

In this issue:

Meet the Team

Working Groups

The ANGIE Zenodo
community

The ANGIE podcast

Chat Lab: a place for
everyone!

Recent events

MAgnetically steerable wireless Nanodevices for the tarGeted delivery of therapeutic agents in any vascular rEgion of the body

Dear Reader,

Welcome to the ANGIE project's second newsletter and thank you for your interest in our work!!

In the ANGIE project, we are developing a novel approach for treating strokes, by magnetically steering microrobots inside the brain to the stroke site. Have a nice reading and keep following us to receive all the updates of our work in the next months!



Prof. Salvador Pané i Vidal
Project Coordinator



<http://www.h2020-angie.eu>



[@angie_h2020](https://twitter.com/angie_h2020)



www.linkedin.com/company/angie-h2020



www.youtube.com/@angie_h2020



MEET THE TEAM

Newsletter
Issue 2
February 2023



ETH zürich

The Multi-Scale Robotics Laboratory is a highly multi-disciplinary group that integrates three distinct sub-groups individually focused on robotics and systems, materials and fabrication, and cellular biology.



U
B Universitat de Barcelona

ChemInFlow Group studies and guides covalent and non-covalent synthesis out-of-equilibrium combining chemistry with engineering and fluid mechanics.



D
Discovery
Foundation

Their growing team of world class educators, researchers, and innovators aims to revolutionize the way we understand the world and how we pass these lessons on to future generations.



Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Their technologies fuel therapeutic development based on molecular insights and bioinspired approaches. They decipher natural phenomena and deploy these insights including the generation of predictive algorithms for pharmaceutical challenges.



MagnebotiX

MagnebotiX, a spin-off of the Institute of Robotics and Intelligent Systems at the ETH Zurich, Switzerland, produces and markets magnetic field generators. These systems are capable of generating a wide variety of static or time-varying magnetic fields for research on magnetic field-dependent phenomena.



The Laboratory of Toxicology and Forensic Science of the University of Crete, serves education, research and clinical needs of modern toxicology while promoting the development of modern basic and applied research in the fields of Forensic Toxicology, Clinical Toxicology and individual branches of toxicology.



SAFE
Stroke Alliance For Europe
THE STROKE PATIENT
VOICE IN EUROPE

The voice of stroke patients and survivors in Europe, representing a range of stroke support organisations from more than 30 European countries.



VERHAERT | MASTERS IN
INNOVATION

Verhaert is an independent pioneering European innovation factory. They cross industries to help ambitious corporations and start-ups to boost their capacity to innovate successfully.



EXPERIAN RESEARCH & CONSULTING

Experian is a research and consulting firm bringing together experts in health and engineering. Experts in modelling, numerical simulation and optimization



BUILDING AN INTERDISCIPLINARY COMMUNITY

The ANGIE project is bringing together key experts from different sectors and fields to discuss aspects of targeted drug delivery in clinical environments that will arise from the development of the ANGIE technology application.

Four working groups have been created with focus on:

Bioethics,
education & social
implications

Economics & long-
term implications

Health technology
assessment

Ecosystems &
innovation



Ion Copoeru
Babes-Bolyai University



Stefan Mühlebach
University of Basel



Maria Blanco-Prieto
University of Nava



Romina Fucà
University of Verona



Maria Rita Mancaniello
University of Florence



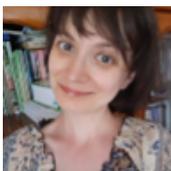
Manuela Joore
Maastricht University



Sabine Grimm
Maastricht University



Dina Pereira
University of Beira Interior



Andreea Somesan
Babes-Bolyai University



Camillo Porcaro
University of Padova



Gennaro Tartarisco
National Research Council
of Italy



Ernesto Santibañez Gonzalez
Universidad de Talca



João Leitão
University of Beira Interior

The **ANGIE Working Groups** have meetings throughout the year where the members explore different issues around targeted drug delivery, exchange ideas, experiences and research results to increase the public understanding of our new technology via an interpretive social science and humanities perspective, which enables to highlight issues of justice, gender, power, and identity. Groups membership will be open during the project's lifecycle! If you wish to join us, please contact: mvliora@discoveryfoundation.eu



THE ANGIE ZENODO COMMUNITY

The **ANGIE Zenodo Community** gathers all public deliverables, scientific publications and publicly available results of the project under one place. All the documents included in the Zenodo Community are under open access status and are freely available. All dissemination material produced for the project are already available, including newsletters and infographics. The ANGIE Zenodo Community is being continuously updated with new publicly available content on targeted drug delivery and research results on microrobots targeting the brain. Find us at www.zenodo.org/communities/angie-h2020eu

ANGIE - MAgnetically steerable wireless Nanodevices for the tarGeted delivery of therapeutic agents in any vascular rEgion of the body

Recent uploads

Search ANGIE - MAgnetically steerable wireless Nanodevices for the tarGeted delivery of therapeutic agents in any vascular rEgion of the body

February 3, 2022 (v1) Journal article Open Access

Magnetically Assisted Robotic Fetal Surgery for the Treatment of Spina Bifida

Simone Gervasoni, Jonas Lussi, Silvia Viviani, Quentin Boehler, Nicole Ochsenbein, Ueli Moehrlen, Bradley J. Nelson,

Spina bifida is a congenital defect that occurs on the vertebral spine of a fetus. The most severe form causes exposure of the spinal cord and spinal nerve and has important repercussions on the life of the newborn child. Current prenatal operative procedures require laparotomy of the abdomen as well

Uploaded on December 22, 2022

Published in IEEE Transactions on Medical Robotics and Bionics.

October 7, 2021 (v1) Journal article Open Access

Powering and Fabrication of Small-Scale Robotics Systems

Salvador Pané, Pedro Wendel-Garcia, Yonca Belce, Xiang-Zhong Chen, Josep Puigmartí-Luis,

Purpose of Review: The increasing number of contributions in the field of small-scale robotics is significantly associated with the progress in material science and process engineering during the last half century. With the objective of integrating the most optimal materials for the propulsion of these

Uploaded on December 22, 2022

Published in NANOROBOTICS AND MICROROBOTICS.

May 25, 2022 (v1) Journal article Open Access

Toward More Inclusive Networks and Initiatives in Innovation Ecosystems: Protocol for a Systematic Review

Georgia Ntina, Eirini Mavromanolaki, Andreas D Flouris,

Expanding the cooperation and enlarging the participation of more diverse stakeholders within innovation ecosystems will increase their efficiency and capacity to contribute at local, regional, and national levels. This paper presents the protocol for a systematic review that will identify &ld

Uploaded on December 22, 2022

Published in JMIR Research Protocols.

September 27, 2021 (v1) Conference paper Open Access

Magnetic small-scale robots: Principles, applications and challenges

S. Pané, J. Puigmartí, M. Pinto, E. Mavromanolaki, A. D. Flouris, T. S. Mayor, T. C. Lühmann, D. Sargent, B. J. Nelson,

Last two decades has seen a growth of the research on untethered mobile small-scale robots. These motile devices display the ability to travel through fluids by transforming the energy generated by an external power source into mechanical motion. As a result, these devices are being recognized as pr

Uploaded on December 22, 2022

September 27, 2021 (v1) Conference paper Open Access

Marrying inorganics and biologics: Opportunities and challenges

New upload

Community

the future of drug delivery
angie

ANGIE - MAgnetically steerable wireless Nanodevices for the tarGeted delivery of therapeutic agents in any vascular rEgion of the body

This repository community collects research outputs related to the ANGIE project. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952152*

MAgnetically steerable wireless Nanodevices for the tarGeted delivery of therapeutic agents in any vascular rEgion of the body – ANGIE - aims to develop a novel, minimally invasive approach for treatment of strokes.

Most strokes occur when a blood vessel in the brain is occluded by a clot. This clot then prevents areas in the brain from being supplied with oxygen, resulting in the sudden death of brain tissue. Strokes are a leading cause of death and disability worldwide, and stroke cases are expected to rise in the coming years. The most common treatment for this kind of stroke involves injecting a thrombolytic drug (usually rtPA) into the blood, which then dissolves the clot. Tiny mobile magnetic devices are showing huge potential for future biomedical applications. The EU-funded ANGIE project will forge ahead with small-scale robotics, magnetic navigation systems and localised targeted drug delivery. Specifically, the project will develop magnetically steerable wireless nanodevices for the targeted delivery of therapeutic agents via the body's vascular system. By creating a baseline of knowledge and skills for localised targeted drug delivery, the project will increase health professionals' capacity to treat multiple chronic diseases. Moreover, it will enable doctors to deliver drugs precisely where needed with minimal side effects.

Curated by:

ANGIE COMMUNITY



THE ANGIE PODCAST

The **ANGIE** podcast aims to foster conversation about Issues on Targeted Drug Delivery in Clinical Environments. In the upcoming episodes, scientists and experts will be discussing topics on education, gender differences, long-term implications, and potential future returns in societal/economic innovation and market creation.



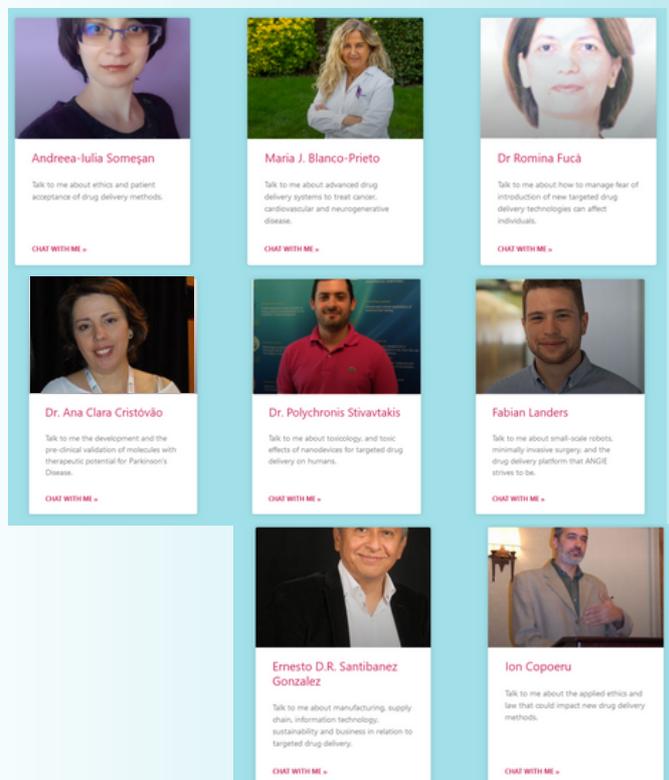
On our first episode, along with Mr Fabian Landers from ETH Zurich we introduce our project and have a very interesting conversation on Targeted Drug Delivery and how it is approached within our project. Listen to the **ANGIE Podcast** series in our **YouTube channel**. Subscribe and stay tuned for the next episodes!



Fabian Landers is a PhD student at ETH. His research puts a spotlight on the development, fabrication, and manipulation of small-scale robots for minimally invasive surgery and drug delivery. Within ANGIE, Fabian coordinates the development and manufacture of the drug delivery platform.

CHAT LAB: MEET THE EXPERTS

Chat Lab is a platform for everyone! Through this platform we aim to initiate conversations between experts on issues related to Targeted Drug Delivery and people from the public or other experts, entrepreneurs, researchers, start ups etc. Participants of our Working Groups as well as members of our Consortium can interact with anyone that is interested either on the project itself or about Targeted Drug Delivery topics.



Experts from the **ANGIE** project as well as researchers and experts from all over the world, are ready to answer all of your questions. Visit the **Chat lab** page and learn more!

www.h2020-angie.eu/chat-lab



RECENT EVENTS

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THE HOSPITAL OF THE FUTURE – ADVANCES IN HEALTHCARE ROBOTICS

In the frame of the **ANGIE Kick-start Programme** our project was presented at "The hospital of the future – advances in healthcare robotics" event on Wednesday, February 8th, organised by **ETH Zurich**. The **ANGIE Kick-start teams** had the chance to get insights from the several projects and companies about future technologies and the possible outcome of these developments. The event was open for experts from hospitals, the healthcare sector, industry and academia as well as other interested parties. We are grateful for the opportunity and looking forward to further collaborations.

The hospital of the future – advances in healthcare robotics

Robots are used in operating rooms and in clinical settings to support healthcare professionals and enhance patient care. The use of robotics extends even to research laboratories to automate manual, repetitive, and high-volume tasks so technicians and scientists can focus their attention on more strategic tasks. As technologies evolve, robots will function more autonomously, eventually performing certain tasks entirely on their own. As a result, doctors, nurses, and other healthcare workers will be able to spend more time providing direct patient care.

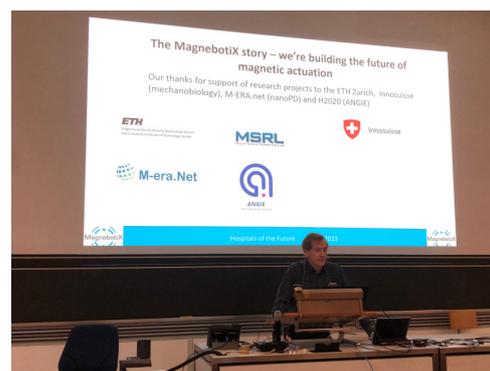
Several public funded projects are currently conducted at ETH Zurich as well as in spin-offs to accelerate innovations in robotics for healthcare. Find out, what the future could look like and how these new technologies can transform hospitals. This event is open for experts from hospitals, the healthcare sector, industry and academia as well as other interested parties. Participation is free of charge, but registration is required.

Contact: ETH Zurich, EU Grants/Access, Katrin.Reschwanm@dl.ethz.ch

Program

14:30 Welcome & Introduction Roland Siegwart, Salvador Fane, Peter Wolf	16:45 Company presentations:
14:45 Project Presentations:	<ul style="list-style-type: none"> • Magnebotix, David Sargent, CEO • Nanoflex Robotics, Christophe Chautems, CEO & Alice Sgato, Engineer • F&P Robotics, Lukas Wirth, CEO
<ul style="list-style-type: none"> • HARMONY, Lionel Del, ETH Zurich • HOSMARTAL, Florian Heemeyer, ETH Zurich • DSH-HERO, Andree Schwirz, CLR • A Submillimeter Minimally Invasive System for Cardiac Arrhythmia Ablations, Cedric Flacher, ETH Zurich • ANGIE, Fabian Lenders, ETH Zurich • MINGRAPH, Sandra Wirth, ETH Zurich 	17:45 Guided Lab Tours:
	<ul style="list-style-type: none"> • Multi-Scale Robotics Lab • Sensory-Motor Systems Lab
16:15 Networking Break	18:30 Networking & Apéro Riche

Date: 8. February 2023, 14:30 – 19:30 Place: LEE E 101, Leonhardstrasse 21, 8092 Zurich
In-person and online participation possible!



HOSPITAL CLÍNIC DE BARCELONA IN-HOUSE SEMINAR

The **ANGIE project** was presented at the **Hospital Clínic de Barcelona in-House Seminar**. The seminar was held on line on February 8th, 2023.

ChemInFlow Group | SOC & SAM | H2020-EU. 1.2.2. Program | Grant Agreement ID: 852152

the future of drug delivery

Prof. Dr. Josep Puigmartí-Luis¹ | Prof. Dr. Jordi Ignés¹ | Dr. Maria Guix¹ | Ph.D. candidate Ramón S. Herrera¹

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1. Departament de Ciència dels Materials i Química Física, Institut de Química Teòrica i Computacional, 08028 Barcelona, Spain
2. FAME Laboratory, University of Thessaly, Greece.
3. Discovery Foundation, 70300, Greece.
4. EXPERIAN, Portugal.
5. SINTeX Laboratory, Transport Phenomena Research Centre, Engineering Faculty of Porto University, 4200-465 Porto, Portugal.
6. Institute of Robotics and Intelligent Systems, ETH Zurich, Tannenstrasse 3, CH-8092 Zurich, Switzerland
7. ICREA, Pg. Lluís Companys 23, 08010 Barcelona, Spain

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Thank you for your attention.

