



This project is co-financed by the European Union  
and the Republic of Türkiye



**ICTürkiye2025**  
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ORGANIZATION: METU, DEPT EE

WORKSHOP NAME: Digital and Smart Health

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## Middle East Technical University



**ODTÜ  
METU**

METU, a state university founded in 1956 has 41 undergraduate programs within 5 faculties. There are 105 master and 70 PhD programs. METU actively took part in many COST, Eureka, NATO, NSF, UN, World Bank, Jean Monnet, INCO, EUMEDIS, 6<sup>th</sup> and 7<sup>th</sup> Framework, Erasmus Mundus ECW, Leonardo and Socrates projects.

EEE Faculty performs innovative research in 10 major research areas of the Electrical Engineering discipline: Biomedical, Electronic, Computer, Electromagnetics, Robotics, Control, Power, etc.

EEE Faculty collaborates with METU Center for Image Analysis (OGAM), ROMER, BILTIR, MicroElectroMechanical Systems Research Center (METUMEMS Center), Center for Solar Energy Research and Applications (GUNAM),

## Team's expertise

### Faculty from

- Electrical and Electronics Eng
  - Biomedical
  - Electronics
  - Computer
  - Signals and Systems
  - Robotics



Cornell Weill Hospital  
Hacettepe Univ Hospital  
Ankara Univ Hospital  
Bilkent Sehir Hospital  
Icterra  
Oslo Metropolitan Univ  
University of Bordeaux  
Slovak Academy of Sciences



### Experienced in

- AI
- Different imaging modalities: MRI, ECGI, Mammography
- Embedded system design
- Robotics
- Low Power Circuit Design
- Mixed Signal Integrated Circuits
- Neuromorphic Architectures
- Microwave Imaging / Harmonic Motion Microwave Imaging (Pat.)
- d) Electro-Thermal Imaging (Pat.)

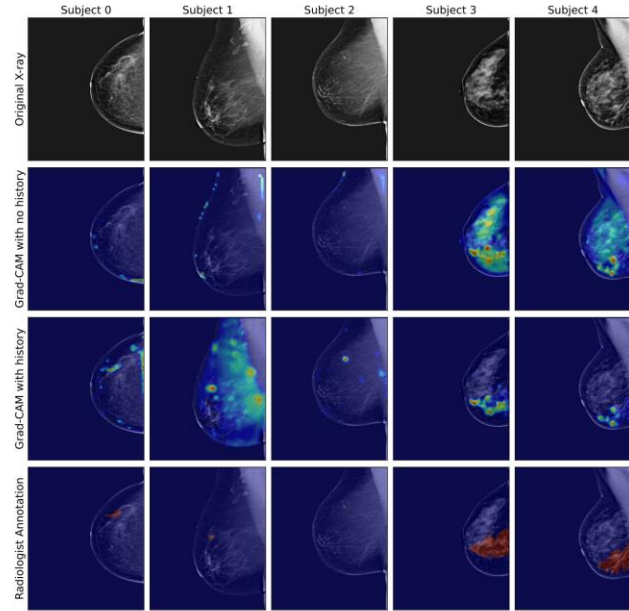
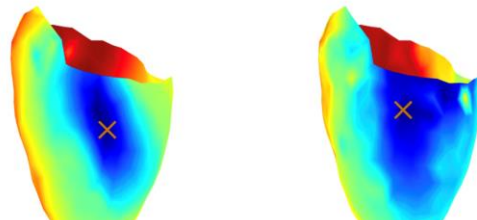
# Research fields/On-going Projects

- Breast Cancer Detection w/Icterra
- Longitudinal Mammogram Risk Prediction w/Cornell Weill Radiology Dept.
- Evaluation of meibomian gland dysfunction with deep learning model w/Ankara Bilkent City Hospital
- Tumor segmentation and grading in histopathology images w/Ankara Bilkent City Hospital
- Sports Performance Monitoring by Wearable Sensors w/METU-DTX, METU Dept. of Physical Education and Sports
- DL-Assisted Physics-Based Approach to the Inverse Problem of Electrocardiography



Ground-truth AT

Proposed AT



Mammography Based Image Diagnosis & Analysis System for Breast Cancer

**500K+** Full-Field Digital Mammography Images from multiple hospitals.

A cutting-edge eXplainable AI model that highlights salient regions on mammograms, enhancing interpretability and trust in automated decision-making.

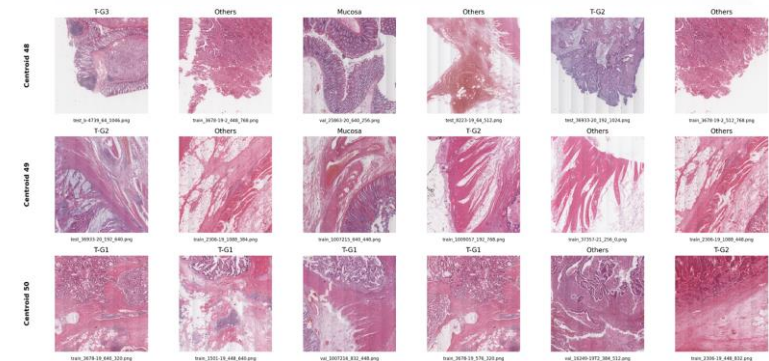
Outperforms radiologists in precision and continues to improve with advanced training techniques.  
**ROC AUC: 0.85**  
**PR AUC: 0.89** (95% CI)

Web-based platform with oncology workflow. Advanced viewer with digital enhancement tools. Seamless integration via service endpoints & PACS connectivity.

DICOM  
Digital Imaging and Communications in Medicine

HL7 FHIR

Icterra Information and Communication Technologies  
[www.icterra.com](http://www.icterra.com) | [info@icterra.com](mailto:info@icterra.com)





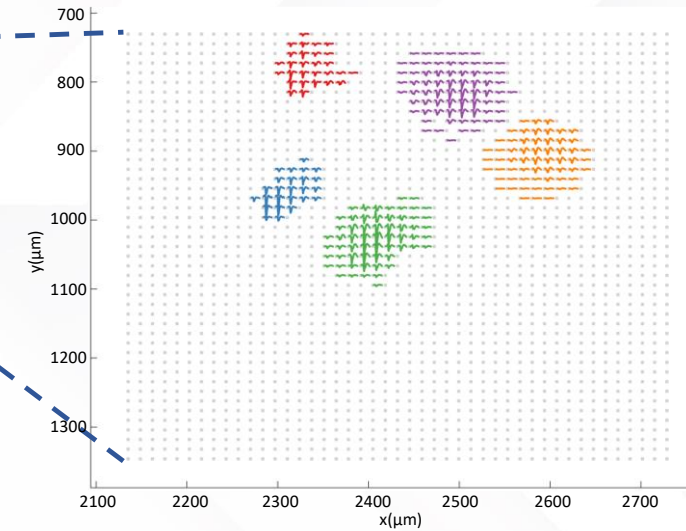
## Research fields/On-going Projects

- *In-vitro* and *in-vivo* Recording neuronal signals with high-density resolution
- Development of CMOS microelectrode array for simultaneous multi-thousand recordings with low power dissipation
- Development of flexible microelectrodes with ODTÜMEMS Centre
- Experimenting with the animal models w/Hacettepe University Hospital
- Bio-inspired RL system architecture with significant energy consumption benefits
- Development of Hardware architecture for successfully modeling features analogous to brain operation

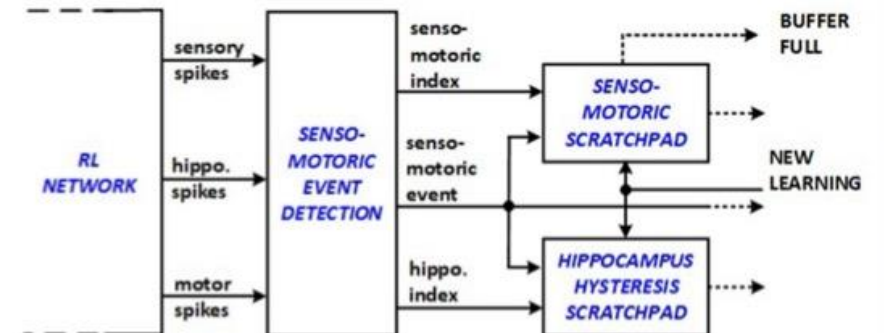
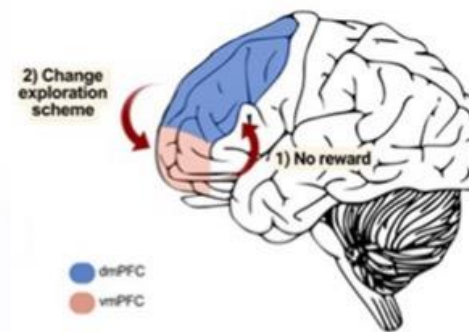
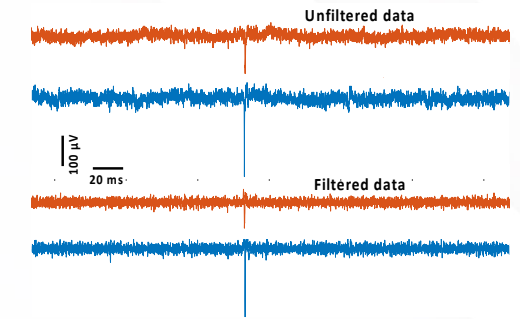
Optical Image of Brain Tissue on Microelectrode Array



Electrical footprints in high-density area



Recorded Voltage Traces



## Project Idea

**Call Topic:** HORIZON-HLTH-2025-03-DISEASE-02-two-stage: Advancing innovative interventions for mental, behavioural and neurodevelopmental disorders

**Deadline Dates:** 18 Sept 2025

☐ **Objectives:**

- ☐ **Low Power Neuromorphic Hardware Systems for Real-Time Image Processing in Edge Applications**
- ☐ **Development of Energy Efficient Reinforced Learning System with a SNN Core for Classification Applications**

☐ **Expected Results:**

- ☐ **Energy Efficient Classification with High Accuracy Performance**
- ☐ **Real Time Operation for Rapid Decision in Health Applications**

**Consortium - profile of known partners (if any)**

| No | Partner Name           | Type | Country | Role in the Project |
|----|------------------------|------|---------|---------------------|
| 01 | METU                   | Univ | Turkey  |                     |
| 02 | Oslo Metropolitan Univ | Univ | Sweden  |                     |
| 03 |                        |      |         |                     |
| 04 |                        |      |         |                     |
| 05 |                        |      |         |                     |



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