energy consumption, but also optimizes the customer's route when used as a free space detector.

Results :

The product works, allows to measure distances from 20cm to 5m. It can be integrated into LoRa, sigFox, or Clover-Net (Ineo-Sense proprietary technology) wireless networks. It works with a battery that offers an autonomy of about 10 years depending on the settings (measurement frequency and RF sending). For 2000 parking spaces, this product saves up to 12 km of cables, 20 tons of steel, and 20 to 30% of energy.

Keywords :

ToF Ultrasound low energy parking guidance

Prototype

Contact(s) : anthony.ferry@etu.umontpellier.fr

Security analysis of random access memory

Security analysis of random access memory

Constantin GABOURY

Constantin GABOURY *MEA*

Academic Supervisor : Florent Bruguier

Objective / Motivation :

Magnetic Random-AccessMemories (MRAM) are a specific type of memories that works on a different principlethan classic RAM butwere never widely commercialized. They are less sensitive to electromagnetic radiation compared to other memories and has interesting applications in the space science and military fields. The project takes as part of the thesis of my tutor. His subject is to make a security study of these MRAM memories.

Results :

The RowHammertests on the MRAM,they were inconclusive, no vulnerabilities were identified. However, we discovered that the current difference between writing 0 and 0xFFFF and reading at address 0 and address 0x3FFFFwas observable. We also discovered that the first 4 address bits were stored in a buffer.

Keywords :

MRAM, magnetic random access memory, FSMC, RowHammer

PCB circuit

Contact(s) : constantin.gaboury@etu.umontpellier.fr

Hicham FAITOUR

System for locating people in an indoor environment, based on RFID tags

Locating indoor, RFID tags

Hicham FAITOUR *MEA*

Academic Supervisor : Vena Arnaud

Objective / Motivation :

In this project, one of the goal is to track the movement of visitors, so we developed an indoor localization system based on RFID technology. For example, knowing the path in the museum can be useful to make statistics regarding the interest of the visitor for a specific artwork.

Results :

Functional board with an RFID reader, IMU, RTC module, SD card reader and an Audio Logger. So we can understand the actual visitor experience by observing movements and we collect his impressions with the audio logger.

Keywords :

RFID, Indoor, Audio Logger, SD card, RTC, STM32 L432KC, localization, museum, embedded system

Board with RFID module and STM32L432KC

Contact(s) : hicham.faitour@etu.umontpellier.fr

Patient intent detection based on inertial unit

Patient intent detection based on inertial unit

Kevin DELVALLEZ

Kevin DELVALLEZ *MEA*

Academic Supervisor : Andreu David

Objective / Motivation :

Detect shoulder movement of tetraplegic patients with no error and a recognition rate near 100%, thanks to an algorithm and two inertial units placed on the shoulder of the patient. Indeed, those results will be used to control their hand, thanks to Active Implantable Medical Devices (AIMD).

Results :

The algorithm can detect forward, upward, backward or downward movement, with an average recognition rate of 97%, without having any errors. However, the optimum configuration is not yet determined.

Keywords :

AIMD Tetraplegic Shoulder movement detection inertial unit

Final prototype version

Contact(s) : kevin.delvallez@etu.umontpellier.fr

Automated Microbrewery

How automation can help home brewer

Nathan LEROY

Nathan LEROY *MEA*

Academic Supervisor : Guy Cathébras

Objective / Motivation :

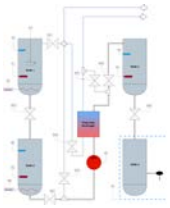
Brewery is a long process, physical and hard. It is why automated it is useful and help brewer to focus on how they can improve their beer. It needs to manage mashing, boiling, fermentation and conservation step. Currently, a microbrewery cost between 300€ and 20 000€, but it can be homemade for the details. So, this is the project aim, create an home made automated microbrewery.

Results :

A homemade microbrewery needs a microcontroller to control solenoid valve, level and temperature sensors, heating resistor and a GUI. We propose to use a Raspberry Pi B 3+, able to host a Wi-Fi hotspot, read and write data through GPIO with RPi.GPIO library and read analogic data with an MCP3008. It can also control solenoid valve with relays, or heating resistor with a wave train modulator. Finally, it can manage a web GUI with HTML, Python and JavaScript code, in the aim of display data or control output GPIO. These features have been tested

Keywords :

Microbrewery, beer, Rapsberry, automation, GPIO



Schematic of sensor and command on the microbrewery

Contact(s) : natleroy1@gmail.com

Automation of ultrasonic waves test bed

Automation of ultrasonic waves test bed

Xavier SULLI

Xavier SULLI *MEA*

Academic Supervisor : AUGEREAU Franck

Objective / Motivation :

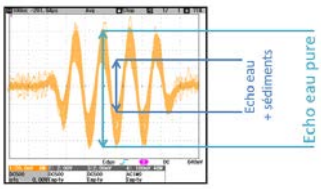
The goal of the project is to automate a test bed which use ultrasonic waves generated by a piezoelectric sensor. The ultrasonic waves spread on the water, then they are reflected on a wall. Thanks to the amplitude of the reflected waves in two types of water (clean and dirty) we can get a ratio that give use the concentration of sediments.

Results :

To use the signal generated by the sensors, I have designed an electronic circuit which shape the signal by removing the negative alternation of the signal. After this I have modified the electronic board to average the signal and just retrieve the envelope. Thanks to an analog to digital converter embedded on the STM32, I succeeded to sample the signal generated by the sensors.

Keywords :

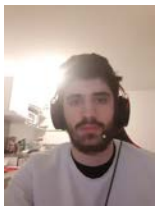
Analog to digital conversion, STM32, Ultrasonic waves, water quality



Signal generated by the sensor

Contact(s) : xavier.sulli@etu.umontpellier.fr

Development of a radar system for the detection and localization of birds on wind farms by radar/camera coupling



Valentin TEZZA

Valentin TEZZA *MEA*

Academic Supervisor : Mariane Comte / Hypolite Le Nabat

Objective / Motivation :

The project is anchored in a context of preservation of the avifauna around wind turbines, which alone cause more than 1 million deaths in the USA. The objective of the project is to improve an already existing system, the SafeWind system, which detects birds using cameras, and to incorporate a boat radar.

Results :

The first objective of this project, which was the feasibility of the method on a particular wind farm, was achieved theoretically, only a field test is missing. The second objective was the optimal placement of the radar on an inshore park, then to try to automate the method using a program. The optimal placement on a designated park was made, but the optimization was not finished. For the sizing of the battery and the solar panels, the work consisted of developing a spreadsheet calculating the power required to supply the radar 24 hours a day

Keywords :

Avifauna, wind farm, feasibility sutdy, self-sufficient in energy, spreadsheet, radar

Radar placement program image

Photo of the radar used by the company

Contact(s) : valentin.tezza@etu.umontpellier.fr

Multi-sensor system embedded for marine biology

Multi-sensor system embedded for marine biology

Victoria BIAL

Victoria BIAL *MEA*

Academic Supervisor : Fabien Soulier

Objective / Motivation :

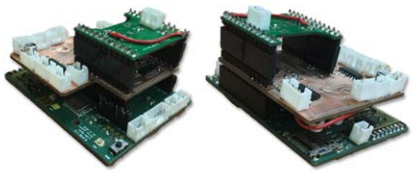
Marine life in lagoons at the south of Montpellier is threaten by dinoflagellates (toxic algae). Factors favouring their growth must be known to limit them. Characterizing the water properties in which those algae are growing is proposed. pH fluctuates because of warmth and luminosity. This project is about monitoring the growth of dinoflagellate algae with various sensors.

Results :

The objective of this project is to make pH, temperature and luminosity sensors that will follow the environment of the algae. The pH is measured with Ion-Sensitive Field-Effect Transistors (ISFET) manufactured by the Laboratory of Analysis and Architecture of Systems (LAAS). The luminosity is measured by counts, providing us the irradiance. This prototype measures at four levels along the pillar it is placed on, via immersed sensors. All the sensors are connected to a STM32 microcontroller, and stores data in an EEPROM.

Keywords :

Environmental Sensor / Self-Sufficient / Embedded System / Dinoflagellates



prototype sensors

Contact(s) : victoria.bial@etu.umontpellier.fr

Design, integration and prototyping of peripherals in an embedded system

VHDL design of peripherals for a microcontroller

Remy BAILLET

Remy BAILLET *MEA*

Academic Supervisor : SORIANO Théo / BENOIT Pascal

Objective / Motivation :

Integrate peripherals to test edge computing applications with rich sensors data output processed thanks to a RiscV microcontroller named ICOBS designed by the ADAC team from the LIRMM?s French laboratory. I needed to implement a HDMI output, a microphone and a camera that can be used through software by connecting them to the architecture using different methods. The goal of this project is then to show an image of the camera on a screen connected through the HDMI output while having the possibility to get microphone data.

Results :

Integrate peripherals to test edge computing applications with rich sensors data output processed by machine learning thanks to a microcontroller designed by the ADAC team from the LIRMM?s French laboratory. I needed to implement a HDMI output, a microphone and a camera that can be used through software by connecting them to the architecture using different methods. The goal of this project is then to show an image of the camera on a screen connected through the HDMI output while having the possibility to get microphone data.

Keywords :

VHDL, Microcontroller, Peripherals, RiscV, Camera, Microphone, SPI, HDMI, MIPI, Data, LIRMM, ICOBS

Nexys Video with an FMC Pcam Adapter to connect the camera with an oscilloscope (Analog Discovery 2) to make sure that everything work as intended

Contact(s) : remy.baillet@etu.umontpellier.fr

Data fusion : the calibration of raw data sent by a unit inertial measurement for underwater robots

Ayoub
LACHEHAB

Inertial data calibration

Ayoub LACHEHAB *MEA*

Academic Supervisor : René Zapata

Objective / Motivation :

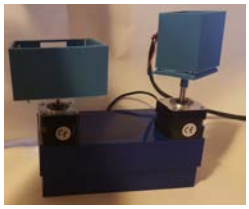
In this project, the goal was to validate data received from the submarine's electronic board. My contribution to the project was to design a prototype that allowed the validation of the calibrated data after acquisition. Thus, I used an inertial measurement unit, or IMU, in order to determine the orientation of the submarine.

Results :

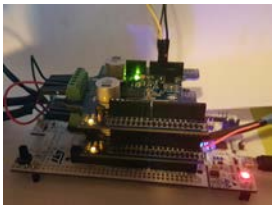
IMUs included a gyrometer, a magnetometer and an accelerometer, of which the data received could then be used to compute a quaternion vector and get a general sense of the submarine's current orientation. This project is useful as the program used to validate the data is modular and could be used on the same IMUs in another system.

Keywords :

Calibration, IMU, AHRS, gyrometer, magnetometer, accelerometer, orientation, quaternion vector



The Verification Prototype for IMU Board



Hardware of the project

Contact(s) : ayoub.lachehab@etu.umontpellier.fr

Design of a GPS/LoRaWAN tracker using the SEMTECH LR1110

Mohamed Reda ARIFI

Low power geotracking

Mohamed Reda ARIFI *MEA*

Academic Supervisor : Laurent Latorre

Objective / Motivation :

Geotracking, also known as geopositioning, is a crucial IoT necessity allowing the real-time monitoring of goods, wildlife and devices etc. In this project, I will be developing a software solution to take advantage of the capabilities of LR1110. This project was carried out in multiples steps. First step consisted in developing a software solution to take advantage of the GNSS tracking capabilities; both the autonomous mode and the assisted mode were implemented while assessing the performance of each mode.

Results :

When we combine all the software that was developed into one comprehensive software solution and after implementing some optimizations to improve power efficiency, we end up with a firmware capable of geotracking a device no matter where it is: indoor or outdoor. The next chapter of the project will be during an internship, where the goal will be to take advantage of all the knowledge acquired during this project in order to develop a product for the company ELA Innovation around the GNSS module the LR1110.

Keywords :

Geotracking, GNSS, Wi-Fi, LoRaWAN, Low power.

GNSS assisted scan mode results

GNSS autonomous scan mode results

Contact(s) : mohamed.arifi@etu.umontpellier.fr

Tyre pressure monitoring system for heavy vehicles

Hugo COURRèGES

Design of a tyre pressure monitoring system sensor for heavy vehicles in order to comply with the standards that are up to come.

Hugo COURRèGES *MEA*

Academic Supervisor : Eric Dubreuil

Objective / Motivation :

This project was made in collaboration with the start-up IOTOOLS. The goal was to implement a tyre pressure monitoring system (TPMS) sensor for heavy vehicles in order to comply with the laws and standards that are to come. For that, the goal was to first search on different TPMS system and the standard on these systems. In the second part of the project an eval-board was to be implemented the project was to send information about temperature et pressure in 434 MHz and code the protocol receiving programming messages in 125 kHz for the MCU.

Results :

The prototype of this project is not final as it does have some errors. However, for testing purposes in a first study, it still is a useful tool for testing signal modulation and encoding work in a new environment such as a truck. As for the part concerning the message decoding, all the work is done and is fully functioning as long as modulation and encoding remain unchanged. Some explanations on the used blocks under GNU radio and pieces of advice useful to beginners can be found. Lastly, python script for decoding the message is provided.

Keywords :

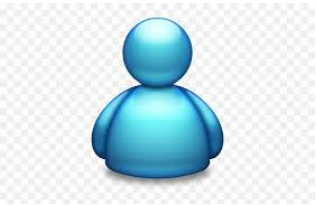
TPMS, radio, microcontroler, sensor, modulation, encoding, Eval-board

Picture of the finished Eval-board

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

Effaroucheur à chauves-souris à ultrasons

Effaroucheur à chauves-souris à ultrasons



Cedric DAGON

Cedric DAGON *MEA*

Academic Supervisor : Le Nabat Hypolite / Comte Mariane

Objective / Motivation :

The number of wind turbines increases drastically, and they are already implanted in areas where bats live. This is a danger for them. So, I have to develop a system that is able to protect bats lives. I worked on a bat deterrent system able to repel bats from wind turbines. It would repel bats by producing an ultrasound. This startle would be triggered by an ultrasound detection system developed by the company.

Results :

I used piezoelectric transducers to emit an ultrasound. To amplify the sound level I can use a sounding board. Using piezoelectric transducers I can produce ultrasound at several frequencies in the range 20 kHz-120 kHz. I am currently trying to measure the sound level of the emitted ultrasound. I have to design the whole circuit around the piezoelectric transducers. Then, I will test the prototype and see if it's working.

Keywords :

Piezoelectric. Transducers. Bats. Ultrasound. Prototype.

Contact(s) : cedric.dagon@etu.umontpellier.fr

Design and development of a current/voltage amplifier for a nervous system stimulator

Noëlie BOURGEOIS

Simulation, design and test

Noëlie BOURGEOIS *MEA*

Academic Supervisor : ANDREU David

Objective / Motivation :

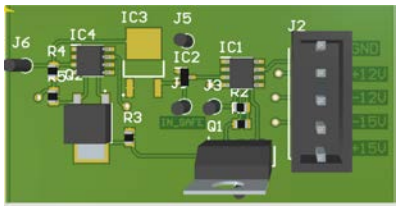
The project presented in this report aims to produce a current/voltage amplifier for Neurinnov. It is a company specialised in Active Implanted Medical Devices (AIMD). The amplifier to be designed will amplify the current coming from an integrated circuit already created by the company, but which is designed for implanted stimulation. The amplification must be of a factor of 25 to go from a current of 6 mA to 150 mA. By amplifying the currents coming from this chip by a factor of 25, it will be possible to achieve external stimulation. The obje

Results :

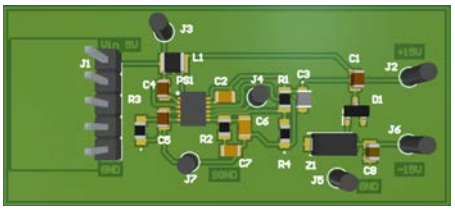
For the moment the assembly is half functional. As a result of this work, it was necessary to create an internal voltage generator. The circuit diagram was designed, simulated and remains to be tested.

Keywords :

Medical device - Current amplifier - Local voltage generator – Stimulation



Amplifier stage



Boost DC/DC convertor

Contact(s) : noelie.bourgeois@etu.umontpellier.fr

Contrat pro: power regulation and connectivity for tidal turbines

Generating clean electricity from the power of water

Tanguy MITCHELL

Tanguy MITCHELL *MEA*

Academic Supervisor : Dubreuil Eric

Objective / Motivation :

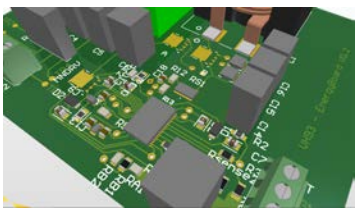
I have chosen to work for VH Quatrevingtreize to make my part in the renewable energy transition. The company manufactures the turbine in-house, using bio-sourced materials and takes into account the recycling at the end of life. The first goal of my apprenticeship is to connect the tidal turbine to the electricity grid. To achieve this goal, we must output a stable 230V at 50Hz. The second objective is to design an IoT module enabling datalog and remote configuration.

Results :

The project is obviously not fully completed because it lasts until the end of August. I have focused on the most urgent project: power regulation. The tidal turbine outputs alternative voltage between 20V and 100V at a frequency of a few hertz. It is first rectified to a continuous voltage by using a diode bridge. Then, a switching regulator boosts or reduces the voltage to a fixed value of 24V. I have designed a circuit board, printed and soldered it to achieve this regulation. It is currently under test and should be shipped with the turbine

Keywords :

tidal turbine, renewable energy, electricity, auto-consumption, autonomy, power regulation, rectifier, inverter, IoT, connectivity



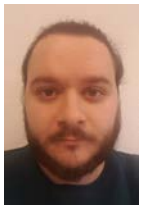
Power regulation board

Contact(s) : tanguy.mitchell@etu.umontpellier.fr

Audio recognition based on machine learning

Tiny Machine Learning on open source ICOBS architecture

Aurélien BOUCHOT



Aurélien BOUCHOT *MEA*

Academic Supervisor : Benoit Pascal

Objective / Motivation :

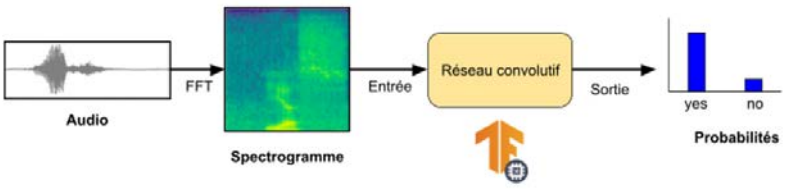
This project fits into a framework of research and experimentation on the hardware architecture on a RISC-V architecture. In this context is added the intention to verify the feasibility of application of Edge computing through measurements of consumption, speed and computing power of the architecture. However, in order to test this architecture, an application must be realized. The chosen application involves audio processing using tiny machine learning solutions based on a Tensorflow Lite model.

Results :

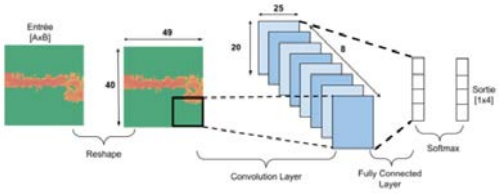
This project has been completed from start to finish with good results. Three application has been created and working well on recognition of differents words like "yes", "no". It can also rocognize when silence is occuring and also he can tel if he doesn't know the word.

Keywords :

Machine Learning , Tiny Machine Learning, Microcontroler, RISC-V, Audio recognition, Spectrogram, Tensorflow Lite



Audio recognition steps



Convolution model

Contact(s) : aurelien.bouchot.pro@gmail.com

Calibration d'horloges internes aux STM32

Contrat de professionnalisation au sein de STMicroelectronics

Emma
LADOUX MARTINEZ

Emma LADOUX MARTINEZ *MEA*

Academic Supervisor : COMTE Mariane

Objective / Motivation :

After the manufacturing process, we can see some failures on the STM32 devices which are microcontrollers developed by STMicroelectronics. The objective of my project is to find a solution the fastest and most accurate possible to trim the clocks presents in the STM32 before we sent the board to the client. This project was developed on the STM32L4 family by the last year student who was working on it. My work is to develop solutions for the STM32U5 family.

Results :

I first, had to work on the two STM32 to study the behavior of clocks. I observed that there were similarities with the L4's. I then used the same method: configure a project to measure the frequency and then implement algorithms to obtain the value as close as possible to the sought frequency. Then, I created a new project, in which I coded the frequency measurement. After that I implemented some algorithms. I then compared them by looking at the time they took to run and the accuracy they gave.

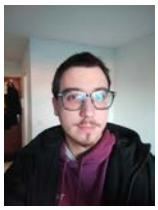
Keywords :

STMicroelectronics - STM32 - clock trimming

Nucleo STM32 on which I worked

Contact(s) : emma.ladoux-martinez@etu.umontpellier.fr

Analysis of the carbon impact of connected objects



Thomas TENRET

Study on the use of the iPad at Polytech Montpellier

Thomas TENRET *MEA*

Academic Supervisor : Torres Lionel

Objective / Motivation :

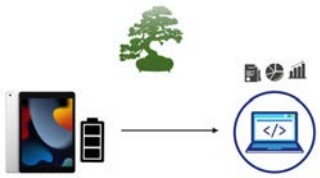
Questioning the value of the iPad in school Feasability study for having solutions to measure the power required to charge the device, collect the charge cycle and consumption. Give keys to measure the carbon impact of the use of the iPad, but also of the use of other products that interact with it.

Results :

We have collected the cycle of charge of some volunteers and measured their impact carbon on the usage since they have received the device. We also give some examples of utilization of the software. We compare performance of three iPad's conference apps and collect internet data.

Keywords :

carbon impact iPad software development Python analysis feasibility study



Software_development_representation

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

POLYTECH
MONTPELLIER

Mechanical Engineering and Interactive Design

Contrat de Professionnalisation à ALSTOM

Méthodologies 3D au sein de l'équipe Train Design

Paul BOVET *MI*

Academic Supervisor : Niel Aurélie

Objective / Motivation :

Help for the development of CAD methods and tools development for all ALSTOM rolling stocks engineering sites. It is necessary to define in a multi-disciplinary team the instructions, the models and the examples of these methods regarding CAD, tolerances and mechanical structure computation. Develop the training supports are also being a part of the job.

Results :

Create 3D/2D examples of parts and assemblies. Write and update these methods for a designing domain. Create the training supports and participate to their deployment. Analyze the datas of available designs and update the database. Define the design tools (solution choices, mechanical calculation, PYTHON, ...). Write reports, summaries, synthesis notes, ...

Keywords :

Design, CAD, Mechanical, Methods & tools, Lean, Train, ALSTOM, vehicles, transport

3D LEAN Scheme

Contact(s) : paul.bovet@etu.umontpellier.fr

Modélisation du procédé de fabrication additive par frittage sélectif laser

utilisation de la méthode élément discret

Andritiana RATSIMBAZAFY

Andritiana RATSIMBAZAFY *MI*

Academic Supervisor : RENOUF Mathieu

Objective / Motivation :

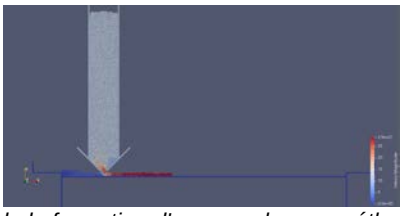
The objective of this study was to determine parameter values that maximize the compactness of a part created by 3D printing. We started from the SLS additive manufacturing method and the knowledge brought to us by Xin Liu through his thesis on the SLS method and his modeling by DEM method to conduct this study.

Results :

We focused on the granular deposition phase, and we manipulated geometric parameters and particle contact laws parameters. During our simulations, we were therefore able to determine configurations to avoid, but also configurations to reduce the roughness of the part while increasing or stabilizing its compactness. It would now be interesting to continue this study and see the impact of the passage of the laser on the different results that we obtained.

Keywords :

DEM, Additive Manufacturing, LMGC90



Simulation de la formation d'une couche par méthode élément discret

Contact(s) : andritiana.ratsimbazafy@etu.umontpellier.fr

Numerical simulation of red blood cell dynamics

Computational fluid dynamics applied to the biology sector

Pierre POTTIER

Pierre POTTIER *MI*

Academic Supervisor : NICOUD Franck / MENDEZ Simon

Objective / Motivation :

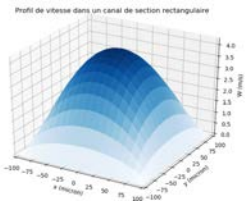
The numerical simulation of red blood cells dynamics is an ambitious biomechanical topic born from a partnership between HORIBA Medical and IMAG. The idea is to analyse the RBC deformation under particular flow and associate behaviour observed to diseases like sickle anemia. This PFE is the first step of a long-term project which includes an internship starting in February 2022, which features state-of-the-art simulations in RBC dynamics. During the PFE, the aim was to document RBC mechanics and learn how to use the simulation tools.

Results :

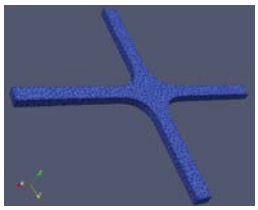
In this project, two cases were processed to learn how to use the simulation tools : 1. Poiseuille flow in a rectangular section channel for which the objective was to validate numerical solution against an analytical solution. 2. Flow in a cross-slot micro devices for which the objective was to analyse the impact of the cross geometry on the flow, and more precisely the area where the extension rate is constant which is of prime interest to subject red blood cells to controled extensional stresses in microfluidic diagnostic tools.

Keywords :

Fluid mechanics, Red blood cell, Diseases, Numerical simulation, Poiseuille, cross-slot micro devices, extension rate.



3D velocity profile within a rectangular section channel



Optimized geometry of a cross-slot micro device

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

Quadrupole method applied to energetic performance

Théo BOISSERIE

Théo BOISSERIE *MI*

Academic Supervisor : André Chrysochoos

MI

CTMNC

Objective / Motivation :

The thermal quadrupole method is an analogy to the electrical quadrupoles. It allows to link the incoming flows and temperatures in a system to the outgoing ones by a matrix relation in the Laplace space. Applied to the structure of a building, it allows to calculate the energy costs of the latter. The objective is to implement a method that is less expensive in terms of calculation time than finite differences or finite elements.

Results :

The computation time of the quadrupole method varies according to the accuracy and the number of points required, but not according to the simulation time, which is a huge advantage. Moreover, the method is semi-analytical and therefore easily exploitable by non-specialists. However, it is less generalized than its counterparts with differences and finite elements. Different insulation configurations in walls have been tested using this method.

Keywords :

Modeling, Thermodynamics, Laplace transform, Matlab, Finite differences, Building, Energy efficiency

building seen with an IR thermal camera

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

UNIVERSITÉ DE MONTPELLIER

POLYTECH MONTPELLIER

Progressive topological optimization by smoothing and remeshing

Mathis DURIEU

Mechanical Engineering and Interactive Design

Mathis DURIEU *MI*

Academic Supervisor : Y. Monerie

MI

MI

Objective / Motivation :

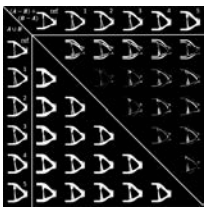
This projet is devoted to the development of an iterative smoothing-remeshing algorithm for topological optimization. The goal is to perform incremental optimization calculation while smoothing the shape of consecutive discretized results. Local stress concentration due to removing finite elements are thus limited.

Results :

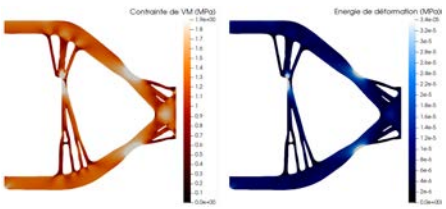
The program is based on the Python language and on the Cast3m, Paraview and GMSH softwares. A geometrical and mechanical study of the solutions shows that it is possible to obtain solutions of different shapes for the same problem according to the given parameters. A statistic analysis seems to indicate that this operation leads to a better global distribution of the stress.

Keywords :

Topological optimization, Cast3m, Python



Results for different evolution of the volume fraction.



Von Mises stress and strain energy for the first case

Contact(s) : mathis.durieu@etu.umontpellier.fr

UNIVERSITÉ DE MONTPELLIER

POLYTECH MONTPELLIER

Optimization of the calculation time / accuracy compromise for the code Pampero

Apprenticeship

Ézéchiel PINEDE

Ézéchiel PINEDE *MI*

Academic Supervisor : MONERIE Yann

Objective / Motivation :

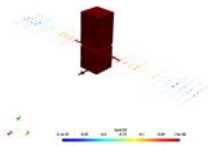
The work carried out during this apprenticeship is within the framework of the law relating to space operations which stipulates that "any object sent into space must represent a minimal risk when it falls back to Earth". The objective of this study is to analyze several lines of research in order to reduce the calculation time of a mechanical study, and if applicable, to proceed with the implementation of the mechanical solver Code_Aster in the Pampero calculation code.

Results :

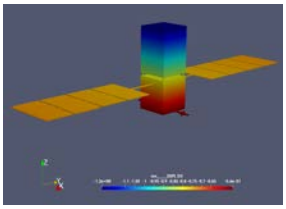
A first method consists of using the static sub-structuring to condense the degrees of freedom of a subdomain of a mesh on the nodes at its interfaces, known as external nodes. A second one consists of simplifying the fragmentation model of a complex object, by determining linear relation between the loading applied and the maximum stress at the junctions. The last method is to condense static mechanical calculations into a single dynamic calculation. The rest of the study will focus on the deepening of those methods and the implementation.

Keywords :

Research & development, mechanics, numerical simulation, space, code_aster



Example of a calculation on a condensed mesh of a JASON satellite geometry



Example of a dynamic result on a JASON satellite geometry

Contact(s) : ezechiel.pinede@etu.umontpellier.fr

Prediction of crack paths in heterogeneous medium by a method of weighted graphs with additional mechanical data

Corentin NOYER

Visible points calculation using visibility polygon algorithms

Corentin NOYER *MI*

Academic Supervisor : Monerie Yann / Pinlou Alexandre

Objective / Motivation :

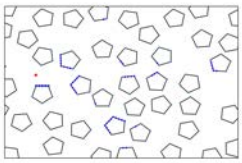
This work is a continuation of the thesis done by K. Pele whose objective was to build a reduced probabilistic mathematical model to determine the cracking path in concrete. The objective of this work is to optimize some parts of the code that uses this model, in particular the way in which the points accessible by the tip of the crack are determined thanks to algorithms for calculating the visibility polygon.

Results :

The rotational sweep line aglorithm was chosen to solve this problem. It was implemented in Python with some modifications to fit the context. However, at the end of the time given to do this work, the program did not work. A solution could be to use versions of this algorithm implemented in C++ available on the library of geometric calculation CGAL.

Keywords :

visibility polygone, rotational sweep line algorithm, balanced binary search tree, reduced model, numerical simulation, crack path



Visible points (blue) from the visibility point (red)

Contact(s) : corentin.noyer@etu.umontpellier.fr

Use of cohesive zone modeling for crack initiation and crack growth prediction in an induction-hardened shaft under alternate bending.

Study of the impact of the quenching depth on crack initiation location in a transmission shaft.

Corentin RAVELEAU

Corentin RAVELEAU *MI*

Academic Supervisor : Monerie Yann

Objective / Motivation :

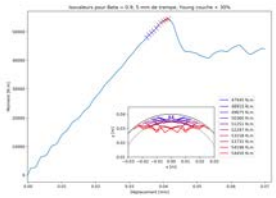
Induction hardenning is used to improve the superficial hardness of steel parts such as transmission shafts. This process is known to improve fatigue strength by creating a surface coating with enhanced mechanical properties compared to the core. Even though it is adventageous from a mechanical point of view, this process makes it more difficult to predict the behaviour of the shaft. This project aims at numericaly predicting the initiation and propagation of fatigue cracks in a induction-hardened shaft by use of the Cohesive Zone Model.

Results :

During this project, an elasto-plastic model including damagable cohesive zones with a soft core and a hard coating was developped. This showed no crack initiation under the coating and the crack propagation seems in good agreements with the experimental data.

Keywords :

Cohesive zone modelling, Functionnaly graded materials, Finite Elements Method, Numerical Simulation



Crack front evolution and resulting bending moment versus applied displacement graph

Contact(s) : corentin.raveleau@etu.umontpellier.fr

Design of a low-tech pilot dryer for developing countries

Guojie FU

Design and production of a low-tech, 3D printed mini-dryer, optimized for aeraulics and instrumentation in order to allow its diffusion in the southern countries

Guojie FU *MI*

Academic Supervisor : J. LAGET and F.COURTOIS

Objective / Motivation :

In this PFE, the objective is to design a low-tech mini-dryer for characterization, optimized for aeraulics and instrumentation in order to allow its diffusion in developing countries.

Results :

The dryer is entirely dimensioned and realized in CAD model on SolidWorks by respecting at most the specifications. The manufacturing of the dryer did not take place for this PFE, but it would be interesting to build the dryer using the CAD model in order to test the performance of the dryer in operation.

Keywords :

low-tech pilot dryer, drying kinetics, fluid mechanics, thermal, numerical simulation, mechanical design.

CAD model of the dryer designed on SolidWorks

Contact(s) : guojie.fu@etu.umontpellier.fr

Design of an automated feeding machine for drosophila

Leaute JEANNE

For INRAE montpellier

Leaute JEANNE *MI*

Academic Supervisor : Duhamel Yvan / Foucaud Julien

Objective / Motivation :

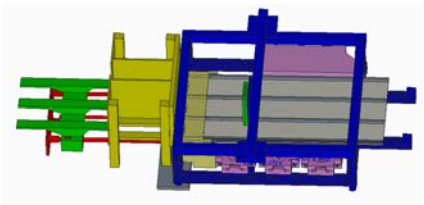
A researcher's team from INRAE is studying the behaviour of insect pests (dosophila suzukii here) and seeks to determine the influence of learning on the evolution of their behaviour through experiments in which flies have the choice between two spawning environments based on fruit purees. To do this, the researchers fill with purees 12 trenches in many plates by hand with a syringe. The aim of this project is to automate the filling of trenches with the design of a machine that meets the constraints of the experiment.

Results :

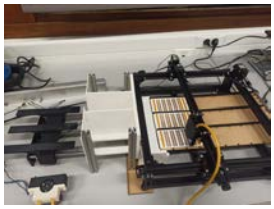
The mechanical operation of the machine was designed, its parts were bought, printed, cut,... The machine was mounted. The different features were electronically connected to the raspberry board and functions were programmed. All features of the machine work independently. A delay caused by a purchase error of an electronic component prevents the complete wiring of the machine which has however been schematized. The operation of the complete program has been drafted but not programmed.

Keywords :

Conception Python CAO



CAD Machine



Real Machine

Contact(s) : jeanne.leaute@etu.umontpellier.fr

Valve sinus dynamics and acute and chronic complications of venous thromboembolic disease

Jolan
LOPEZ

Venous valve dynamics

Jolan LOPEZ *MI*

Academic Supervisor : Nicoud Franck

Objective / Motivation :

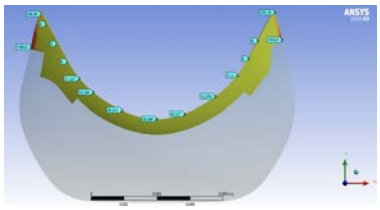
Comparison between YALES2, Ansys Mechanical and RDM theory for linear elastic model ;Comparison between YALES2 and Ansys Mechanical for hyper elastic model ; Simulation of contact between vein and fixed plane

Results :

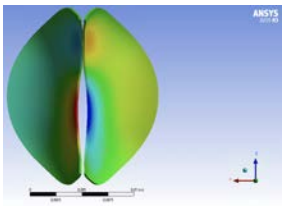
Coherence of results between all three means of simulation ; Implementation of a new hyper elastic model in YALES2 (Neo Hookean) ; Compute of pressure contact between leaflet

Keywords :

ANSYS Mechanical ; YALES2 ; Hyper elastic ; RDM ; Contact mechanics ;



Contact pressure



Leaflets displacement

Contact(s) : jolant.lopez@etu.umontpellier.fr

Mechanics and 3D reconstruction from monocular images

End of study project

Picard
MARIE-CHARLOTTE

Picard MARIE-CHARLOTTE *MI*

Academic Supervisor : Wattrisse Bertrand

MI

INSTITUT PASCAL
sciences de l'ingénierie et des systèmes

Objective / Motivation :

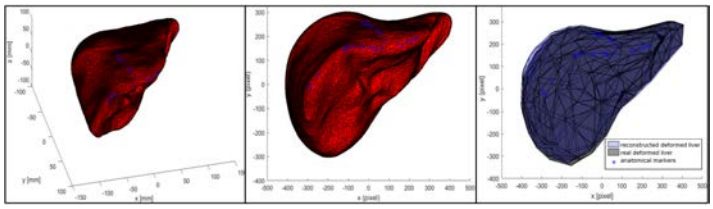
One of the main difficulties of minimally invasive surgery is to identify the location of a tumor on the video feedback from the endoscope. Today, surgeons use augmented reality by superimposing a rigid liver model on the image of the endoscope during the operation, but it has become considerably deformed since the preoperative data (scanner). The objective of this project is therefore to create a model of the liver, which can be projected on the video feedback from the endoscope during the operation, and to analyze its sensitivity.

Results :

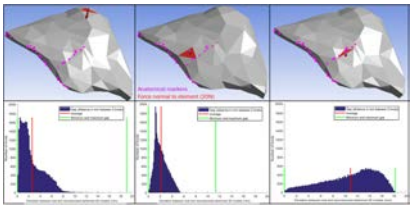
The liver model that can be projected on the video feedback from the endoscope is constructed solely from anatomical markers such as ligaments. The gap between the deformation of the real liver and the deformation of the reconstructed model depends on the position of the tumor (the farther it is from the markers, the greater the difference). It also depends on the position and the direction of the applied force which can cause rigid solid motion. This can be removed by adding constraints such as the silhouette of the liver.

Keywords :

Mechanic, monocular image, minimally invasive surgery (MIS), liver surgery



3D liver and its projection on the image plane (left and center) as well as the projection of the deformed reference and reconstructed models from the anatomical markers (right)



Three numerical simulations with different position and direction of the force, with the histogram of the deviations between the reference deformed model and the reconstructed deformed model

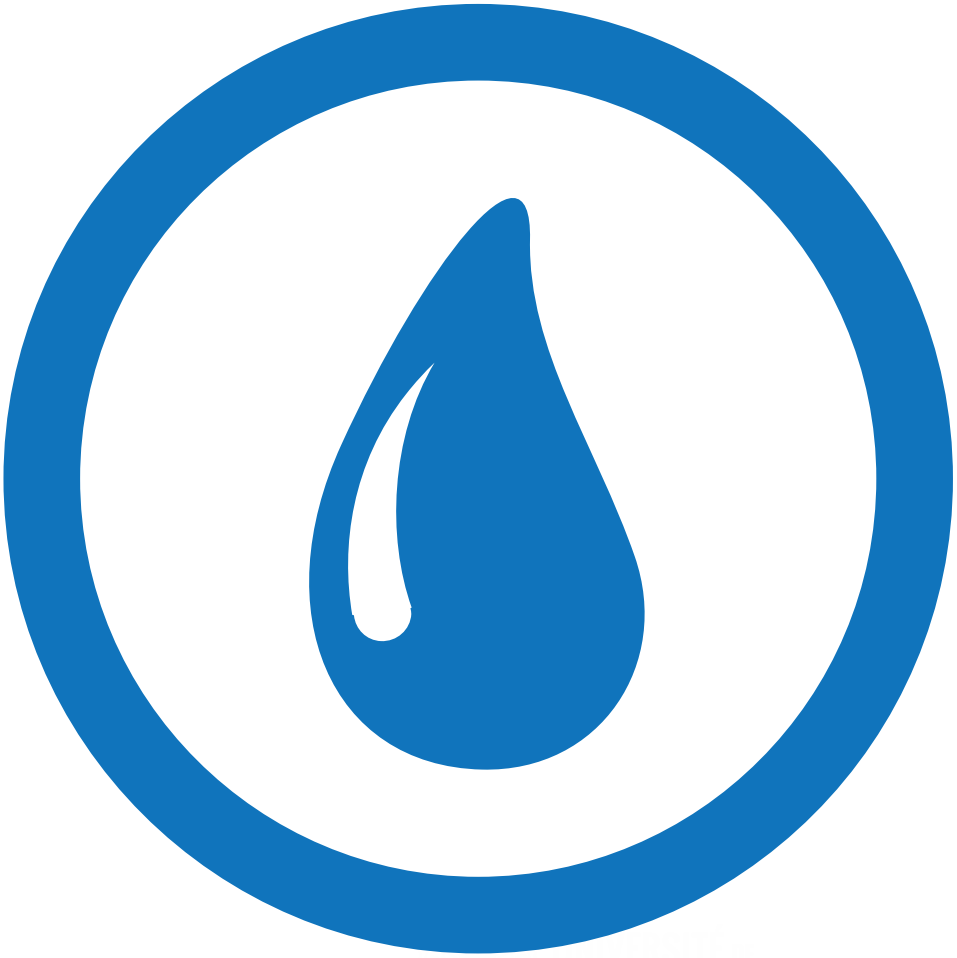
Contact(s) : marie-charlotte.picard@etu.umontpellier.fr

UNIVERSITÉ DE MONTPELLIER

POLYTECH MONTPELLIER

POLYTECH
MONTPELLIER

Water Science and Engineering



Adaptations physiologiques des microalgues aux canicules marines

le cas de Picochlorum sp et Navicula sp, espèces emblématiques de la lagune de Thau

Ilona PETERHANSEL

Ilona PETERHANSEL *STE*

Academic Supervisor : Bec Béatrice

Objective / Motivation :

This subject allowed me to deepen the study of microalgae that we had started in STE4 during the Practical Work of Plant Biology. I wanted to work on a subject centered on biology. The objective of this PFE was to study the adaptations of 2 species of microalgae ("Picochlorum sp." and "Navicula sp.") to the rise in temperature.

Results :

Picochlorum sp has a very good resistance and grows rapidly when exposed to high temperatures (32°C). Navicula sp. develops more slowly but seems also resistant to high temperatures despite its benthic character. Furthermore, the variable fluorescence data indicate that both algae are in a good physiological state at the three temperatures tested. Nevertheless, the fluorescence emission curves differ from one temperature to another, testifying to a possible modification of the pigment composition as a function of temperature.

Keywords :

Algae, microalgae, temperature, physiological adaptation, benthic, fluorescence, biomass, pigments

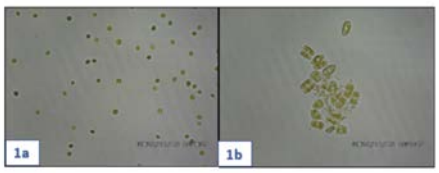


Figure 1: Photo au microscope photonique (x1000) de Picochlorum sp (1a) et Navicula sp (1b)

Photo of both micro algae

Photo of Picochlorum sp. growth at 3 different temperatures

Contact(s) : ilona.peterhansel@etu.umontpellier.fr

Proposal for an innovative reed bed filter process

Design and implementation of a monitoring protocol for a demonstration pilot

Camille FOURNIER

Camille FOURNIER *STE*

Academic Supervisor : Aliaume Catherine (UM) ; Samuel Lauverjat and Yoann Millot (Phytoserpe)

Objective / Motivation :

To find and develop a reed filter design that improves the efficiency of the treatment of total nitrogen, compared to the processes mostly found in France. Ensure a compact system to meet the growing land pressure. To ensure a simple operation in order to continue to place this system as the first choice of municipalities with less than 2500 inhabitants.

Results :

Find a way to make the bacterial communities that participate in the treatment of organic matter and nitrogen present in wastewater cohabit. With the exception of phosphorus, which is a separate issue in reed filter systems.

Keywords :

Reed bed filter, nitrogen removal, innovation

Competitions and blockages that appear when we try to make the three bacterial communities necessary for the treatment of organic matter and nitrogen cohabit in a single reactor.

Contact(s) : camille.fournier04@etu.umontpellier.fr

Characterization of aquifer hydrodynamic properties

Test on an innovative prototype : the pneumatic slug test

Marion JICQUEL

Marion JICQUEL *STE*

Academic Supervisor : Christian Salles

Objective / Motivation :

EDF has developed, in collaboration with the university of Rouen, a prototype able to generate harmonic signals into an aquifer, by using injection of airstream. These harmonic signals can be used to determine the spatial distribution of hydraulic properties of the aquifer, without having to withdraw or inject water into the well. The project described in the following report aims at testing and validating this prototype. Tests have been realized during November and December 2021 on the French piezometric observatory Hydroscan (76).

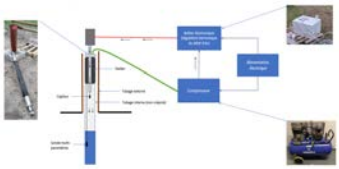
Results :

The tests results reveal that the prototype enables to create a response signal in the aquifer by injecting airstream in a piezometer. However, the part of the prototype aiming at regulating the signal with an harmonic frequency has not been tested yet.

Keywords :

Aquifers, hydraulic tomography, characterization, slug tests, Hydroscan

Picture of the all prototype



Functional scheme of the pneumatic slug test

Contact(s) : marion.jicquel@etu.umontpellier.fr

Sectorization approach and search for leakage by zone

Bastien FABRE

Deepening of the sectorization approach and search for leakage by zone on the Vaucluse

Bastien FABRE *STE*

Academic Supervisor : STEPHAN BROSILLON

Objective / Motivation :

In France, about 700 billion liter of drinking water are lost due to leaks. In accordance whit the law Grennelle II, performance tagets must be met for drinking water systems. To this end, leak detection can be optimised by using tools to sectorize drinking water systems This project was made to improve the network performance of water distribution. We use the technique of sectorization for knowing the area where we need to create a leak search campaign.

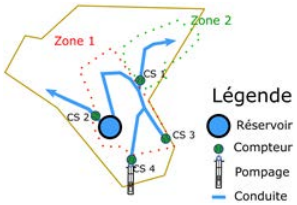
Results :

The work carried out made it possible to set up a tool related to sectorization, facilitating the search for leaks and the understanding for each employee of the operation of the network. In this context of optimizing the performance of the network, the parameterized tool made it possible to guide the search for leaks. It facilitates the understanding of the zones of sectorization and prioritizes the zones where the search for leaks is urgent.

Keywords :

Sectorization, leak search, water distribution, Night flow

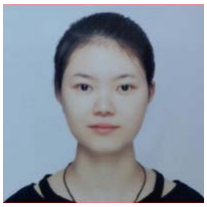
Leakage of a pipe



example of synoptic

Contact(s) : bastien.fabre@etu.umontpellier.fr

Design of hydrometry devices on the Verdanson using hydraulic modeling



Construction of hydraulic model under HEC-RAS and SMS

Guomiao WANG

Guomiao WANG *STE*

Academic Supervisor : Vincent Guinot, Pascal Finaud-Guyot

Objective / Motivation :

The first part is to determine whether the bridge of the School of Health Professions is a control section to measure the flow using the HEC-RAS software to build a one-dimensional hydraulic model, the results are displayed by the relationship between the flow and the water height. The second part is to study the distribution of the speed and flow field at the Fond d'Aurelle tunnel under the SMS mesh and the SW2D software and to compare our results with the speed measured using floating objects.

Results :

In the first study, for the water height downstream less than 1m and the flow less than 7 m^3/s, two height measurement are needed to measure the discharge. For downstream water heights smaller than 1m and the flow higher than 7 m^3/s, only one depth measurement is needed. Finally, for the water level downstream greater than 1m, we need to add a sensor to measure the flow. In the second study, the flow field distribution is more identical.

Keywords :

Urban flood, stage-discharge relationship

Photo of Verdanson from HEC-RAS

Flow velocities at the Fond d'Aurelle tunnel from SMS

Contact(s) : Guomiao.wang@etu.umontpellier.fr

Les fuites dans un réseau

Les fuites en Adduction d'Eau Potable

Michael MAREGRANDE

Michael MAREGRANDE *STE*

Academic Supervisor : DELENNE Carole

Objective / Motivation :

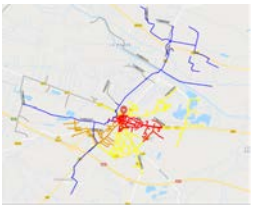
The aim of this project was to highlight the importance of good network management to identify and repair leaks. Through the municipality of BRAM (South of France), it was possible to see the costs generated by a non-optimal management of the network. SAUR has developed a computer tool to monitor the flow of leaks in the network according to the location and thanks to different sectorisation meters. This makes it possible to have an optimal follow-up of the flows in the network, thus a follow-up of the leaks.

Results :

The results show low costs in terms of penalties. However, an environmental cost remains, which is a major issue for SAUR. Moreover, as the water of the municipality of BRAM (south of France) is purchased from another community and not produced, additional costs may arise at the time of purchase, which can quickly become expensive for nothing. Finally, a pressure stabiliser is installed upstream of the network to solve the problems of too high pressure in the network, which will reduce leakages in the network.

Keywords :

SAUR, water network, leaks, water pipes, drinking water supply, costs, penalties, network management, pressure stabiliser.



BRAM map showing leakage rates in the network according to colour (red: high leakage rates) (before installation of the pressure stabiliser)

BRAM map showing leakage rates in the network according to colour (red: high leakage rates) (after installation of the pressure stabiliser)

Contact(s) : michael.maregrande@etu.umontpellier.fr

Wastewater treatment by photo-filtration using composite anti-fouling membranes

Rym BENSALEM

Rym BENSALEM *STE*

Academic Supervisor : Julie Mendret / Jean-Pierre Méricq

Objective / Motivation :

This study focuses on the performance of a PVDF- TiO2 composite hollow fiber membrane module, surrounded by free optical fibers. The filtration of such a module, due to the presence of titanium dioxide (semiconductor), confers to the membrane properties of "super-hydrophilicity" and of "photo-catalysis" to optimize the performance of the module. During this project, the performances of this module have been tested, in order to see the photo-induced effects of TiO2.

Results :

Although a clear increase in flux was not observed during these manipulations, the effect of UV light irradiation is still remarkable, during pure water or BSA solution filtration. Fouling also seems to be slowed down in the presence of UV light, for the same reasons as mentioned above. However, the study of the retention rate is not conclusive. Using UV light during washing did not show any significtive improvment of the operation.

Keywords :

Membrane, hollow fiber, composite, TiO2, photoinduction, superhydrophilicity, photo-catalysis, fouling, BSA, flux, permeability, retention rate

Filtration module used

Contact(s) : rym.bensalem@etu.umontpellier.fr

Mise en place du diagnostic permanent

Chez Saur

Sarah VITROU

Sarah VITROU *STE*

Academic Supervisor : Carole Delenne

Objective / Motivation :

In France, the order of July 21rst, 2015 (updated July 31rst, 2020) specifies in its article 12, the obligations of communities to establish a diagnosis of the wastewater treatment system. This diagnosis brings together all the means and practices implemented to assess the condition and operation of a sanitation system with a view to improving its operation and programming the actions necessary for its development in an optimized manner.

Results :

My mission consisted in collecting as much information as possible on different sanitation systems. For that I studied all the documents relating to the system (from Saur or from the communities).These data are put in a report allowing Saur to find a suitable action plan to improve the treatment systeme.

Keywords :

Waste water treatment / diagnostic / actions plan / improve performance

Improve sanitation systems

Contact(s) : sarah.vitrou@etu.umontpellier.fr

Collecteurs Ceinture d’assainissement - Poste de refoulement à Cugnaux

Rapport de Projet de Fin d’Etude

Telma CHAUVIN

Telma CHAUVIN *STE*

Academic Supervisor : Samer Majdalani

Objective / Motivation :

My End of Study Project consisted of carrying out the DCE phase of a transfer network and a discharge station construction project. Indeed, the municipality of Cugnaux sees its sewerage network saturated.

Results :

My work was mainly focused on bibliographic research and optimization of calculations. The bibliographic research allowed me to be up to date on the uses of a discharge station, the construction techniques, the different pipes that could be used for the networks and the analysis of the site. I optimized the hydraulic sizing calculations of the substation in order to develop the Business Consultation File (DCE). Before drafting this document, it was necessary to make amendments to the notices of the previous phases of the MOP law.

Keywords :

Sewerage network, discharge station, construction

Plan of the discharge station

Contact(s) : telma.chauvin@etu.umontpellier.fr

Pollution tolerance in an invasive fish, *Gambusia holbrooki* : a study of underlying mechanisms

Analyze gambusia transcriptomic data from oxadiazon exposure

Florine MARECHAL

Florine MARECHAL *STE*

Academic Supervisor : FARCY Emilie

Objective / Motivation :

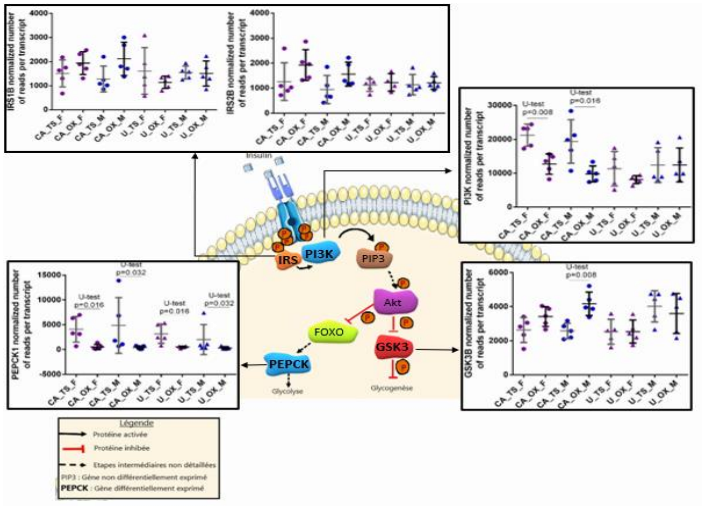
The aim was to analyse transcriptomic data obtained in the liver of the fish *Gambusia holbrooki* following exposure to oxadiazon, an herbicide frequently found in Camargue waters due to its use in rice agriculture. The two main objectives were 1- to highlight molecular pathways influenced by a 4-day exposure to an environmentally relevant concentration of oxadiazon and 2- to study the puttative constitutive differences in expression levels of genes between an exposed population from Camargue drainage channel and a reference unexposed population

Results :

This study highlighted that oxadiazon had an effect on both Gambusia populations by increasing expression levels of genes associated to glucose metabolism pathway. In addition, oxadiazon would inhibit apoptosis and cell proliferation, which may promote the development of cancer according to the bibliography.

Keywords : oxadiazon, Gambusia holbrooki, gene expression, energy metabolism, apoptosis, detoxification process.

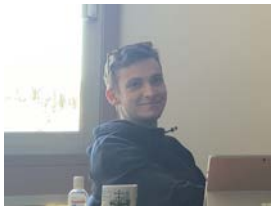
photograph of a gambusia



Standardized number of reads per transcrit for genes involved in glucose metabolism.

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

Optimization of the remediation of port sediments contaminated by organotins by homogeneous photocatalysis



Treatment of aqueous and sedimentary organotin micropollution by advanced oxidation processes

Aurelien FAURE

Aurelien FAURE *STE*

Academic Supervisor : Montigny Chrystelle

Objective / Motivation :

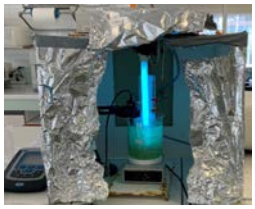
Optimization of treatment by homogeneous photocatalysis and application to the treatment of sedimentary organotin micropollution in Port-Camargue and Perols to reduce to level N1 or even eliminate this pollution

Results :

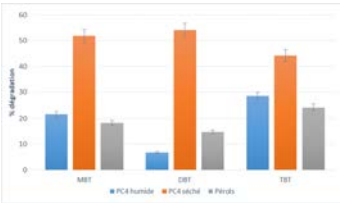
Port Camargue sediments are highly contaminated. Concentrations much higher than N1 and N2 levels (respectively 41 ng(Sn).g-1 and 164 ng(Sn).g-1; regulatory concentrations for dredging regulations). Better treatment yields for dried Port-Camargue sediments than for the wet sediments and those of Perols. The nature of the sediment (granulometry, age of the sediment, humidity rate...) is a parameter to be taken in consideration during the degradation reaction.

Keywords :

Seaports, Sediments, Dredging, Organotins, Tributyltins, Homogeneous photocatalysis



Homogeneous photocatalysis experimental set up



Percentage degradation of organotin compounds in Port-Camargue and Perols sediments

Contact(s) : aurelien.faure01@etu.umontpellier.fr

Gestion du Chlorure de Vinyle Monomère dans les réseaux d'adduction d'eau potable

Baptiste SUEUR

Baptiste SUEUR *STE*

Academic Supervisor : Bouyer Denis

Objective / Motivation :

Vinyl chloride monomer is a molecule that can be released from certain polyvinyl chloride (PVC) pipes. The release of this molecule depends on the quality of the material but also on the operating and external conditions to which the pipes are subjected (temperature, residence time of the water). The network owners as well as the operators are responsible for maintaining the water at the level defined by the french public health code (CSP). This document will address the knowledge of the systems for the management of vinyl chloride monomer in t

Results :

The management of vinyl chloride monomer can be complex depending on the length of the network concerned. However, methods such as network purging or pipe renewal allow a rapid return to a state of compliance when an exceedance is observed. There is therefore a need to develop new tools to allow network operators and owners to better understand the phenomena of leaching and to prioritize their investments in order to maintain MVC concentrations below the quality limit set by the regulations. [...]

Keywords :

Vinyl Chloride Monomer, PVC, drinking water, networks, materials

page de garde

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

Study of the transfers of anthropogenic pollution in the soil

Modeling on GRASS Gis

Alexandre BON

Alexandre BON *STE*

Academic Supervisor : Neppel Luc

Objective / Motivation :

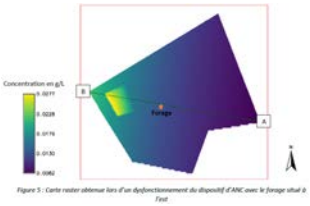
This project has several objectives : to determine the ideal location for setting up a non-collective sanitation device vis-a-vis a borehole, but also to highlight the importance of setting up a wastewater treatment in accordance with the planned project.

Results :

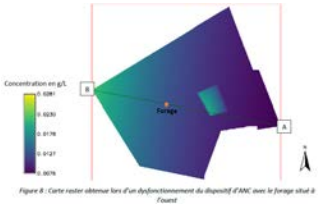
For each of the analyzed cases, the standard is respected. But, with a dysfunction of the sanitation device, the concentration value is near to the maximum limit, especially when the borehole is located downstream of the sewerage device. The best location is located where the groundwater flows don't go toward the borehole. Some limits have been discovered during the using of GRASS Gis.

Keywords :

Groundwater, anthropogenic pollution, sewerage, hydrogeology, GRASS Gis, water



Raster map obtained during a dysfunction of the sewerage device with the borehole located upstream



Raster map obtained during a dysfunction of the sewerage device with the borehole located downstream

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

Hydraulic study of the Sainte Cécile d'Andorge's dam

Etude hydraulique du barrage de Sainte Cécile d'Andorge

Martin BOUSQUET

Martin BOUSQUET *STE*

Academic Supervisor : Samer Majdalani / Francis Foussard

Objective / Motivation :

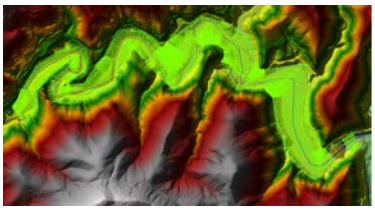
The dam of Sainte Cécile d'Andorge has been studied extensively, specifically in order to know the water flow coming in the water impoundment, the only measure known being the water level at the dam. Following those studies, this project's aim was to create a model of the impoundment on the software HEC RAS. This model allowed the verification of the incoming (and hypothetical) water flow giving the known limnigram at the dam for a given event.

Results :

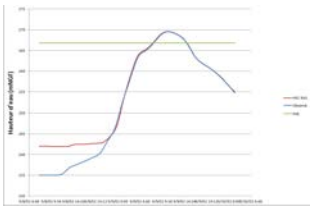
The model was then validated on different floods. This allowed a better understanding of what was wrong with the first model. The different simulations made showed that the model works well and gives an accurate limnigram when compared to the real and expected one. The results obtained also showed that if the most intense rain of September 2002?s episode had fallen within the dam's catchment; the dam would likely have broken.

Keywords :

Model, Hydraulics, HEC RAS, flood, dam



HEC RAS model built



Limnigrams modelized of the September 2002 floods

Contact(s) : martin.bousquet@etu.umontpellier.fr

Waste management in Marseille

Innovation of the connected gully basket

Hugo DELALLEAU

Hugo DELALLEAU *STE*

Academic Supervisor : Neppel Luc

Objective / Motivation :

The Seramm company is testing new solutions such as the gully basket, which is a first in the world of sanitation. The objective of this study is to understand how rainfall affects the functioning of the baskets and to be able to anticipate the reactions of the baskets in a relevant way. The problem is then the following: To what extent are the gully baskets influenced by rainfall and the external environment? And are they useful for waste control? The results of this study allow us to identify the advantages, disadvantages, and usefulness

Results :

In terms of the rainfall study, the most important conclusion to be drawn is the fact that the baskets are doing a good job of keeping the waste without sending it into the the sewage system. This study highlighted the vulnerability of the gullies with areas that are more or less sensitive to waste, and areas that are very sensitive in the autumn. sensitive to waste, and areas that are very sensitive in the autumn. The use of sensors allows a focus on these sensitive areas and thus a management much more adapted to the real needs of the cit

Keywords :

Innovation, environment, gully basket, sensors, rain response.

basket use in gully with sensor

sensor used with baskets and technology diagram

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

Study of the membrane fouling and compaction in water treatment

Pierre.jacquet JACQUET

Pierre.jacquet JACQUET *STE*

Academic Supervisor : Mendret Julie / Méricq Jean-Pierre

Objective / Motivation :

Membrane filtration is an increasingly used process in the water treatment. However, this method remains limited due to its high sensitivity to fouling. Then, the membranes become less efficient and have a reduced service life. Therefore, the objective of the project is to study the phenomenon of membrane fouling in order to provide elements of understanding. A bentonite-based model solution will be used to simulate sludge filtration. Various experiments involving the filtration of this solution will be carried out during the project.

Results :

The agitated filtration showed a very lower membrane fouling in comparison to the non-agitated filtration. The presence of activated carbons helped to limit the effects of fouling on the membrane through the adsorption of bentonite particles. An increasing concentration of activated carbons showed a noticeable decrease in fouling, up to a certain limit, however. To reduce the membrane fouling, we also saw that it is preferable to work at low pressure and low temperature.

Keywords :

Membrane, filtration, water treatment, fouling, bentonite, sludge, activated carbons

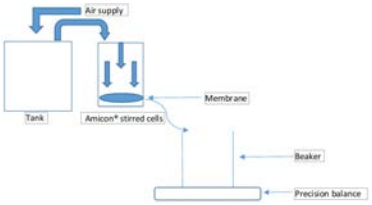
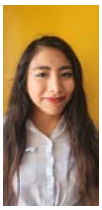


Diagram of the experimental setup

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

conductive membranes

Implementation of electrochemically active conductive membranes for zero rejection technology



Lisbeth Diana HUARANCCA HUAMANI

Lisbeth Diana HUARANCCA HUAMANI *STE*

Academic Supervisor : François ZAVISKA

Objective / Motivation :

This subject is included in a project to develop an innovative technology for the treatment of aqueous effluents containing biorefractory organic micropollutants, based on the development of advanced electrochemical oxidation processes. The main objective will be the integration of reactive membranes based on carbon (cathode) or based on sub-stoichiometric titanium oxides (anode) in these systems electrochemicals developed at the European Institute of Membranes (IEM).

Results :

The results show that the technique the application of this process is effective in eliminating the two micropollutants The ability to oxidize for the case of AO7 with the electrolyte Na2 SO4 is 95.7%±1.4% and 75.3±5% using the electrolyte NaNO3. For the case of paracetamol the reduction percentage corresponds to 60.1±5.4% using as electrolytes Na2 SO4. In the 2 cases, a significant reduction in the reduction was not found, but a change in DDP and therefore in the behavior of the anode are visible after 45 hours.

Keywords :

Advanced oxidation processes, anodic oxidation, micropollutants, paracetamol, acid orange 7 Hydroxy radicals, sulfates, mineralization, TOC, electromembrane.

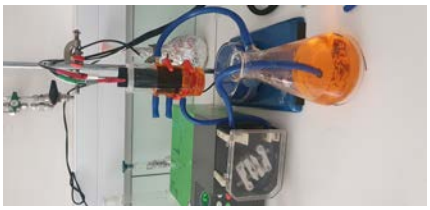


Photo du pilote d'électrochimique avec cellule électrochimique, logiciel Versa studio, électrodes en titanium, pompe mécanique et échantillons prélevés

Contact(s) : lisbeth-diana.huaranna-huamani@etu.umontpellier.fr

Contribution to the creation of a fish ecological indicator in the lagoon

for French Mediterranean waters

Lucas RUZAFA

Lucas RUZAFA *STE*

Academic Supervisor : Catherine ALIAUME

Objective / Motivation :

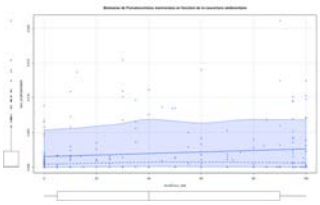
As the lagoons are important coastal ecosystems presenting a rich biodiversity, serval indices have been created in order to evaluate their ecological status. In this context, the Water Framework Directive (Directive Cadre sur l'Eau) calls for the creation of a lagoon fish index to characterize Mediterranean lagoons. The objective of this project is to meet this request with the creation of this new index.

Results :

A study of the synthetic indices of the diversity of the different lagoons, followed by the analysis of the different populations. Then, a multivariate analysis of all the data as well as the identification of correlations between pressure levels and metrics were performed. The most relevant species and metrics can then be identified and used for the creation of the fish index of French Mediterranean lagoons.

Keywords :

Fish indicator, Mediterranean lagoons, data processing, biodiversity, pressures



Biomass of P. marmoratus as a function of percentage of sediment cover

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

Identification of dinoflagellate cysts in resuspended sediments during trawling activities in the Gulf of Lion.

Meilin-Marion PENG

A study carried out over two months

Meilin-Marion PENG *STE*

Academic Supervisor : Masseret Estelle

Objective / Motivation :

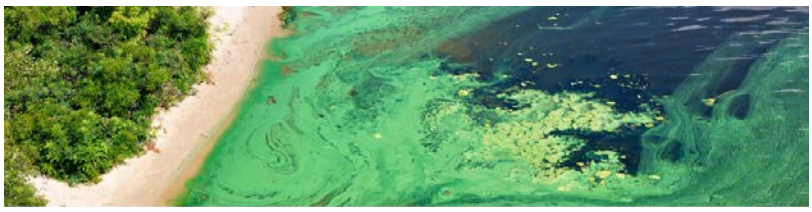
Dinoflagellates are planktonic microalgae. Some species are responsible for Harmful Algal Bloom or HABs. Cysts are the benthic forms of dinoflagellates, and they ensure the survival of the species. Human activities, such as trawling, impact the sediments on the seabed and can allow these cysts to germinate. The objective of the study is to identify and estimates cysts that are still considered viable in the sediments resuspended by the activity of a trawl in the Gulf of Lion in the Mediterranean Sea.

Results :

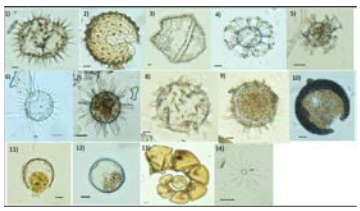
The study shows that approximately 100 billion cysts are present in the sediment analysed. Not every observed cyst is still viable but there is still a handful of them that can germinate later on. Furthermore, the sample studied displayed some harmful species, such as Alexandrium Catenella. This particular species of dinoflagellates is known for causing HABs all around the world.

Keywords :

HAB: Harmful Algal Bloom Cyst of Dinoflagellates Trawling Activities Resuspended Sediments



Harmful Algal Bloom



Example of Cysts under the microscope

Contact(s) : meilin-marion.peng@etu.umontpellier

Implementation of key performance indicators

Implementation of key performance indicators to control the costing of projects during offer phase

Thomas PAUZIé

Thomas PAUZIé *STE*

Academic Supervisor : Brosillon Stephan

Objective / Motivation :

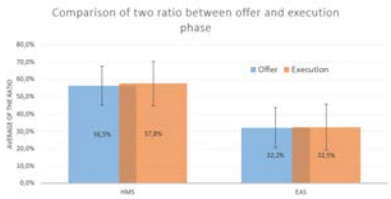
Key performance indicators are necessary tools for companies who want to improve their performance. In this study they will be used to improve the project costing of the cases on which engineers work. An executable program under Excel will be set up to organize the values in the form of a database and facilitate the processing of the results of the different ratios. Results obtained in offer phase will be compared with those obtained in execution and anomalies will be extracted and studied.

Results :

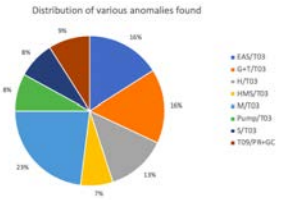
Results showed that there is little variability of most of the indicators through out the years. The anomalies extracted are mostly due to the specificity of the offer or an over estimation of the price of equipments. The comparison of ratios from execution and offer phase showed that there is little variation between those two phases.

Keywords :

Key performance indicators, KPI, Project Costing, Offer, Engineering



Comparison of two ratios between offer and execution phase



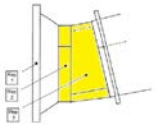
Distribution of various anomalies found

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

POLYTECH
MONTPELLIER

Industrial Structure Mechanics

Fatigue cracking phenomenon of vapor admission piping of the low pressure turbine



Research for a new repair solution

Axel BAGDASSARIAN

Axel BAGDASSARIAN *MSI*

Academic Supervisor : LE PARC Rozenn

Objective / Motivation :

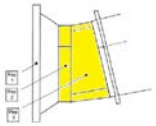
The objective of my project is to find a durable repair solution to a complex fatigue cracking problem. The problem is complex because the cracking is created by a mechanical vibratory cycle and a thermal cycle. The first difficulty is the non-modifiable parameters of the equipment. The second difficulty is to create the equipment and repairs history of the last eleven years (the first phenomenon is appeared in 2011).

Results :

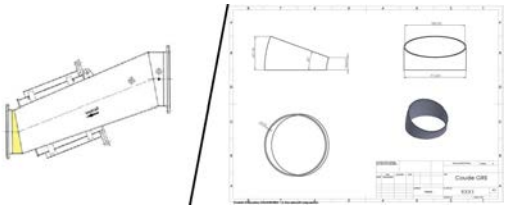
Two repair solutions have been created, with recommendations for welding. The elbow that crack is a bisector elbow (two welded parts). The first solution is to use a one-piece elbow, rolled and welded. The second solution is to use a forged elbow. Estimates are in progress by French, German and Italian companies. The desired result is a technical and financial comparison of the two solutions.

Keywords :

Fatigue cracking ; Low pressure turbine ; Vapor admission piping ; Rolled and welded elbow ; Forged elbow ; Welding ; Nuclear power plant ; Superheated vapor ; Bisector elbow ;



Original elbow



Rolled and welded elbow / Forged elbow

Contact(s) : axel.bagdassarian@etu.umontpellier.fr

Execution studies of different steel structures

For the shutdown of the ISOM unit at PETROINEOS LAVERA

Baptiste BROUDARD

Baptiste BROUDARD *MSI*

Academic Supervisor : PERRIN Claude

Objective / Motivation :

The objective of this case was to carry out the design, dimensioning and documentation for the fabrication of various steel structures. This involved drawing up quotations, carrying out a number of technical briefings and progress meetings with clients, carrying out site surveys, calculating structures, managing a budget and distributing the work internally between the various collaborators.

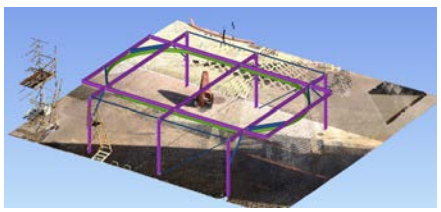
Results :

The steel structures were installed on site without any problems and perform their functions perfectly. The client is satisfied with the work done. The company has made a fair profit on this project and the work carried out has been very instructive

Keywords :

steel structures; 3D surveys; project management; design; dimensioning; management; budget; drawings; fabrication

Column head structure after installation



3D implantation of a new structure in its future environment

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

Analysis concerning the deterioration of the dividers of the deaerator at N4 feedwater system and evaluation of the repairs carried out

Baptiste LECOQ

Baptiste LECOQ *MSI*

Academic Supervisor : Andrea PIARRISTEGUY

Objective / Motivation :

The deaerators in the feedwater system of the secondary circuit of the N4 Nuclear Power Plants, including the Civaux Nuclear Power Plant, are affected by cracks on their internal dividers. At each unit shutdown, in particular to carry out reactor maintenance, the dividers were repaired in various ways, including by welding. During the previous unit shutdown, the most damaged dividers were reinforced with T shaped iron. The objective of this memoir is to understand how cracks appear, to evaluate the repairs carried out and to suggest improvement

Results :

First of all, it was necessary to understand how the deaerator works and what its function is. Then, search through the history of degradations at the Civaux nuclear power plant, and also the other N4 installation as well as the 1300 tiers because of their similar design was done to analyse how often they recur. After mapping the cracks, a hypothesis was issued: vibration fatigue. To verify this hypothesis, a finite element analysis was carried out on the original dividers, the strengthened dividers and for perspectives of complementary studies

Keywords :

Nuclear Power Plant - Secondary circuit - Feedwater system - Pressure vessel – Cracks – Vibration fatigue – History search – Study – Finite elements – Frequency – Mechanical Stress – Strengthening – Improvement

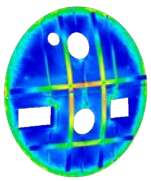


Image of the divider in finite elements

Picture of cracked divider

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

Third-part inspection

The construction of a SUEZ boiler unit, on the site of Le Havre

Corentin VARIN

Corentin VARIN *MSI*

Academic Supervisor : CERVELLIN Denis

Objective / Motivation :

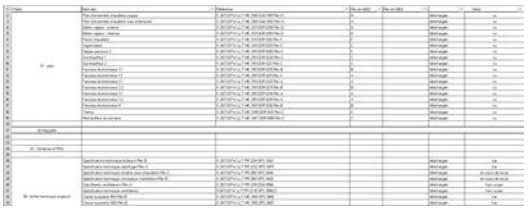
The main objective of this third-part inspection is the assembly conformity assessment. Our main tasks are : - Check the consistency between the technical documents. - Attend non-reglementary tests. - Verification of CE markings on site and on-site reservation closure visits. - Drafting of the final summary report.

Results :

The project is not yet finished, but it's on the right track. The start-up of the plant is scheduled for autumn 2023, once the assembly will be CE certified.

Keywords :

Boilermaking, third-part inspection, technical documentation, hydrostatic test, conformity assessment, notified body.



File allowing to exchange with the customer on the various technical documentations.

Forecast picture of the boiler.

Contact(s) : corentin.varin@etu.umontpellier.fr

Hyperbaric chamber manufacturing

Welding coordination and production tracking of a pressure equipment

Emeric OLLIVE

Emeric OLLIVE *MSI*

Academic Supervisor : MARCHAL Aurélie

Objective / Motivation :

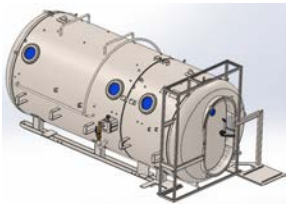
Welding coordination and production tracking of a pressure equipment // Product : A hyperbaric chamber - CE marked DESP // Maker : CSTI (for COMEX - Compagnie Maritime d'Expertise) // Requirements : In accordance with their manufacturing specification, and the CODAP manufacturing code - CAT IV - construction category B2 - Welded joint coefficient z=0.85 // Weight : 3.2T - Chamber : 7.45 m3 - Airlock : 2.49 m3 - Operating pressure : 5.5 bar - Test pressure : 7.9 bar - Fluid : Air - Temperature : +10°C / +40°C -

Results :

The aim of this project was to use my knowledge in order to develop and perfect my welding coordination proficiency. The product has been delivered and is fonctional.

Keywords :

#COMEX #Welding #Pressure #Engineering #Stainless steel #CODAP #DESP #CE



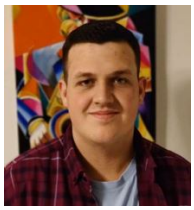
Overview

Rolled shells assembly using MAG welding process in flat position

Contact(s) : emeric.ollive@etu.umontpellier.fr

STUDY AND MANUFACTURING FOLLOW-UP

DOWNSTREAM GATE OF THE SABLONS LOCK



Florent KRESS

Florent KRESS *MSI*

Academic Supervisor : BENOIT Jean-Marc

Objective / Motivation :

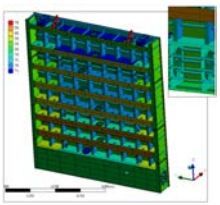
The objective of this project was to manufacture the downstream gate of the SABLONS lock. Sablons is a lock located between Lyon and Valence. The downstream gate of the SABLONS lock was damaged in 2020 by a boat collision and temporarily replaced by a replacement gate. We were therefore commissioned to supply and install a new main downstream.My missions were to write the manufacturing and the welding documentation, the follow-up of the welding, the realization of the manufacturing methods as well as the follow-up in production.

Results :

The result is more than satisfactory as the door was manufactured within the timeframe imposed by the customer in order to respect the navigation stop. The customer is very satisfied with the product and with our service. The customer has already told us about future projects that we will be working on.

Keywords :

Manufacturing, lock gate, drawings, steel structures, welding, machining, sealing, project management, fabrication management, industry, vantry.



3D view during the design and calculation phase

1 of the 4 elements during manufacture

Contact(s) : florent.kress01@etu.umontpellier.fr

Deployment of an integrated application for welding coordination

Kevin OUDOT

Quality improvement

Kevin OUDOT *MSI*

Academic Supervisor : Fabien Soulie

Objective / Motivation :

Improvement of a part of a welding activity (preparation part) in order to improve our follow-up of our welding activities but also of the team. This will allow us a better coordination in welding

Results :

Set up within EDF Tricastin, Several other sites are interested in our solution to prepare our welding files, this will allow them to re-launch welding teams within EDF. Other improvements will be possible to continue in the DIGITAL project of EDF.

Keywords :

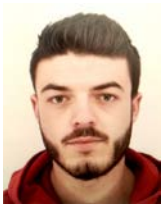
Welding file Activity tracking Quality improvement Ergonomics Economic

Environement application

Contact(s) : kevin.oudot@umontpellier.fr

Welding of steel and reinforced concrete walls

Research project with EDF



Loan MENVIELLE

Loan MENVIELLE *MSI*

Academic Supervisor : Aurélie MARCHAL

Objective / Motivation :

The objective of this project is to complete the development of a new generation of emergency generators for EDF, in partnership with Bouyges Construction and Peiko. ADF is an innovative sponsor of the project. The aim of this partnership is to prove the feasibility of these new generators in record time and to show that ADF is capable of meeting this demand in the years to come. We are involved in the welding assembly of the modules prefabricated by Peiko, on the last 2 levels of the building.

Results :

I therefore set up an automated welding process, qualified the operators for this process beforehand and qualified the personnel according to the technical specifications of the specifications. Currently underway, I am involved in the smooth running of the site by solving technical problems with my team of 6 people and in co-activity with Bouygues. I organise the weekly work schedule, carry out the financial follow-up and liaise with the client and investors to answer questions and expectations. The deadlines and budgets have been met to date.

Keywords :

Welding, welder qualifications, operator qualifications, QMOS, planning, budget, site, steel-concrete structure.

Emergency generator building being erected

Full penetration weld 141+138

Contact(s) : loan.menvielle@etu.umontpellier.fr

Project Follow-Up : Realization of a Valotherm

A boiler that recycles biogas into producing hot water

Ludovic MAUCUER

Ludovic MAUCUER *MSI*

Academic Supervisor : Denis CERVELLIN

Objective / Motivation :

SAMM has been consulted to realize a Valotherm, a boiler room allowing to recycle a part of the biogas in a boiler. The design of this closed circuit allows the continuous production of hot water in a heating network. The objective of the project was to : - to make a calculation - to submit a technical and commercial proposal - supply the material - to follow up the project and contact the subcontractor - to prepare the record of works executed that will be given to the customer at the end of the project

Results :

It was an interesting project because I dealt with several parts of the case. In the workshop, I have seen the raw product to it's final form once weld and assembled. In the office beside the calculation and the preparation of the offer, I have prepared the Welding Procedure Specification (WPS) according to the Procedure Qualification Record (PQR) that we have. I had to choose the adequate qualified welder.

Keywords :

DESP, Art4.3, Piping, Biogas, MSI, Prodeval, SAMM, Stainless steel, Project Follow-Up, Record of Works Executed, Weld

Contact(s) : ludovic.maucuer@etu.umontpellier.fr

Supervision and manufacturing of a water treatment SKID

Mickael ERGEN

Engineering master degree in Mechanical Industrial Structures 2019/2022

Mickael ERGEN *MSI*

Academic Supervisor : SOULIE Fabien

Objective / Motivation :

The subject of my end-of-studies project is the realization of a water treatment SKID by supervising all the stages of the project, that is to say from the design to its final implementation. This project allowed me to implement the skills I was able to develop throughout my work-study program in total autonomy. The SKID project for water treatment was entrusted to me as part of a large project in which CIMAT manufactures 20 tanks with piping networks and CIMAT has to perform hydraulic tests.

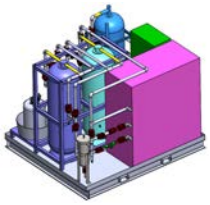
Results :

During the realization of the project I encountered several difficulties, however the project came to the end within the time initially planned and with a final budget respected. The SKID meets the criteria imposed by the CIMAT company, the water production flow must be 3 to 5 cubic meters per hour.

Keywords :

Assembly; Welding; Project management; Strategy; Requirements; Constraints; Technical solutions; Goals; Schedule follow-up; Financial monitoring; Risk analysis; Action plan; Consultation; Studies; Supply; Manufacturing; Assembly; Commissioning;

First visuals of the water treatment SKID



Second view of the water treatment SKID

Contact(s) : mickael.ergen@etu.umontpellier.fr

To integrate within MGC the Thermal Treatment process dedicated to medical instrumentation

Investment study for a heat treatment furnace and a hardness testing machine

Nicolas CARPIN

Nicolas CARPIN *MSI*

Academic Supervisor : Cyril Bordreuil

Objective / Motivation :

MGC is a manufacturer of surgical instruments. In the current process, MGC subcontracts the heat treatment process and the post treatment on the instruments it produces. In order to internalise the heat treatment of these, the purchase of a heat treatment machine is necessary. After the instruments have been heat treated, their mechanical characteristics must be checked. This is why the purchase of a hardness tester is necessary.

Results :

The project allows the MGC company to have all the necessary information to make its choice on the investment they wish to make.

Keywords :

Investments; project management; heat treatment; hardness testing; process integration

Electrical heated forced convection furnace

Hardness testing machine

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

Revision of Inspection Plans to bring them in line with the new version of the EDF Professional Guide

Presentation of the technical, regulatory and industrial stakes of this subject, of the approach adopted to deal with it, as well as the state of play of its progress.

Louis REGAD

Louis REGAD *MSI*

Academic Supervisor : Fabien SOULIÉ

Objective / Motivation :

The Authorised Inspection Service (SIR) has the authority to check the pressure equipments by using Inspection Plans, which are made in application of a specific EDF Professional Guide. Initially scheduled for the end of 2019, this guide was revised on 16 October 2020 to make the necessary changes identified over the last 15 years. The SIR has committed to modify all its inspection plans to take advantage of these necessary and industrially beneficial modifications.

Results :

Of our 936 Inspection Plans, 879 have been revised, and the 57 remaining are expected to be processed by the first half of september. Among the most significant benefits, we have dispensed 530 equipments from pressure test, and reduced tank openings between 2 periodic requalifications by 418.

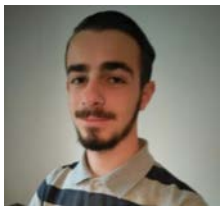
Keywords :

SIR; EDF Professional Guide for the creation of Inspection Plans; In-use checks; Pressure equipment

Machine room of the Tricastin Nuclear Plant

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

Robotic GTAW industrialization



Gaël SCHROOTEN

Gaël SCHROOTEN *MSI*

Academic Supervisor : Rozenn Le Park

Objective / Motivation :

Following a drop in activity at our plant, one of the goals is to recall welded parts that have been historically sub-contracted in our vendors to weld them internally with our welding robot. This robotized installation proposes two welding processes, the GMAW and the GTAW (which until now has never been used). To optimize the existing welding procedure qualifications and the full capacity of this equipment, the GTAW process is the chosen process to weld these parts. The objective is to industrialize robotized implementation of CRO welding.

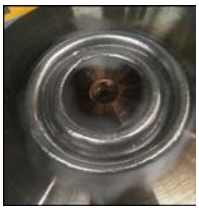
Results :

After completion of multiple tests on production coupons, we can now produce these parts internally. Another advantage is that the Welding cycle time with GTAW robotized has been reduced by half compared to conventional automatic GTAW. Dedicated robotized (CRO) welding procedure specifications have been approved, and the workstation has been set up to produce with GTAW Hot Wire robotized installation.

Keywords :

Welding, robot, overlay, GTAW, CRO (Corrosion Resistant Overlay), continuous improvement, WPS (Welding Procedure Specification), steel, Inconel 625

Program achievement on welding robot IGM Rti 370 S AC 6 axes



BX-155 ring groove after overlay on welding robot

Contact(s) : gael.schrooten@etu.umontpellier.fr

Industrial Performance Improvement

Orano NCPF project « New Fission Products Concentration Unit»

Rémi SEUX

Rémi SEUX *MSI*

Academic Supervisor : PAPET Philippe

Objective / Motivation :

ORANO La Hague, world leader in nuclear fuel recycling has launched the NCPF project (New Fission Product Concentration Unit) to ensure the sustainability of their production. Due to corrosion, the existing evaporators are reaching the end of their cycle life; therefore, this project has been set up to create new facilities. Piping work and fitting are carried out by a consortium of companies Bilfinger LTM and FOSELEV AGINTIS (50/50), with an initial value order of 55 million / EUR for a piping equivalent of 113,000 linear meters

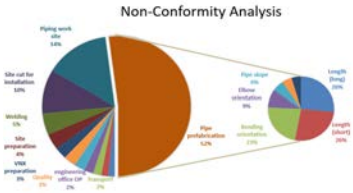
Results :

As this is the most important project for AGINTIS, it is most important to set up a feedback system to improve industrial performances of the company. Non-conformities will be analyzed in order to find out palliative solutions to avoid technical errors.

Keywords :

Piping - FOSELEV AGINTIS - ORANO - NCPF - Industrial performance improvement - REX - Non-conformity - Financial impact - Palliative solution

New Fission Product Concentration Unit



Non-conformity analysis

Contact(s) : remi.seux@etu.umontpellier.fr

Supervision of the manufacture of a horizontal tank under slope

Louis METZINGER

Construction of a 400 m3 LPG pressure tank according to CODAP-2015 Div. 2

Louis METZINGER *MSI*

Academic Supervisor : CERVELLIN Denis

Objective / Motivation :

The main purpose of this project was to coordinate the manufacturing and testing activities during the assembly of a 400 m3 LPG tank for our customer PRIMAGAZ, since the delivery of the material until the departure of our workshop. Reporting directly to the project manager and technical director, I was involved in method support for construction and welding operations, quality control, client contact, monitoring of specific budgets.

Results :

The building of our tank was a success, with a very low repair rate and limited costs. The schedule was met to ensure delivery to the site on time. Our historical contractors is happy with the final product and we can expect further orders. Finished with the transport and lifting of this 88,5T steel vessel. This project has allowed me to increase my knowledge and skills day by day.

Keywords :

Boilermaking, tank construction, welding, pressure vessel, workshop activities, engineering, lifting, TISSOT Industrie

Construction of the tank in our workshop in St-Nazaire (44)

Installation using a mobile crane on site in Druye (37)

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

PROJECT MANAGEMENT AND DESIGN OF STEEL STRUCTURES

Rémy LAMBE

Installation of new building and various conveyors at Ciments Calcia HEIDELBERG Airvault (79)

Rémy LAMBE *MSI*

Academic Supervisor : PERRIN Claude

Objective / Motivation :

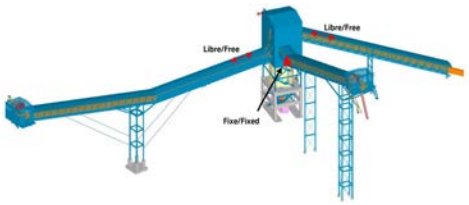
The purpose of this project is to make me manage a project as a business manager and to apply my skills learnt from the beginnig of my internship designing steel structures of this project.

Results :

Currently in work, the project goes on well. Already two conveyors steel structures are designed and drawings done too. We are working on the main building and the last conveyor steel structures. This project is very instructive for me, and the customers are satisfied. Moreover the company i'm working for is satisfied too.

Keywords :

Steel structures, design, drawings, project management



3D view of all concrete and steel structures

Snapshot of one of the conveyor design

Contact(s) : remy.lambe@etu.umontpellier.fr