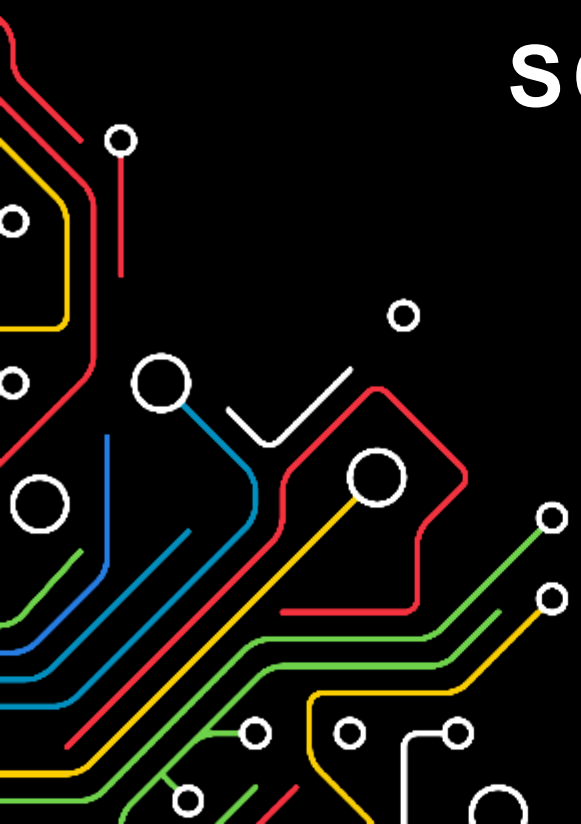
INSTITUTE FOR SYSTEMS
AND COMPUTER ENGINEERING,
TECHNOLOGY AND SCIENCE

INESCTEC 35 1985 TRINTA E CINCO ANOS 2020

C-BER

SCOPE AND ACTIVITY FOR 2021

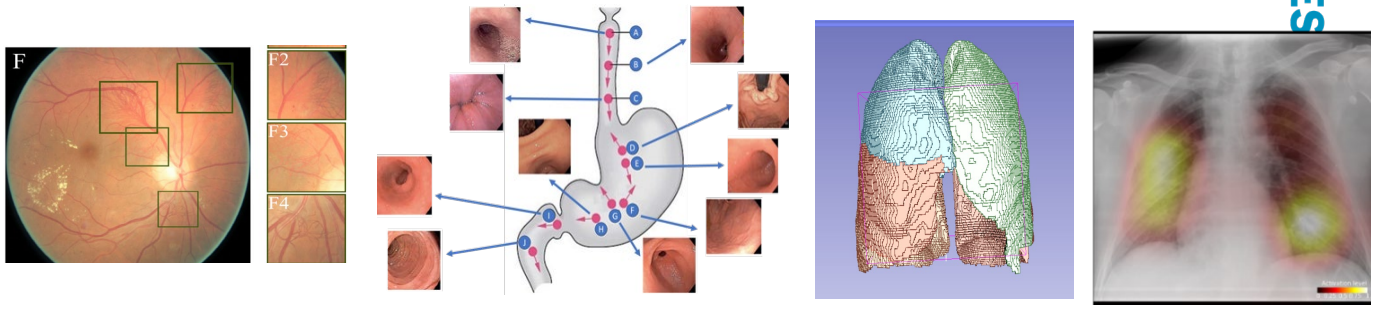
CCI/2021-05-16



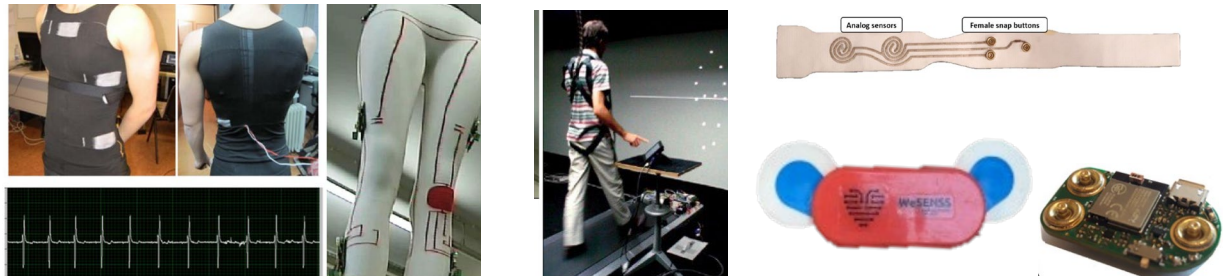
from knowledge
generation to
science-based
innovation

C-BER RESEARCH LINES

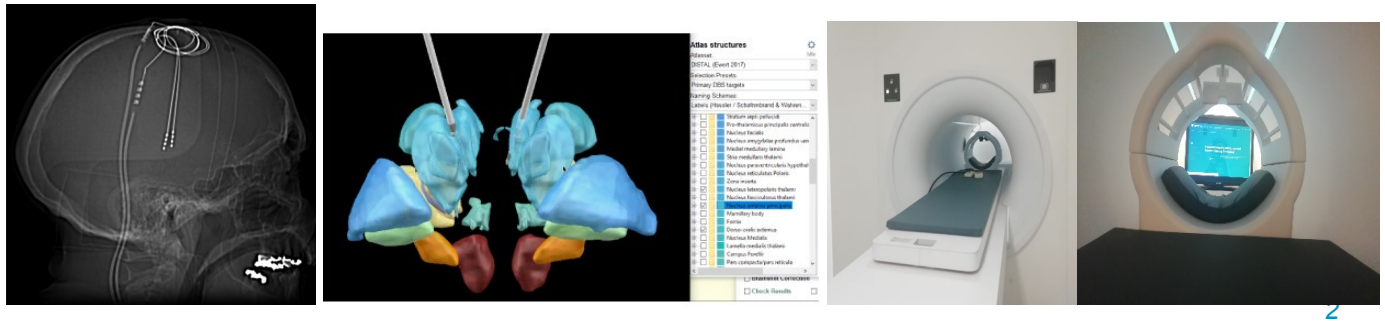
- **RL1. Biomedical Imaging**
  Coordinator: Aurélio Campilho



- **RL2. BioInstrumentation**
  Coordinator: Miguel Velhote Correia



- **RL3. NeuroEngineering**
  Coordinator: João Paulo Cunha



INNOVATION ACTIVITIES/MAIN MARKETS AND APPLICATION AREAS

	TEC4AGRO	TEC4ENERGY	TEC4HEALTH	TEC4 INDUSTRY	TEC4SEA	Other
Diagnosis support systems (signal & image based)			x			
Disease screening			x			
Occupational health monitoring systems	x	x	x	x		
Functional MRI simulation			x			
R&D of wearable health & sport devices	x	x	x	x		
IoT4health platform	x	x	x	x		

OBJECTIVES 2021

- To create interdisciplinary knowledge enabling opportunities for innovation and technology transfer with economic impact (Science with Impact);
- To develop bioengineering methods, products and tools for the prevention, early detection and diagnosis of different types of diseases, aging-related impairments, rehabilitation, occupational health and wellness;
- To contribute to the development of advanced neuro-technologies at the frontier of engineering and neuroscience;
- To promote internal synergies and strategic partnerships with other Centres of INESC TEC, clinical partners, research institutes, medtech companies & startups and foster international cooperation.

-> Science-based Innovation Cycles Model

MAIN ACTIONS 2021

1. Active fund raising for the next R&D cycle (namely Horizon Europe) and improve of scientific and IP indicators. ->1st ever C-BER H2020 project participation; <see next slide>

2. Establish, renew and enlarge R&D contract programs with recent startups that licensed our patents; -> New R&D contract with inSignals Neurotech submitted; Second one in preparation;

4. Novel hierarchical edge-AI architectures with neuron-mimetic knowledge transfer to neural-net architectures; ->Not funded; internal lab prototypes; Follow-up from NanoSTIMA proj.

9. Evolve to a multi-modal approach to cardiac signal processing by including simultaneous ECG in a variety of clinical situations (screening in underprivileged scenarios, surgery) ->project submitted;

5. Design of methodologies for the analysis of OCT/OCTA images for the diagnosis and follow-up of diabetic retinopathy and age-related macular degeneration. ->Project subm.; Follow-up SCREEN-DR proj

7. Development of a second opinion system for COVID-19 diagnosis and prognosis based on the integration of multimodal data (e.g. namely CXR /CT images and results of other medical reports) -> project funded;

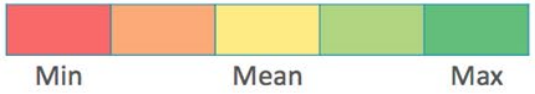
8. Establish long-term partnership with Medtronic and several clinical partners in the Neurostimulation R&D area; -> Horizon Europe - EIC Pathfinder WeAI-Epil project submitted

C-BER FULFILMENT STATUS

GLOBAL INDICATORS / FTE

2021 T1

Indicator		R&D Centres												
		CTM	CAP	CRAS	CBER	CPES	CESE	CRIIS	CEGI	CITE	CSIG	LIAAD	CRACS	HASLAB
Publications	Indexed Publications in Journals / FTE	0.28	0.71	0.15	0.58	0.79	0.14	0.79	0.30	0.17	0.27	0.31	0.39	0.14
	Indexed Publications / FTE	0.30	0.76	0.22	0.58	0.79	0.27	1.18	0.35	0.33	0.41	0.38	0.39	0.16
IP Protection	Number of results / FTE	0.40	4.00	1.65	5.00		0.04				0.82		0.56	0.03
Cooperation	Publications in Cooperation / FTE	0.13		0.15	0.42	0.05	0.09	0.14	0.03		0.06	0.08		
	Projects in Cooperation / FTE	0.99	1.37	1.70	1.96	1.49	2.22	1.15	1.56	0.17	0.81	1.20		0.96
Project Activity	Total Income (k€) / FTE	15.12	6.48	14.73	3.72	16.44	10.50	10.61	7.10	7.26	7.81	7.53	2.70	13.68
	Total Margin (k€) / FTE	5.70	-2.04	1.11	-2.16	3.84	-1.11	2.50	-0.21	-1.39	-0.18	2.55	0.10	4.23



FLAGSHIP PROJECTS UNDER WAY OR TO BEGIN IN 2021

- FIRE-RES- Innovative technologies and socio-ecological-economic solutions for fire resilient territories in Europe (H2020-Green Deal; recently approved – CITE, CBER, CEGI)
- THOR - Computer Assisted Thoracic Assessment using POCUS (FCT – Covid-19)
- CAGED - Computer Assisted Gastric Cancer Diagnosis (FCT)
- VitalPROVID - Wearable Covid-19 patient monitoring & follow-up (P2020 – covid-19)
- TAMI - Transparent Artificial Medical Intelligence (CMU Portugal)
- First R&D services contract with our spin-off *inSignals Neurotech*

MAIN EXTERNAL PARTNERS AND COLLABORATIONS WITH OTHER CENTRES - RESEARCH

- INESC TEC Centers: CAP; LIAAD; CSIG; CTM; CITE; CEGI
- External Partners:

Universities/faculties

Research Institutions

Hospitals/Healthcare Institutions

MAIN EXTERNAL PARTNERS AND COLLABORATIONS WITH OTHER CENTRES - INNOVATION

- INESC TEC Centers: CITE; (SAL);
- External Partners:

Parceiros têxteis

P&R TÊXTEIS, S.A.

LMA Leandro Manuel Araújo, S.A.

citeve TECNOLOGIA TÊXTIL

petratex

Parceiros técnologicos

biodevices

Medtronic

plux WIRELESS BIOSIGNALS S.A.

eqs MANAGING YOUR RISK

Spin-off/start-ups

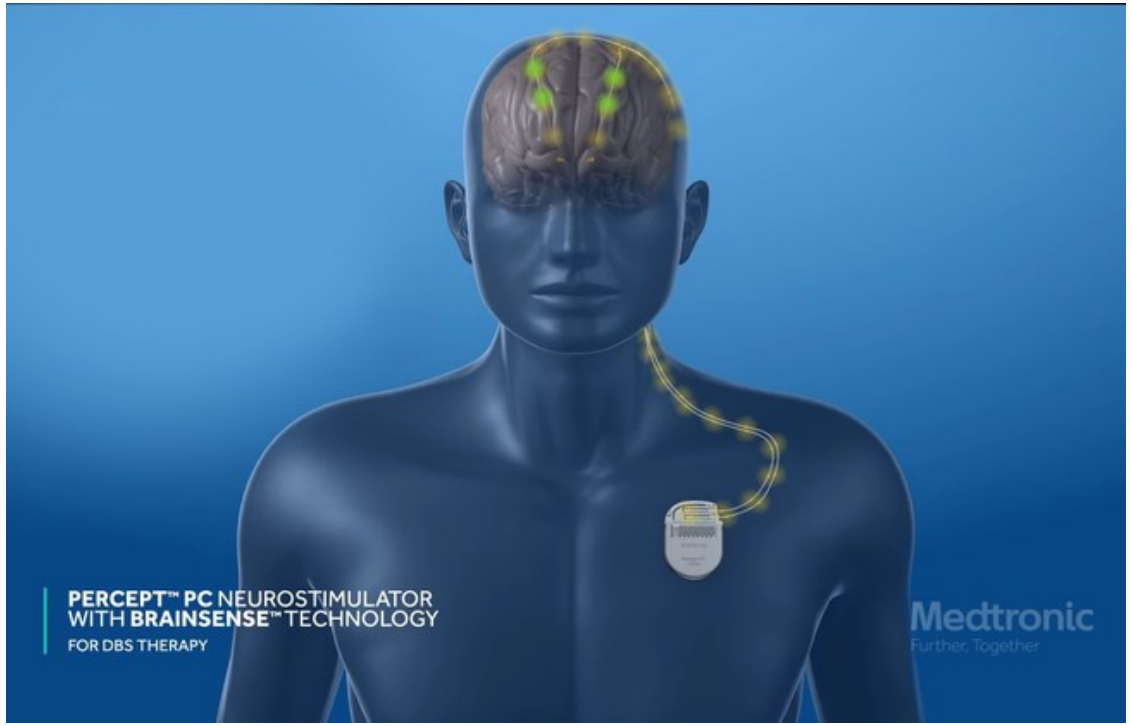
iLoF

insignals neurotech

WeSENSS WEARABLE SENSORS FOR SAFETY

INESCTEC

ADAPTATIVE BRAIN NEUROSTIMULATION: A NEW OPPORTUNITY TO INNOVATE IN NEUROENGINEERING



8 / 16 channels

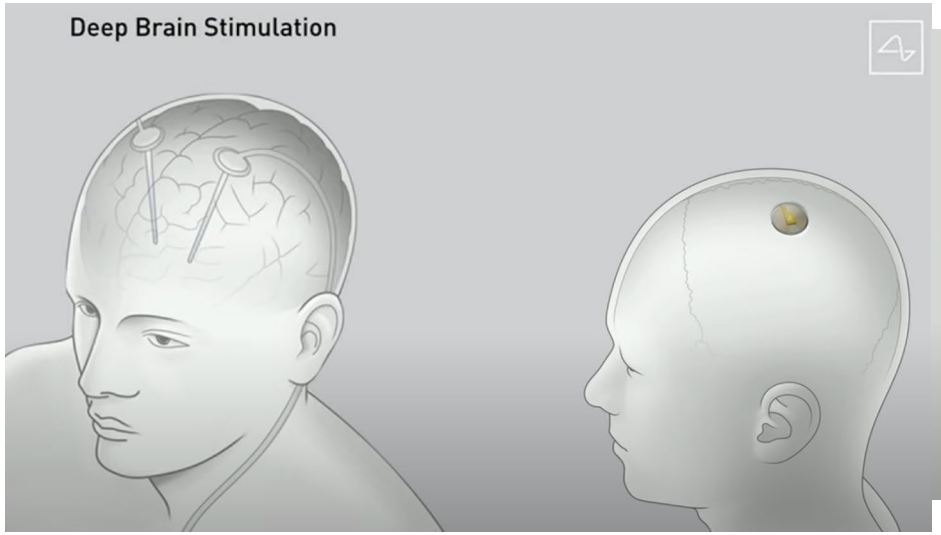
Stim & read
brain signals

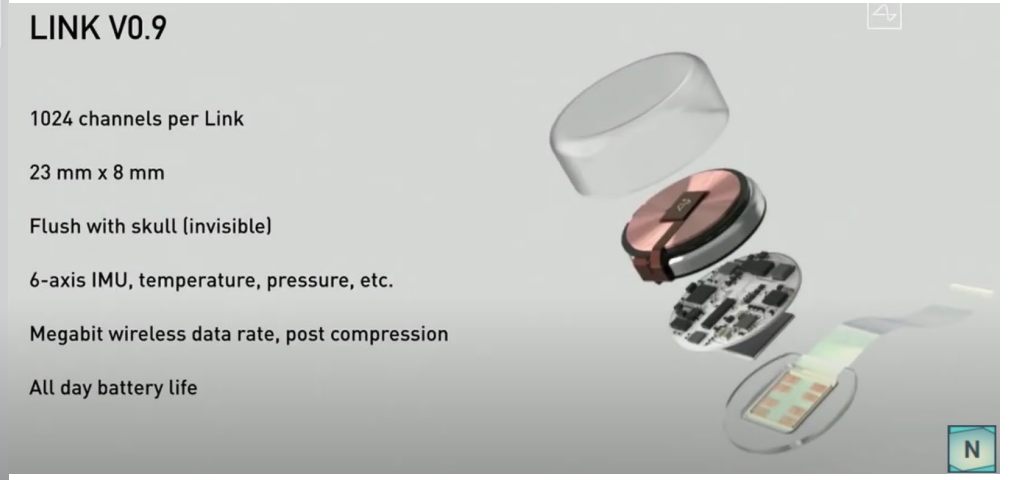
2021 10th International IEEE/EMBS Conference on Neural Engineering (NER)
Virtual Conference, May 4-6, 2021

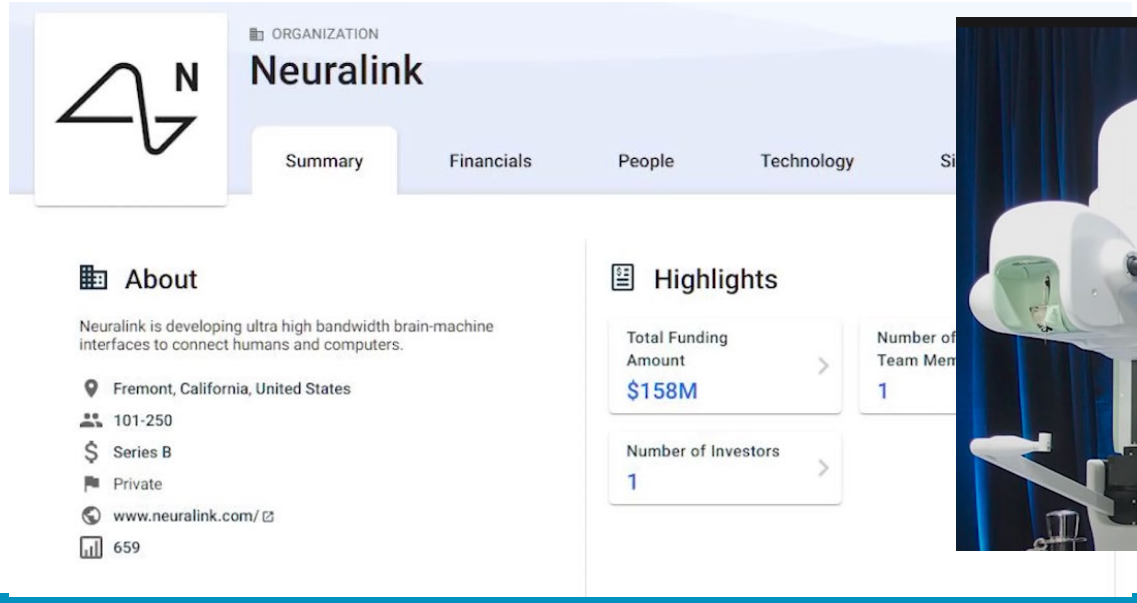
Video-EEG and PerceptTM PC Deep Brain Neurostimulator Fine-Grained Synchronization for Multimodal Neurodata Analysis

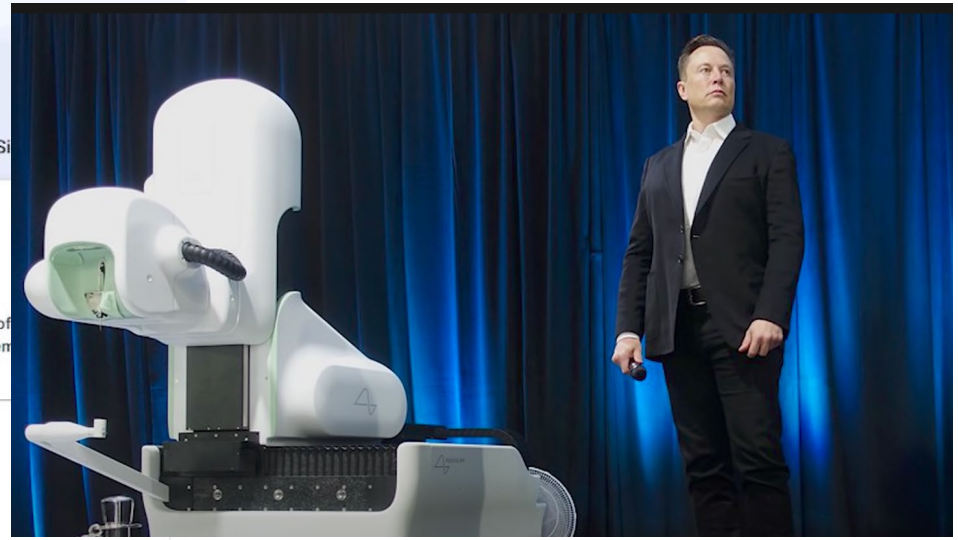
Elodie M. Lopes*, Maria do Carmo Vilas-Boas, Ricardo Rego, Ângela Santos, and João P. S. Cunha,
Senior Member IEEE

ADAPTATIVE BRAIN NEUROSTIMULATION: A NEW OPPORTUNITY TO INNOVATE IN NEUROENGINEERING









C-BER Fall Meeting – October 2019