

# Europsko vijeće za inovacije – Info dan *EIC Pathfinder*

## Predstavljavanje uspješnog projekta *BRAINSTORM*

doc. dr. sc. Tomislav Marković  
20. veljače 2025. godine  
SEECCEL, Zagreb



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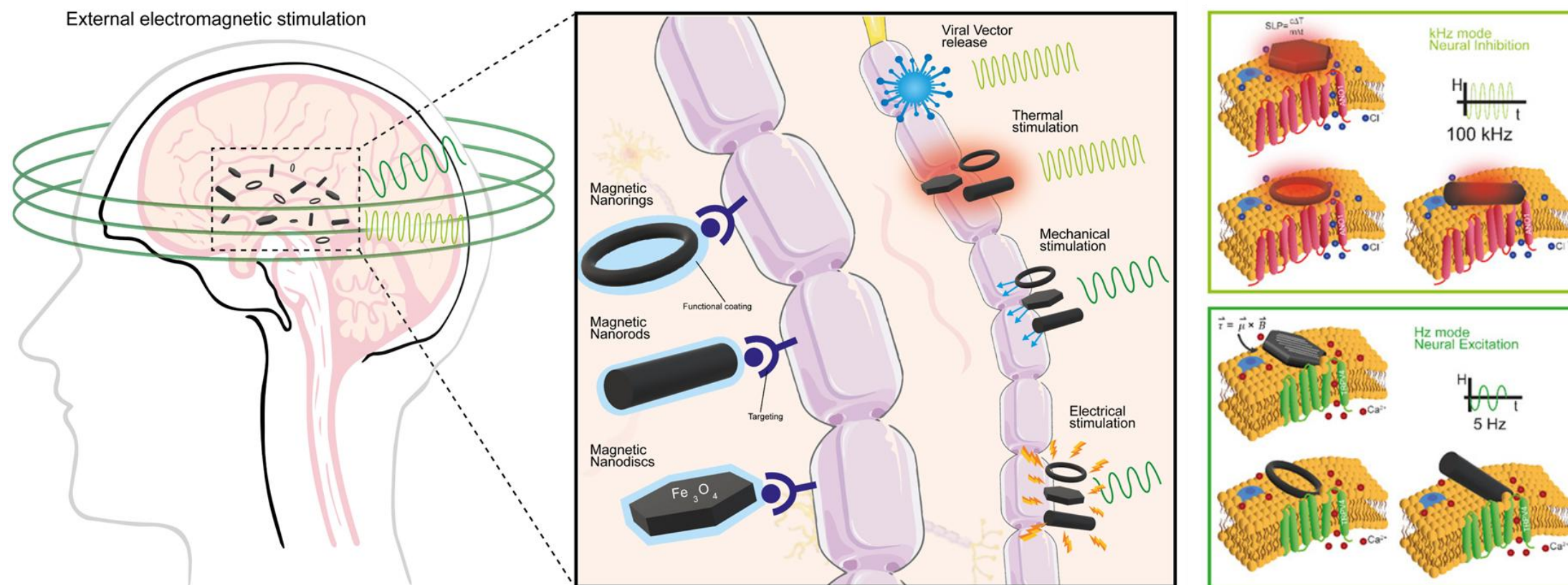


# Predstavljanje uspješnog projekta

- Projekt *BRAINSTORM*
- Iskustvo prijave
- Naučene lekcije

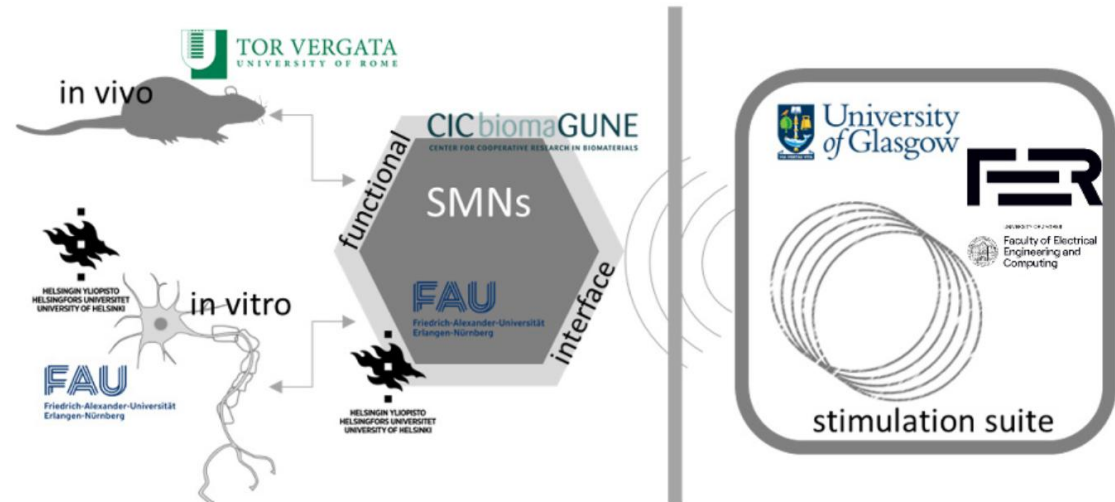
# BRAINSTORM

*Wireless deep brain stimulation through engineered multifunctional nanomaterials*



# BRAINSTORM – Projektne uloge

- Inženjerstvo materijala
- Molekularna biologija
- Neurobiologija
- Elektrotehnika
- Kemija
- Fizika
- Translacijska medicina



# BRAINSTORM – Projektni tim



Friedrich-Alexander-Universität  
Erlangen-Nürnberg

**Danijela Gregurec**  
FAU – Njemačka  
Koordinator projekta



HELSINGIN YLIOPISTO

**Vincenzo Cerullo**  
UH – Finska

**CICbiomaGUNE**

MEMBER OF BASQUE RESEARCH  
& TECHNOLOGY ALLIANCE

**Sergio Moya**  
CIC – Španjolska



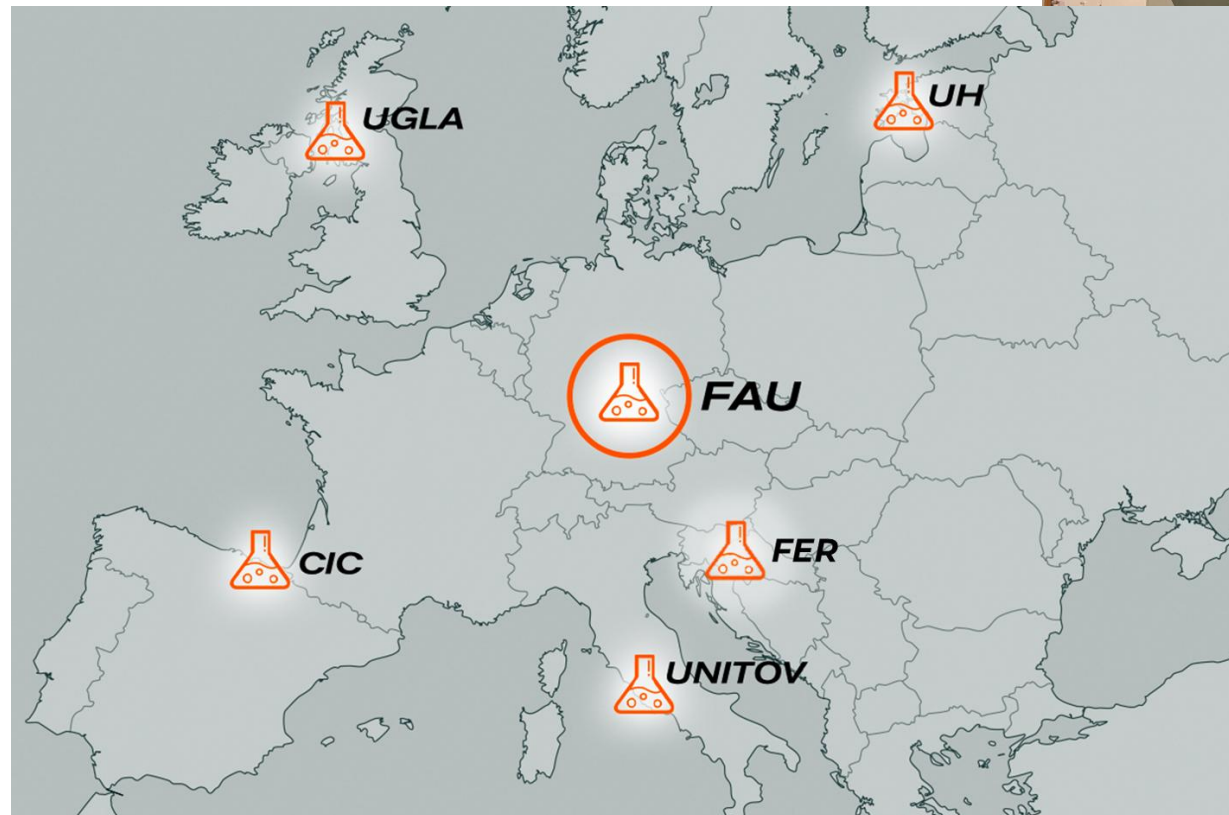
**Hadi Heidari**  
UGLA – Velika Britanija



**Nicola Toschi**  
UNITOV – Italija



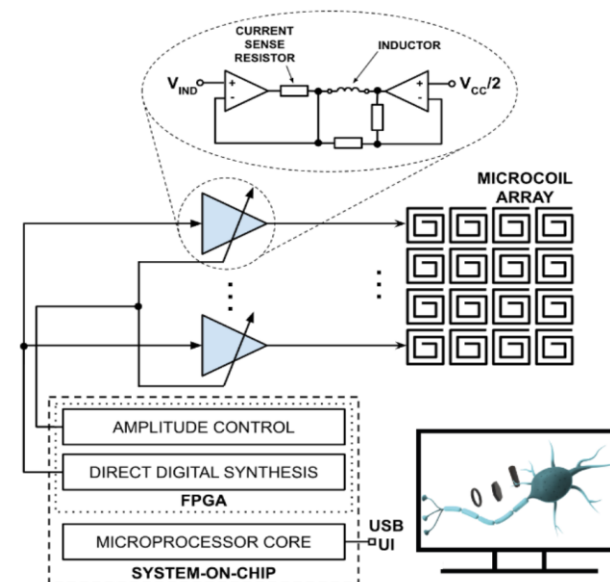
**Tomislav Marković**  
FER – Hrvatska





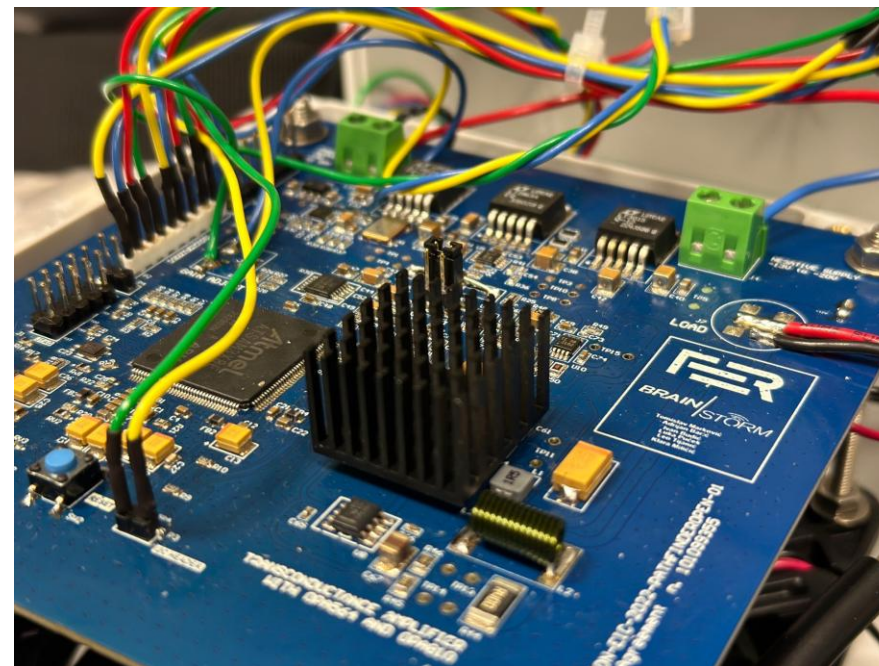
# BRAINSTORM – FER

- Programabilni digitalni elektronički sustav za upravljanje strujom (*Programmable digital electronic system for current management - PROSUM*)
  - Visoko efikasno pojačalo struje s mogućnosti brzog prekidanja strujnih signala za polje zavojnica
  - Kompaktni i efikasni digitalni sustav za generiranje signala i upravljanje pojačalima
  - Programibilno računalno sučelje za digitalni sustav za željene profile neuromodulacije



# BRAINSTORM – FER

- Polje od 8x8 zavojnica,  $\sim 10 \mu\text{H}$  ( $\sim \text{mT}$ )
- Sinusni izvor struje od  $\sim \text{Hz}$  do  $\sim 500 \text{ kHz}$  amplitude  $\sim 10 \text{ A}$



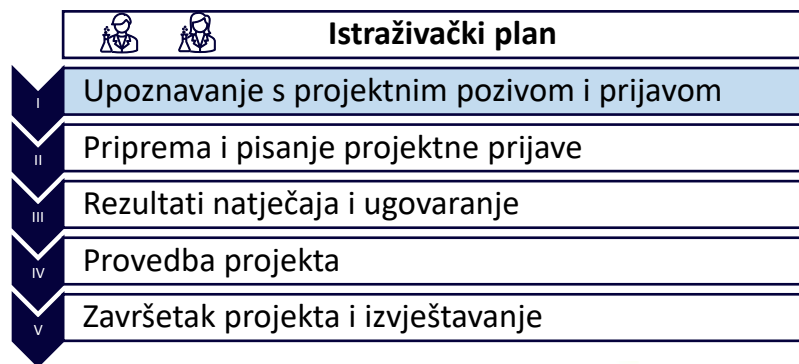
# Predstavljanje uspješnog projekta

- Projekt *BRAINSTORM*
- Iskustvo prijave
- Naučene lekcije



# Priprema projektne prijave

## EU Funding & Tenders Portal



European Commission | EU Funding & Tenders Portal

Welcome Markovic Tomislav

Home Funding Procurement Projects & results News & events Work as an expert Guidance & documents

Search...

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- Saved searches
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- Formal notifications
- Grants centre
- Proposals**
- Projects

### Proposals

Results: 3

PROGRAMME	CALL	TYPE OF ACTION	PROPOSAL ID	ACRONYM	STATUS	REMAINING TIME	CLOSURE DATE (Brussels time)	ACTIONS
HORIZON	HORIZON-MSCA-2024-SE-01	HORIZON-TMA-MSCA-SE	101236510	SUSNAMU	Final	Closed	05/02/2025 17:00:00	Actions
HORIZON	HORIZON-MSCA-2024-DN-01	HORIZON-TMA-MSCA-DN	101227372	NEUROMAGIC	Final	Closed	27/11/2024 17:00:00	Actions
HORIZON	ERC-2025-STG	HORIZON-ERC	101221585	microMOSAIC	Final	Closed	15/10/2024 17:00:00	Actions

Funding Opportunities News

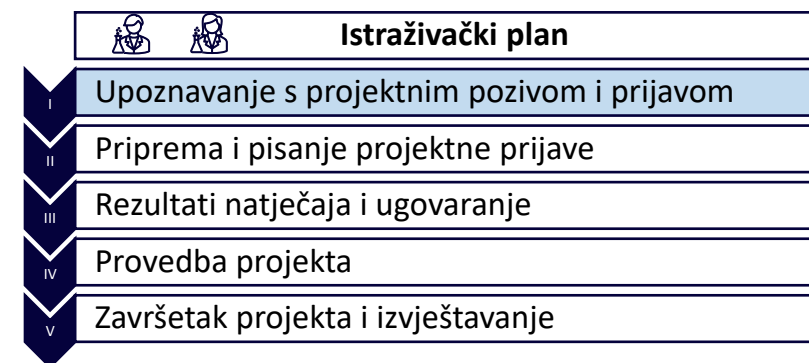
Citizens, Equality, Rights & Values programme  
**Q&A SESSION #NT25**


Global Gateway  
Youth Mobility for Africa  
**Intra-Africa Academic Mobility Scheme 2022-2027**

EU funding for:  
**Promotion of Agricultural Products**  
Apply by: **23 April 2025**  
ENJOY IT'S FROM EUROPE

# Priprema projektne prijave


## *EU Funding & Tenders Portal*




**European Commission** | Funding: Submission Service


Welcome **Tomislav Markovic** **TM**



**Deadline**  
21 May 2025 17:00:00 Brussels Local Time  
89 days left until closure






**Call data**  
Call: **HORIZON-EIC-2025-PATHFINDEROPEN**  
Topic: **HORIZON-EIC-2025-PATHFINDEROPEN**  
Type of action: **HORIZON-EIC**  
Type of MGA: **HORIZON-AG**  
 Topic and type of action can only be changed by creating a new proposal.

**Proposal data**  
Acronym: **INDOOR**  
Draft ID: **SEP-211142028**

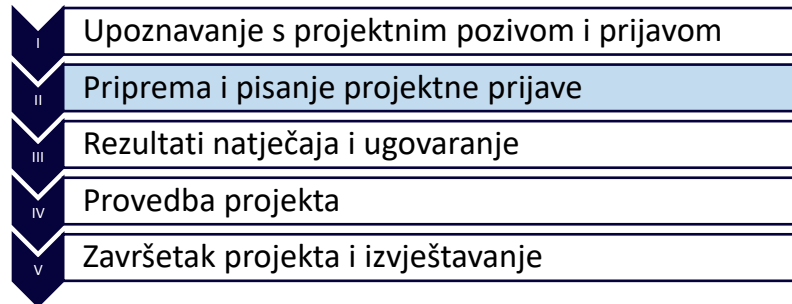
**Download Part B templates**  
 [Download part B templates](#)

 Your proposal contains changes that have not yet been submitted.

**Administrative forms (Part A)**  
[Edit forms](#)  [View history](#) [Print preview](#) 

**Part B and Annexes**  
In this section you may upload the technical annex of the proposal (in PDF format only) and any other requested attachments.   
**Part B \***   [Upload](#)   
**Information on clinical trials**   [Upload](#) 

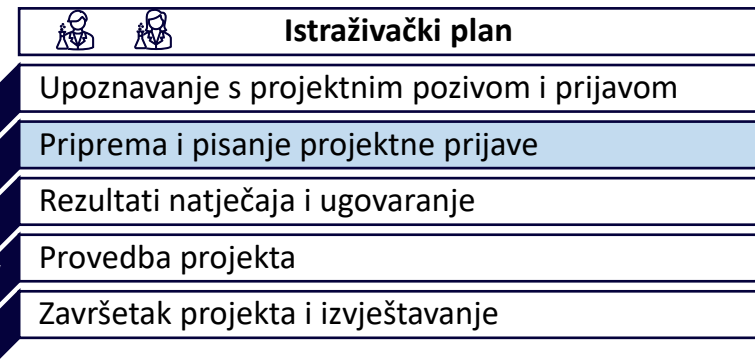
[< BACK TO PARTICIPANTS LIST](#) [VALIDATE](#) [SUBMIT](#)



# Priprema projektne prijave

- Projektni ured – Centar za istraživanje i inovacije FER-a
- Administrativni dio (*Part A*)
  - Lista prijavitelja
    - Opis voditelja/partnera
    - Istraživački tim
    - Uloga u projektu
    - Popis 5 značajnih uspjeha (npr. radovi)
    - Popis 5 relevantnih projekata ili aktivnosti
    - Opis važne istraživačke opreme
    - Budžet
    - Etički i sigurnosni aspekti projekta

# Priprema projektne prijave



## Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title	Prof.	Gender	<input type="radio"/> Woman <input checked="" type="radio"/> Man <input type="radio"/> Non Binary
First name*	Tomislav	Last name*	Markovic
E-Mail*	tomislav.markovic@fer.hr		
Position in org.	Assistant Professor		
Department	ZEMRIS	<input type="checkbox"/> Same as organisation name	
	<input checked="" type="checkbox"/> Same as proposing organisation's address		
Street	UNSKA 3		
Town	ZAGREB	Post code	10000
Country	Croatia		
Website	http://www.zemris.fer.hr		
Phone	+38516129929	Phone 2	+38598392459

## Researchers involved in the proposal

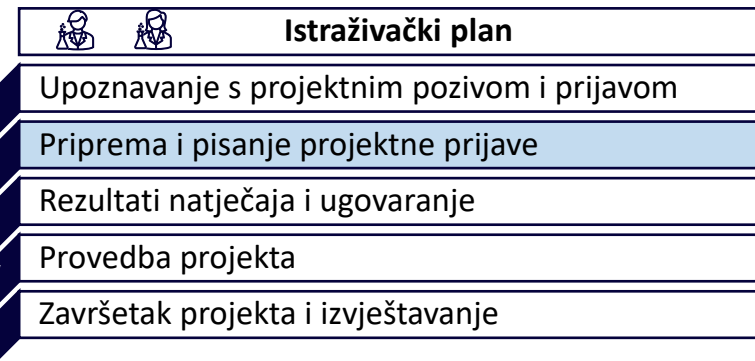
Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	Tomislav	Markovic	Man	Croatia	tomislav.markovic@fer.hr	Category B Senior research	Leading	0000-0002-9645-5565	Orcid ID
Dr	Jurica	Kundrata	Man	Croatia	jurica.kundrata@fer.hr	Category B Senior research	Team member	0000-0003-1687-0548	Orcid ID

## Role of participating organisation in the project

Project management	<input type="checkbox"/>
Communication, dissemination and engagement	<input checked="" type="checkbox"/>
Provision of research and technology infrastructure	<input checked="" type="checkbox"/>
Co-definition of research and market needs	<input checked="" type="checkbox"/>
Civil society representative	<input type="checkbox"/>
Policy maker or regulator, incl. standardisation body	<input type="checkbox"/>
Research performer	<input checked="" type="checkbox"/>
Technology developer	<input checked="" type="checkbox"/>
Testing/validation of approaches and ideas	<input checked="" type="checkbox"/>
Prototyping and demonstration	<input checked="" type="checkbox"/>
IPR management incl. technology transfer	<input type="checkbox"/>
Public procurer of results	<input type="checkbox"/>
Private buyer of results	<input type="checkbox"/>
Finance provider (public or private)	<input type="checkbox"/>
Education and training	<input checked="" type="checkbox"/>
Contributions from the social sciences or/and the humanities	<input type="checkbox"/>
Other	<input type="checkbox"/>
If yes, please specify: (Maximum number of characters allowed: 50)	



# Priprema projektne prijave



List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	T. Markovic, J. Bao, G. Maenhout, I. Ocket, B. Nauwelaers, "An Interdigital Capacitor for Microwave Heating at 25 GHz and Wideband Dielectric Sensing of nL Volumes in Continuous Microfluidics," <i>Sensors</i> , vol. 19, no. 3, 2019.
Publication	P. Barmuta, T. Markovic, et al., "Broadband Measurement Setup for Cell Electrorotation," 2020 IEEE MTT-S International Microwave Biomedical Conference (IMBioC), Toulouse, France, 2020, pp. 1-3
Publication	M. Chavoshi, M. Martinic, B. Nauwelaers, T. Markovic, D. Schreurs, "Design of Uncoupled and Cascaded Array of Resonant Microwave Sensors for Dielectric Characterization of Liquids," <i>IEEE Transactions on Microwave Theory and Techniques</i> , vol. 71, no. 4, 2023.
Publication	J. Kundrata, A. Baric, "EMC-Aware Design of a Planar Inductor for Low-Profile OLED Drivers," <i>IEEE Transactions on Power Electronics</i> , vol. 31, no. 6, pp. 4474-4483, 2016.
Publication	J. Kundrata, I. Skeledzija, A. Baric, "EMI and Voltage Ripple Co-Optimization of a Spread-Spectrum Controller in Buck Converters," <i>IEEE Access</i> , vol. 10, pp. 131909-131919, 2022.

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Ni PXle-5433 Arbitrary Waveform Generator	A waveform generator used to test the current drivers and fast switching between Hz and kHz signals.
InTEST ECO-560-A ThermoStream	A thermal chamber used to evaluate heating/cooling performance of the designed electronics platform. -60 deg C to +200 deg C, 35 seconds for transition from +105 deg C to -40 deg C
VNA R&S ZNB8 - VNA 9 kHz to 8.5 GHz, 4-port	A vector network analyser used to characterize designed current drivers operating at kHz frequencies.
R&S ESRP3 - EMI receiver 9 kHz to 3.6 GHz	A laboratory instrument to measure electromagnetic interference of designed electronics platform.
Tektronix 11801B	Digital sampling oscilloscope with 20 GHz TDR heads for measurements of switching of current drivers.
TPT HB16 wirebonder	A laboratory device used to integrate numerous devices on a single PCB.
Keysight 33622A Waveform Generator	A waveform generator with Trueform signal generation technology - more capability, fidelity, and flexibility than previous generation DDS generators. 1 GSa/s sampling rate, 14-bit resolution with 1 mVpp to 10 Vpp amplitude, Sine waves with 5x lower harmonic distortion.

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Microwave Heating in Tube for Optimal Proteomics	Even though research in life sciences is evolving, the main challenge of efficient, uniform and rapid heating of millilitre volume liquids in tubes remains. To achieve the microwave way of heating coupled with rapid cooling, our goal in this project is to combine computational electromagnetism coupled with thermal metamaterials, resulting in a computational microwave heat transfer eco-system that will enable us to conceive an optimal heater design.
MESMERIC	A promising way to fight cancer is through information carried by extracellular vesicles (EVs). Extracting this information often depends on the availability of biomarkers and their matching bioreceptors. In this interdisciplinary project microwave dielectric sensing combined with microfluidic solutions capable of differentiating EVs in a label-free manner is investigated. By using microwaves, the technology could alleviate biomarker discovery, EVs analysis and have an impact on many fields.
MIRACLE: Microwave a la Carte Flow Chemistry	A significant improvements can be achieved by microwave heating in organic synthesis reactions by 1) moving to flow-based systems, 2) using optimized signal power and frequency for a reaction, 3) using reactors that provide multi-dimensional temperature control. By exploring the design space for microwave thermal systems on the microscale, a new scalable generation of flow devices with the high throughput in an energy efficient manner large chemical compounds libraries will be enabled.
SENFUS	Project Sensor Fusion develops the platform for integration of ARM Cortex platform on the chip level with sensors, information processing and secure storage of information. A high speed digital interface in charge of communication with surrounding sensors is also developed and it will be integrated with an ARM Cortex core. Additionally, automated measurement and verification of the digital platform integrated with analog circuits and sensors will be performed.
Co-operation University of Zagreb and Ljubljana	Improving heat dissipation by extended surfaces and forced convection no longer provides sufficient removal of heat and will be insufficient when controlling thermal transients or dissipating heat to the ambient on a mm-scale. We want to establish a platform consisting of the thermal switches and an array of planar heaters in the first layer of the stack up, and an array of high-accuracy and low-thermal loading thermal resistive detectors in second layer in the stack up.



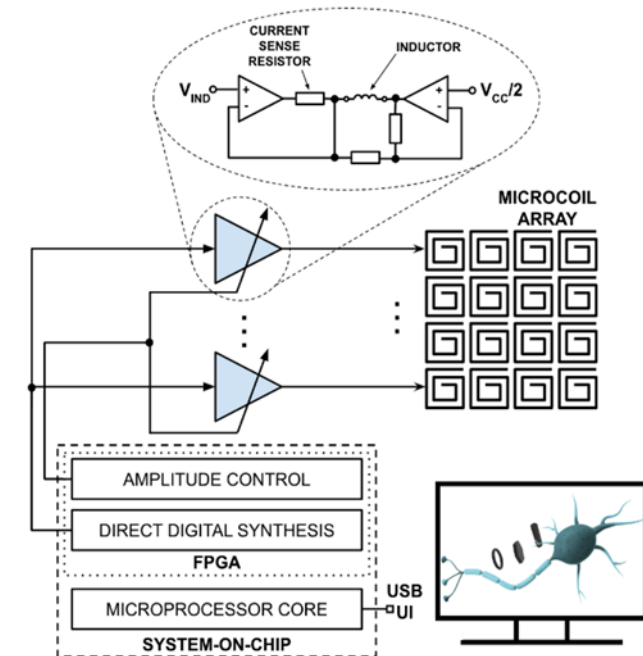
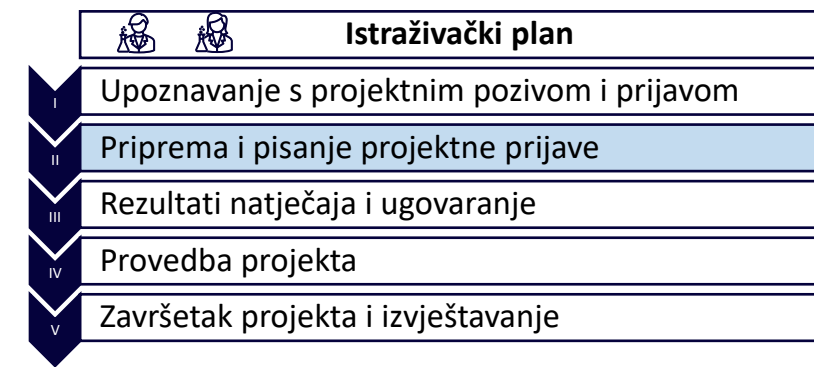
# Priprema projektne prijave

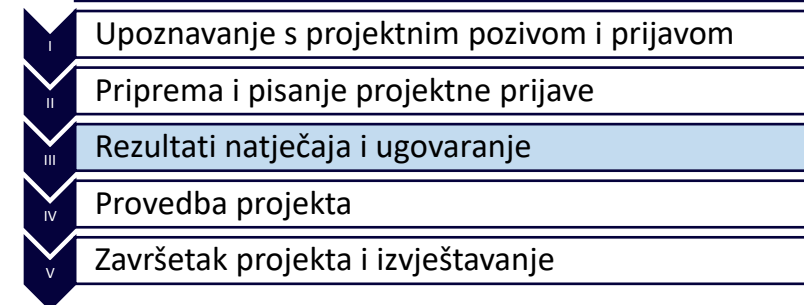
- Projektni dio (*Part B*)
  - 17 stranica
  - Projektna prijava *BRAINSTORM*
    - Excellence
      - Long-term vision
      - Science-towards-technology breakthrough
      - Objectives
      - Interdisciplinarity
    - Impact
      - Long-term impact
      - Innovation potential
      - Communication and dissemination
    - Quality and efficiency of the implementation
      - Work plan and resources
      - Quality of the consortium

Table 2. Award criteria for EIC Pathfinder Open
<b>Excellence (Threshold: 4/5, weight 60%)</b>
<b>Long-term vision:</b> How convincing is the vision of a radically new technology and relevant potential solutions, towards which the project would contribute in the long term?
<b>Science-towards-technology breakthrough:</b> How concrete, novel, and ambitious is the proposed science-towards-technology breakthrough with respect to the state-of-the-art? What advancement does it provide towards realising the envisioned technology?
<b>Objectives:</b> How concrete and plausible are the proposed objectives to reach the envisaged proof of principle? To what extent is the high-risk/high-gain research approach appropriate for achieving them? How sound is the proposed methodology, including the underlying concepts, models, assumptions, alternative directions and options, appropriate consideration of the gender dimension in research content, and the quality of open science practices?
<b>Interdisciplinarity:</b> How relevant is the interdisciplinary approach from traditionally distant disciplines for achieving the proposed breakthrough?
<b>Impact (Threshold: 3.5/5, weight 20%)</b>
<b>Long-term impact:</b> How significant are the potential transformative positive effects that the envisioned new technology would have to our economy, environment and society?
<b>Innovation potential:</b> To what extent does the envisioned new technology have potential for generating disruptive innovations in the future and for creating new markets? How adequate are the proposed measures for protection of results and any other exploitation measures to facilitate future translation of research results into innovations? How suitable are the proposed measures for involving and empowering key actors that have the potential to take the lead in translating research into innovations in the future?
<b>Communication and Dissemination:</b> How suitable are the measures to maximise expected outcomes and impacts, including scientific publications, communication activities, for raising awareness about the project results' potential to establish new markets and/or address global challenges?
<b>Quality and efficiency of the implementation (Threshold 3/5, weight 20%)</b>
<b>Work plan:</b> How coherent and effective are the work plan (work packages, tasks, deliverables, milestones, timeline, etc.) and risk mitigation measures in order to achieve the project objectives?
<b>Allocation of resources:</b> How appropriate and effective is the allocation of resources (comprising person-months and other cost items) to work packages and consortium members?
<b>Quality of the consortium:</b> To what extent do all the consortium members have the necessary capacity and high-quality expertise for performing the project tasks?

# Priprema projektne prijave

- Program *Hop-on Facility*
- Projektna prijava (*Part B*)
  - 8 stranica
  - Projektna prijava *BRAINSTORM*
    - *Excellence*
    - *Impact*
    - *Quality and efficiency of the implementation*





# Rezultati i ugovaranje

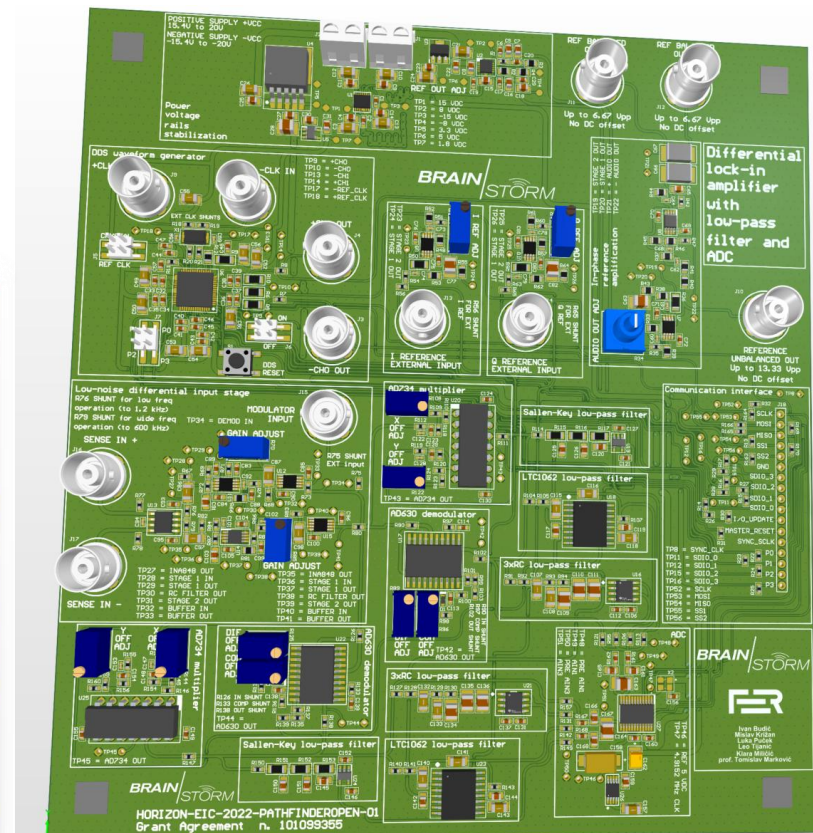
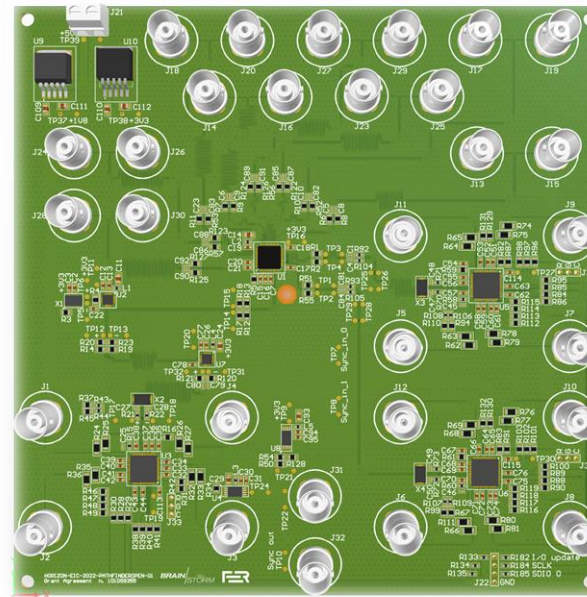
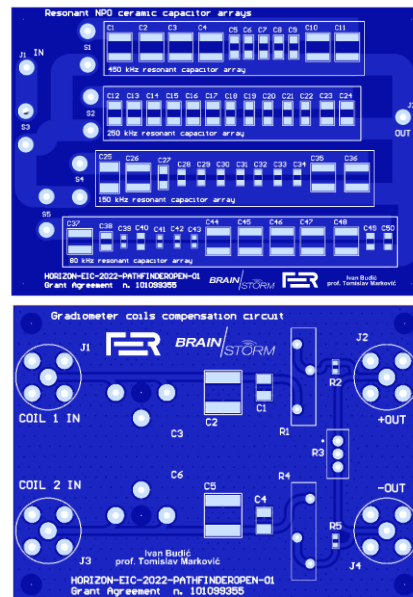
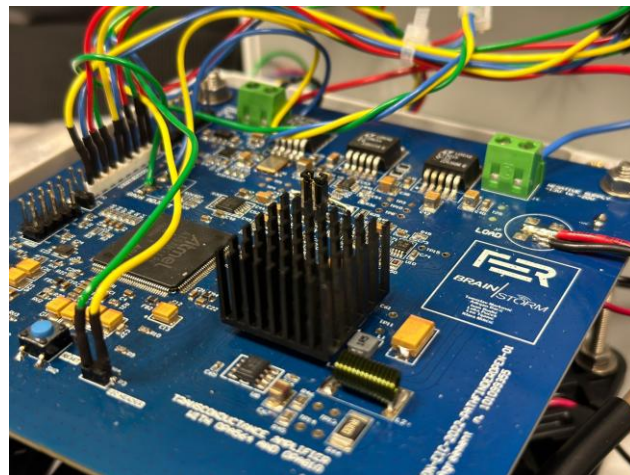
- Priprema projektne prijave – rujan 2023.
- Rezultati – siječanj 2024.
- Ugovaranje projekta – veljača 2024.
- Projektni ured – Centar za istraživanje i inovacije FER-a
  - Potpis odgovorne osobe institucije



	Istraživački plan
I	Upoznavanje s projektnim pozivom i prijavom
II	Priprema i pisanje projektne prijave
III	Rezultati natječaja i ugovaranje
IV	Provedba projekta
V	Završetak projekta i izvještavanje

# Provedba projekta

- Provedba projekta – travanj 2024.
  - Zapošljavanje istraživača i nabava opreme
    - Ivan Budić
    - Mislav Križan



# Predstavljanje uspješnog projekta

- Projekt *BRAINSTORM*
- Iskustvo prijave
- Naučene lekcije



# Naučene lekcije

- „*Da sam imao samo još samo jedan dan*”
  - Za opsežne projekte prijave potrebno je krenuti na vrijeme s formiranjem ideje i tima te projektnom prijavom
- Prvo administrativni pa znanstveno-tehnički dio
  - Upoznavanje s *EU Funding & Tenders* portalom
  - Budžet i troškovnik, npr. iznosi plaća istraživača
  - Trajanje procesa javne nabave
  - Etička i sigurnosna pitanja
- Pravovremeno pripremiti svoj profil
  - Mobilnost, rad na projektima, umreženost
- *EIC Pathfinder Open i Challenge*
  - $\geq 3$  institucije,  $\leq 20$  stranica B dio



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Image by [PIRO](#) from [Pixabay](#)



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SVEUČILIŠTE U ZAGREBU

Fakultet  
elektrotehnike i  
računarstva

# BRAINSTORM, HORIZON-EIC-2022-PATHFINDEROPEN-01 Grant Agreement n.101099355

<https://www.brainstorm-project.eu>

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D zgrada, FER

01/6129-929



20. veljače 2025. godine

SEECCEL, Zagreb

