Topics offered to students by other master's programs

TARGET PROGRAM

Architectural Engineering

Sustainable iron metal production by direct electroreduction of iron ore

Program : Chemical & Materials engineering - M-IRMAE

Description

Steel production accounts for more than 8% of global emissions and sustainable steel production is key to achieve a decarbonized economy. The direct electroreduction of iron oxide to produce metallic iron (ULCOS project) is truly a fascinating field of research and offers a breakthrough alternative to the existing status quo of blast furnace based iron production. The reaction happens in alkaline media and the mechanism of electroreduction -ie, solid state direct reduction is yet to explored in detail. Furthermore, a lot of other sources such as bauxite residue can be directly used to produce metallic iron via this method. The student will work on firstly understanding the fundamental reaction mechanism of direct electroreduction of iron from iron oxide in alkaline media.

Promotor: Prakash Venkatesan (Prakash.venkatesan@ulb.be)

Language	EN (english)
Open to other master's programs	Yes
Eligible master's programs	M-IRARE, M-IRCBS, M-IRCNE
Number of topics	2

Supervision

Supervisor : Prakash Venkatesan (prakash.venkatesan@ulb.be)

Analysis of Heat and Mass Transport During Hydrogen Bubble Growth in Water Electrolysis

Program : Chemical & Materials engineering - M-IRMAE

Description

Hydrogen can be produced by splitting water through electrochemical reactions in electrolysis. Although the process is overall endothermic, additional heat can be generated locally, most notably through Joule heating at the electrode surface. This localized heating modifies the temperature field near the growing hydrogen bubble, creating temperature gradients that induce thermocapillary (Marangoni) flows along the bubble interface.
In addition to thermal effects, concentration gradients of surface active species such as ions or dissolved gases can also alter surface tension, resulting in solutal Marangoni convection. These interfacial flows strongly affect bubble growth, shape, and detachment dynamics. Understanding these coupled effects requires the ability to accurately resolve the local temperature and concentration fields around the bubble. However, measuring both fields at the same time remains a significant experimental challenge.
Previous studies have demonstrated that at high applied potentials, Joule heating dominates, and thermocapillary effects become the primary drivers of interfacial motion, while solutal effects can often be neglected. Various optical techniques such as Schlieren imaging, laser induced fluorescence, and interferometry have been used to study these fields.
Mach Zehnder interferometry stands out as a noninvasive and calibration free technique for resolving instantaneous temperature fields with high sensitivity.
This thesis will focus on hydrogen bubble dynamics on a microelectrode in acidic electrolysis, using two complementary experimental techniques:
• Mach Zehnder Interferometry, to quantify the temperature field near the electrode and at the base of the bubble, especially when concentration variations are negligible.
• High speed visualization, to qualitatively capture the bubble inception, growth, and detachment processes.
• Complementary Schlieren imaging may be used for qualitative validation as done in the previous study [1].
Methodology
1. Literature survey
The student will begin by familiarising themselves with the topic. A thorough review of recent literature, especially on interferometric and visualisation techniques applied to gas-evolving electrodes, will help define the research scope and objectives.
2. Experimental set-up
The student will work with the existing electrolysis cell, Mach Zehnder interferometer, and high-speed imaging system available at the TIPS laboratory. This phase will involve hands-on training with laser alignment, optical adjustments, electrode handling, and system calibration. The student will also participate in test runs to optimise measurement conditions and gain confidence in operating the setup independently.

3. Measurement campaign and data analysis
The student will conduct experiments to visualise hydrogen bubble growth on microelectrodes using high-speed imaging and Mach Zehnder interferometry. Interferometric data will be analysed to extract local temperature fields, while high-speed recordings will be used to characterise bubble shape, growth, and detachment dynamics. Post-processing and analysis will be carried out using MATLAB. If numerical simulation results are available, they will be compared with the experimental data. In parallel, the student will measure the refractive index, density, and viscosity of the electrolyte across different concentrations and temperatures, using the available facilities at the TIPs laboratory, ULB.
4. Reporting
- Weekly meetings with the supervisor(s) to define tasks and discuss outcomes and practicalities.
- Monthly meeting with the team to verify the progress and discuss follow-up
- Final presentation

References
[1]. A. Babich, A. Bashkatov, X. Yang, G. Mutschke, and K. Eckert, "In-situ measurements of temperature field and Marangoni convection at hydrogen bubbles using schlieren and PTV techniques," Int. J. Heat Mass Transf., vol. 215, p. 124466, 2023.
[2]. J. Massing, G. Mutschke, D. Baczyzmalski, S. S. Hossain, X. Yang, K. Eckert, and C. Cierpka, "Thermocapillary convection during hydrogen evolution at microelectrodes," Electrochimica Acta, vol. 297, pp. 929–940, 2019.

Language	EN (english)
Open to other master's programs	Yes
Eligible master's programs	M-IRARE, M-IRCBS, M-IRCNE, M-IRMAE, M-IRIFS, M-IRELE, M-IREMR-A, M-IREMR-E, M-IREMR-M, M-IREMR-O, M-IREMI, M-IRPH
Number of topics	2

Supervision
Supervisor : Pierre Colinet (pierre.colinet@ulb.be)

Co-supervisor : Senthil Kumar Parimalanathan (senthil.parimalanathan@ulb.be)

Topics offered to students by other master's programs

TARGET PROGRAM

Architectural engineering

Master's program offering the topic: Chemical & Materials engineering - M-IRMAE

Effect of additives on optical properties and corrosion resistance of anodized recycled Al alloys

Description

The use of recycled aluminum (Al) alloys is rapidly increasing in industrial applications due to their potential to reduce energy consumption and improve material sustainability. Moreover, industries demand high surface quality and durability, particularly for functional or decorative applications. One of the most applied surface treatments for Al alloys is anodizing, which produces a protective alumina (anodic) layer that enhances corrosion resistance, wear resistance, and aesthetic appearance. However, recycled Al alloys may differ from primary alloys in terms of microstructure, impurity levels, and alloying element composition (e.g., zinc). These differences can influence the formation, morphology, and properties of the oxide layer. As a result, anodized recycled alloys may show variations in optical appearance, corrosion resistance, and overall surface performance compared with anodized primary alloys. Understanding and controlling these differences is therefore essential for enabling the broader industrial adoption of recycled Al.
This project focuses on the role of additives in the anodizing electrolyte and their influence on the resulting oxide layer. The study will explore how these additives affect optical properties and corrosion resistance under different anodizing conditions. Experimental work will involve anodizing selected primary and recycled Al alloys under controlled conditions with different concentration of additives in anodizing electrolyte. The resulting oxide layers will be characterized using advanced surface analysis and electrochemical techniques, including SEM and EDS for morphology and chemical composition, XRD for crystalline structure analysis, and EIS to evaluate corrosion resistance. By correlating alloy composition, anodizing parameters, and electrolyte additives with the resulting surface properties, this research aims to provide insights into how anodizing processes can be performed to ensure high-performance coatings on recycled Al alloys.

Langue	EN (english)
Ouvert à d'autres masters	Yes
Masters concernés	M-IRARE
Nombre de sujets	1

Supervision

Supervisor : De Graeve Iris (iris.de.graeve@vub.be)

Master’s program offering the topic: Chemical & Materials engineering - M-IRMAE

Towards Low-Carbon Construction Materials: Linking Strength to Carbonation in CO_2-Cured Steel Slag

Description

Cement production is one of the largest industrial sources of CO_2, responsible for roughly 8% of global emissions. Unlike most industries, more than half of these emissions come not from energy use but from the chemical process itself — the decomposition of limestone — meaning that switching to renewable energy alone cannot solve the problem.
A promising alternative lies in steel slag, a by-product of the steel industry that is currently underused. When mixed with water and exposed to CO_2, certain minerals in steel slag react to form stable carbonates that bind the material together and give it mechanical strength. This approach offers a double environmental benefit: it avoids the need for conventional cement, and it actively locks CO_2 into the final product, effectively turning a greenhouse gas into a building material.
However, making this process reliable remains a challenge. The carbonation reaction is sensitive to many interacting parameters — CO_2 concentration, humidity, temperature, and exposure time — and achieving more carbonation does not always lead to higher strength. This master's thesis tackles these questions by combining complementary characterisation techniques. Impulse excitation — a non-destructive method that measures stiffness by analysing the natural vibration frequency of a specimen — offers a quick window into mechanical performance without breaking the sample, while conventional compression testing provides direct strength values. Together, they allow the investigation of the process parameters and sample handling affect mechanical outcomes. Thermogravimetric analysis (TGA), which tracks mass loss as carbonates decompose under controlled heating, is then used to determine the actual degree of carbonation and relate it to the measured strength. A key part of the work will be developing sampling and testing protocols that are not only accurate and reproducible, but that could ultimately help bring CO_2-cured construction materials from the laboratory to real-world application.

Langue	EN (english)
Ouvert à d’autres masters	Yes
Masters concernés	M-IRARE, M-IRCNE
Nombre de sujets	1

Supervision

Supervisor : Rahier Hubert (hubert.rahier@vub.be)

Master’s program offering the topic: Chemical & Materials engineering - M-IRMAE

Exploring how fillers affect the strength and heat resistance of new cement mixes

Description

The construction industry, a significant contributor to global carbon emissions, faces a pressing need to reduce its environmental footprint. Traditional cement production processes release an enormous amount of carbon dioxide, due to the conversion of calcium carbonate to calcium oxide which requires high temperature (fossil fuels burnt). Additionally, conventional cement-based mortars exhibit compromised mechanical performance at elevated temperatures, this is attributed to the decomposition of Calcium Silicate Hydrate (CSH) which starts at around 300 °C. Alkali activation is a promising alternative, using industrial waste materials from sectors like iron or copper industries as precursors; this allows to reduce cement consumption, so less CO_2 is emitted, and enhance mechanical and thermal properties. However, the thermal resistance and mechanical strength of alkali-activated materials are influenced by various factors such as water/binder ratio, binder/filler ratio, and the type of filler used (e.g., sand, granite, limestone, chamotte). Moreover, the different chemical compositions of potential raw materials, such as metakaolin, fly ash, and blast furnace slags, can significantly impact thermal resistance. The choice of alkali cation could also play an important role in the thermal behaviour of the materials.

The main objective of this master's thesis is to investigate the influence of different fillers on the mechanical and thermal properties of alkali-activated mortars. Initially, a literature review will be conducted to provide a ground understanding of the topic. Then, an alkali activation system will be selected: precursors, activators, and different types of fillers. Formulation of the system will be started by assessing the reactivity through isothermal calorimetry. The mechanical characterization of the formulations will be done with flexural strength, compressive strength, and Young's modulus testing to evaluate mechanical properties. The residual mechanical properties of materials after exposure to high temperatures (up to 1000 °C) will be assessed, and the study of crack formation using acoustic emission analysis might be a test to be performed as well. Additionally, the evolution of Young's modulus during heating, from room temperature to high temperatures, will be monitored. Microstructural changes in the different compositions will be investigated to provide insights into the elemental mechanisms influencing the mechanical and thermal behaviour of the alkali-activated mortars.

Langue	EN (english)
Ouvert à d'autres masters	Yes
Masters concernés	M-IRARE, M-IRCNE
Nombre de sujets	1

Supervision

Supervisor : Rahier Hubert (hubert.rahier@vub.be)

Master’s program offering the topic: Civil engineering - M-IRCNE

Hybrid Bio-Cemented Earthen Materials Using Enzyme-Induced Carbonate Precipitation (EICP) and Polysaccharide Biopolymers (Xanthan Gum and Guar Gum)

Description

The production of conventional construction materials such as fired clay bricks and cement-bound blocks is energy-intensive and remains a significant contributor to global CO_2 emissions. This has motivated increasing interest in alternative low-carbon stabilization strategies capable of reducing embodied energy while maintaining structural performance. Among bio-based approaches, two techniques have emerged as particularly promising: biopolymer treatment (BPT) and enzyme-induced carbonate precipitation (EICP). Although both methods enhance soil strength through fundamentally different mechanisms, their combined potential remains insufficiently understood. Biopolymer treatment involves the incorporation of natural polysaccharides such as xanthan gum and guar gum into soil. These long-chain macromolecules dissolve in water and form hydrogel networks through hydrogen bonding, chain entanglement and, in some cases, ionic crosslinking. In granular soils, the resulting viscous hydrogel phase increases interparticle adhesion and creates flexible polymer bridges capable of accommodating strain. In fine-grained soils, polymer chains adsorb onto clay mineral surfaces through electrostatic interactions and hydrogen bonding, modifying the diffuse double layer and promoting aggregate formation. The stabilization mechanism is therefore not purely cementitious, but viscoelastic in nature, often leading to improved tensile resistance and enhanced ductility. However, the mechanical contribution of biopolymers is strongly dependent on moisture content, and significant reductions in stiffness and strength can occur under wetting-drying cycles due to hydrogel swelling and contraction. In contrast, EICP is a biomineralization process in which urease catalyzes the hydrolysis of urea, producing carbonate ions that react with calcium ions to precipitate calcium carbonate ($CaCO_3$). The precipitated crystals form rigid interparticle bridges that increase contact stiffness and compressive strength. EICP has been investigated for soil improvement, crack remediation in cementitious materials, erosion control, soil reinforcement and additive manufacturing of bio-cemented products. Nevertheless, its application in the production of bio-bricks remains limited, partly due to lower calcium conversion efficiency compared with microbially induced carbonate precipitation, and partly due to the tendency of carbonate precipitation to be spatially heterogeneous when used as a standalone treatment. Recent observations indicate that xanthan gum can enhance retention of carbonate precipitates produced by EICP, improving resistance to erosion and mechanical degradation. This suggests that biopolymers may not only contribute mechanically through hydrogel bonding, but may also influence reaction-transport processes by modifying ion mobility, solution viscosity and nucleation sites. The scientific question is therefore not simply whether strength increases when the two methods are combined, but whether a true composite bonding system can be engineered at the microstructural scale. The working hypothesis of this thesis is that combining EICP with xanthan gum and guar gum produces a coupled bio-mineral network in which flexible hydrogel bridges coexist with rigid $CaCO_3$ crystals. In such a system, the polymer phase may regulate ion transport and precipitation morphology, while the mineral phase provides stiffness and compressive capacity. The resulting microstructure may exhibit improved bond continuity, reduced brittleness and enhanced durability compared with single-mechanism stabilization.

Understanding this interaction requires a deeper investigation linking polymer physics, carbonate precipitation kinetics and macroscopic mechanical response.

The main objective of this thesis is to evaluate whether a hybrid stabilization strategy combining enzyme-induced carbonate precipitation (EICP) with natural biopolymers such as xanthan gum and guar gum can produce mechanically efficient and durable bio-cemented earthen materials suitable for low-carbon
construction applications.

The study aims to determine how polymer type and concentration influence carbonate precipitation efficiency, crystal morphology and spatial distribution, and whether the presence of a hydrogel network enhances the uniformity and retention of $CaCO_3$ within the soil matrix. The mechanical performance of the hybrid system will be assessed through unconfined compressive strength tests and three-point bending tests in order to characterize both compressive capacity and flexural behaviour. Particular attention will be given to stress-strain response, post-peak softening and ductility in order to evaluate whether the addition of biopolymers mitigates the brittle behaviour typically associated with EICP only treatment. The results will be compared with EICP-only. Durability will be evaluated through water absorption measurements, initial rate of absorption tests, and cyclic wetting-drying and freeze-thaw exposure, in order to assess moisture sensitivity and degradation mechanisms. Where relevant, thermal conductivity may also be measured to examine the potential of the hybrid material for earthen construction applications. The expected outcome is a deeper understanding of how polymer-mineral interactions influence composite bonding, mechanical response and environmental resistance, and whether this hybrid system can offer a viable and more resilient alternative to conventional cement-bound materials.

Langue	EN (english)
Ouvert à d'autres masters	Yes
Masters concernés	M-IRARE
Nombre de sujets	1

Supervision

Supervisor : CUCCURULLO ALESSIA (alessia.cuccurullo@ulb.be)

Master's program offering the topic: Civil engineering - M-IRCNE

Design optimization of Baubotanik living plant structures

Description

Living plant structures, referred to as Baubotanik structures, are promising sustainable solutions in civil engineering, acting as CO2 sinks, as opposed to the classical constructions that are responsible for a large part of the worldwide CO2 emissions. Such structures have been implemented in the past as experiments and proofs-of-concept, without however following a proper engineering design. The master thesis answers to this gap of knowledge of living plant structures from the perspective of civil engineering design. This work consists of (i) the understanding of the specificity and challenges related to building with living plant structures, (ii) the mastering of the current design approach based on Abaqus and MatLab coupling that incorporates growth and material models, (iii) the formulation of a multi-objective optimization problem of the design aiming at balancing structural performance and growth duration preceding the exploitation, (iv) the incorporation of uncertainties in the optimum design, (v) the application of the developed design approach to different real life scenarios.

Langue	EN (english)
Ouvert à d'autres masters	Yes
Masters concernés	M-IRARE
Nombre de sujets	1

Supervision

Supervisor : Berke Péter (peter.berke@ulb.be)

Master's program offering the topic: Civil engineering - M-IRCNE

Hybrid Chemo-Bio Stabilization of Fine-Grained Soils: Reducing Lime Content through Enzyme-Induced Carbonate Precipitation (EICP)

Description

Lime stabilization is one of the most established and reliable techniques in geotechnical engineering for improving soft and fine-grained soils. It is extensively used in subgrade stabilization, embankment construction and shallow foundation support due to its capacity to reduce plasticity, increase shear strength and enhance stiffness. The mechanisms governing lime treatment are well understood. Immediate cation exchange and flocculation modify the clay fabric and reduce plasticity, while long-term pozzolanic reactions between calcium hydroxide and reactive silica and alumina phases generate calcium silicate hydrates (C–S–H) and calcium aluminate hydrates (C–A–H), leading to progressive strength gain and improved compressibility behaviour. Although lime stabilization has proven highly efficient, it remains associated with non-negligible environmental impact due to calcination processes and CO_2 emissions. From a sustainability perspective, completely replacing lime is neither realistic nor necessarily desirable, given its well-documented reliability and predictable performance. A more viable strategy may consist in reducing the required lime content while maintaining or enhancing mechanical performance through complementary stabilization mechanisms. In this context, Enzyme-Induced Carbonate Precipitation (EICP) offers an innovative approach. In EICP, urease catalyzes the hydrolysis of urea, producing carbonate ions that react with calcium ions to precipitate calcium carbonate ($CaCO_3$). The resulting calcite crystals form interparticle bonds that increase stiffness and compressive strength. Unlike pozzolanic gels formed during lime stabilization, EICP generates discrete crystalline bridges that modify contact-scale stress transmission and may contribute to pore filling and permeability reduction. The combined use of lime and EICP therefore represents a chemo-bio stabilization strategy in which traditional chemical modification of clay fabric is supplemented by biomineral bonding. The central scientific question is whether EICP can compensate for a reduction in lime dosage by providing additional interparticle cementation, and whether the interaction between pozzolanic products and carbonate precipitation produces synergistic effects at the microstructural and macroscopic scales. Understanding this interaction requires linking mineralogical transformations, fabric evolution and shear strength development within a consistent geomechanical framework.

The main objective of this thesis is to evaluate whether partial replacement of lime by EICP treatment can maintain or improve the mechanical and hydraulic performance of fine-grained soils used in geotechnical applications. The study aims to determine whether a

reduced-lime hybrid stabilization strategy can achieve
comparable shear strength parameters, stiffness and durability to conventional lime treatment, thereby contributing to lower-carbon ground improvement solutions. The research will investigate the influence of decreasing lime content on plasticity reduction, compressibility and shear strength, and assess whether the addition of EICP compensates for the reduction in pozzolanic bonding. Particular attention will be given to the evolution of effective shear strength parameters, stress–strain response and post-peak behaviour in order to determine whether hybrid stabilization modifies brittleness and failure mechanisms. The time dependent development of strength during curing will also be analysed to distinguish between early biomineral bonding and longer-term pozzolanic hardening.

Mechanical characterization will involve unconfined compressive strength testing to monitor strength development with curing time, as well as consolidated triaxial tests to determine effective cohesion and friction angle. Oedometer tests will be performed to assess compressibility and preconsolidation pressure, allowing evaluation of stiffness evolution and yield stress modification. Where possible, permeability tests will be conducted to quantify changes in hydraulic conductivity associated with hybrid treatment. Durability will be assessed through controlled wetting–drying cycles in order to evaluate strength retention and structural stability. Microstructural observations using scanning electron microscopy will be carried out to identify the spatial distribution of hydration products and carbonate crystals, and to interpret the relationship between bonding morphology and macroscopic behaviour.

Langue	EN (english)
Ouvert à d'autres masters	Yes
Masters concernés	M-IRARE
Nombre de sujets	1

Supervision

Supervisor : Cuccurullo Alessia (alessia.cuccurullo@ulb.be)

Master’s program offering the topic: EM - Robotics & mechatronics constructions - M-IREMR-M

Geometric and structural design of flexible joints for deployable scissor grids

Description

Note: if interested, come and discuss the topics with us, to refine the research question based on your skills and interests.

Context:

Deployable structures are fascinating structural mechanisms: they have the ability to transform themselves from a small, closed or stowed configuration to a much larger, open or deployed configuration. Mobile deployable structures have the great advantage of speed and ease of erection and dismantling compared to conventional building forms. They have a wide field of application, from space antennas to festival structures, to adaptable furniture and toys.

At VUB there is 20 years of expertise on these fascinating systems and recently a spin-off company called KONLIGO was created to design and build zero-waste event structures based on our scissor technology.

Because these deployable structures can be used and reused over and over again they are well-suited to support the transition to a zero-waste event industry, where currently the waste problem is huge. Because of the modular construction and high component uniformity, and easy repair and maintenance, they are well-suited for a ‘circular business model’.

Topic:
Many new shapes have been developed by us in recent years. Digital models have been made, new shapes have been patented and small-scale models have been realised to test these concepts.
But every new shape has its specific detailing issues to be solved: e new joint that allows the required movement, a new material for the joint or the beams, a modular design that allows reconfiguration, adding stiffening cables or not, etc…

To be able to build our vast library of new and promising shapes for scissor structures, one

possible strategy is to develop new joints that are flexible in one direction and stiff in the other. This requires 3D-printing/prototyping and some material engineering. This could potentially unlock very interesting new shapes for expanding the application potential of scissor grids.
Depending on the interest and the profile of the student(s) involved, different accents/directions can be identified, collaboration between students with a different profile is also accepted:
• Emphasis on the exploration of various configurations based on a range of design criteria and application contexts, through scale models and 2D-3D prototyping
• Parametric modelling of scissor geometry in Rhino/Grasshopper and 3D-models/rendered images
• Prototyping a scissor structure at full scale
The aim of this project is the successful experimental exploration and realisation of deployable scissor structures, based on realistic design criteria. Digital and physical design and fabrication tools can be explored and used for the successful realisation of these new shapes.

Langue	EN (english)
Ouvert à d'autres masters	Yes
Masters concernés	M-IRARE, M-IRCNE, M-IREMR-A, M-IREMR-E, M-IREMR-M, M-IREMR-O
Nombre de sujets	2

Supervision

Supervisor : Roels Ellen (ellen.roels@vub.be)

Master’s program offering the topic: EM - Robotics & mechatronics constructions - M-IREMR-M

3D printing of deployable scissor joints

Description

Note: if interested, come and discuss the topics with us, to refine the research question based on your skills and interests.

Context:

Deployable structures are fascinating structural mechanisms: they have the ability to transform themselves from a small, closed or stowed configuration to a much larger, open or deployed configuration. Mobile deployable structures have the great advantage of speed and ease of erection and dismantling compared to conventional building forms. They have a wide field of application, from space antennas to festival structures, to adaptable furniture and toys.

At VUB there is 20 years of expertise on these fascinating systems and recently a spin-off company called KONLIGO was created to design and build zero-waste event structures based on our scissor technology.

Because these deployable structures can be used and reused over and over again they are well-suited to support the transition to a zero-waste event industry, where currently the waste problem is huge. Because of the modular construction and high component uniformity, and easy repair and maintenance, they are well-suited for a ‘circular business model’.

Topic:
The deployable bars of a scissor structure are connected by specifically designed joints, that allow the necessary movement. However, there is a specific class of structures that is left out because of the deployment is not possible, or difficult. Unless the joints are designed in such a way that they accommodate this special requirement movement. The projected outcome is an overview of the possibilities for innovative joints for deployable scissor structures that open up the possibilities for new shapes that have never been built before. Physical models (small and medium scale), digital parametric modelling, digital fabrication and potential full-scale testing belong to the possibilities, depending on the chosen focus.

Langue	EN (english)
Ouvert à d'autres masters	Yes
Masters concernés	M-IRARE, M-IRCNE, M-IREMR-A, M-IREMR-E, M-IREMR-M, M-IREMR-O
Nombre de sujets	2

Supervision

Supervisor : Roels Ellen (ellen.roels@vub.be)

Master's program offering the topic: EM - Robotics & mechatronics constructions - M-IREMR-M

Multi-robot localisation

Description

This thesis topic is a broad collection of subtasks that can be undertaken within multi-robot localisation research.
This includes topics such as:
- Multi-agent SLAM.
- UWB Anchored localisaiton
- Relative pose estimation
- Map sharing
- ODometry sensors: IMU, Camera, VIO, LiDAR, LIO.

And this on multiple different robots:
- AGVs
- Humanoids
- Drones.

In case you want to discuss possibilities in this research field please contact yuri.durodie@vub.be for more details.

Langue	EN (english)
Ouvert à d'autres masters	Yes
Masters concernés	M-IRARE, M-IRCBS, M-IRCNE, M-IRMAE, M-IRIFS, M-IRELE, M-IREMR-A, M-IREMR-E, M-IREMR-M, M-IREMR-O, M-IREMI, M-IRPH
Nombre de sujets	5

Supervision

Supervisor : Vanderborght Bram (Bram.Vanderborght@vub.be)

Architectural Engineering Master Thesis Topics

Academic year 2026–2027

Incorporating Sustainability in the design process of products, processes and businesses.

Program : Architectural engineering - M-IRARE

Description

How to design products that have a better impact on environment, social and economy? This thesis starts with a state of art review of methods for 'Design for Sustainability'. What are methods to decision on sustainability and what are the remaining challenges and pitfalls? The aim of the thesis is to formulate a novel way to embed sustainability in the decision process of companies and link it to existing methods for corporate sustainability reporting.

Language	EN (english)
Open to other master's programs	Yes
Masters concernés	M-IRCNE, M-IRMAE, M-IREMR-E, M-IREMR-M, M-IREMR-O, M-IREMI
Number of topics	1

Supervision

Supervisor : Messagie Maarten - maarten.messagie@vub.be

Co-supervisor : Philippot Lavigne Maeva- Maeva.Philippot@vub.be