AMANDA Project

AutonoMous self powered miniAturized iNtelligent sensor for environmental sensing anD asset tracking in smArt IoT environments

www.amanda-project.eu

The project has received funding from European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n°825464

AMANDA ASSC

One Card - A World of Features and Solutions!

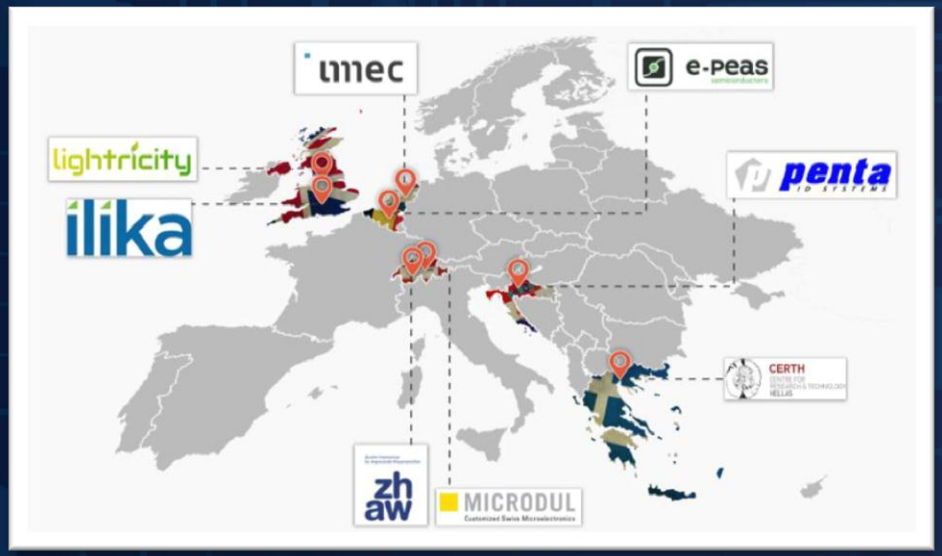
AMANDA Project

The ultimate goal of the AMANDA project is to create an autonomous multisensory platform, in the size of a credit card and with a thickness not exceeding 3 mm.

AMANDA's partners combine the expertise of world-class manufacturing infrastructures and know-how, using micro and nanotechnology, new composites, innovative architectures and advanced software.

AMANDA Project Partners

- **CERTH, The Centre for Research and Technology-Hellas** - Information Technologies Institute (Solun, Greece)
- **IMEC** - Interuniversity Microelectronics Center (Eindhoven, The Netherlands)
- **ZHAW** - Zürich University of Applied Sciences (Zürich, Switzerland)
- **Lightricity Ltd** (Oxford, UK)
- **E-peas S.A** (Mont-Saint-Guibert, Belgium)
- **Ilika plc** (Southampton, UK)
- **Microdul AG** (Zürich, Switzerland)
- **Penta d.o.o.** (Pula, Croatia)



Objectives

- **Objective 1**: To design and develop a maintenance-free, miniaturised and easily deployable Autonomous Smart Sensing Card (ASSC) for environmental sensing and asset & people tracking/monitoring in smart living and working environments.

- **Objective 2**: To apply high aspect ratio architectures and miniaturization-oriented design in terms of the overall size reduction to achieve maximum thickness of up to 3 mm thickness depending on sensors employed.

- **Objective 3**: To ensure maintenance-free (energy autonomy) functionalities exploring energy harvesting and storage concepts for powering micro sensor nodes.

Objectives

- **Objective 4**: To apply multi-layer optimisation strategies for ultra low power processing/management.

- **Objective 5**: To develop and integrate advanced miniaturised multi-sensing technology that will contribute significantly to the realization of next generation autonomous analytical instruments for distributed environmental sensing, asset and people tracking and monitoring.

- **Objective 6:** To enrich wireless connectivity capabilities in support of cyber-secure mesh communication as well as ultra low power localisation and tracking.

Objectives

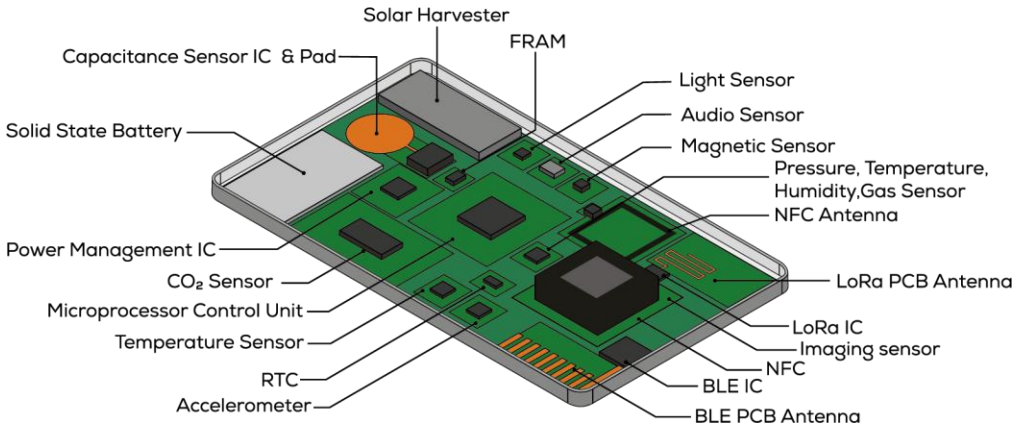
- **Objective 7**: To incorporate built-in ASSC processing capabilities for sensor/data fusion and low power edge intelligence in support of IoT-related services.

- **Objective 8**: To validate the proposed ASSC in laboratory conditions under variable application scenarios.

The Architecture of the ASSC

Sensors

- Temperature sensor
- Relative Humidity sensor
- Air pressure sensor
- Capacitive sensor
- CO_2 sensor
- Accelerometer
- Light sensor
- Acoustic sensor
- Spintronic sensor /Magnetometer



PV Energy Harvester & Solid State Battery

LoRa, BLE and NFC wireless connectivity

Use Cases

3 versions of the ASSC

Indoor / Outdoor / Wearable

	Use Case	Description	Component of the System	Version
	**UC1**	ENVIRONMENTAL ROOM SENSING FOR AUTOMATED ROOM CONTROL AND SAFETY	Core System, Temperature, Humidity, Pressure, VOC, Light Sensor, CO_2, LED	Indoor
	**UC2**	MULTISENSORY INDOOR/OUTDOOR PARKING SLOT OCCUPANCY MONITORING	Core System, Temperature, Humidity, VOC, Light Sensor, Accelerometer, Magnetic Sensor	Indoor/ Outdoor
	**UC3**	INFRASTRUCTURE, NOISE, WEATHER AND AIR QUALITY MONITORING STATION	Core System, Temperature, Humidity, Pressure, Light Sensor, Accelerometer, Magnetic Sensor	Outdoor
	**UC4**	IDENTIFICATION AND HEALTH OF PEOPLE IN A WORKING ENVIRONMENT	Core System, Temperature, Humidity, Pressure, Light Sensor, Accelerometer, Acoustic Sensor, Magnetic Sensor, LED	Wearable
	**UC5**	ASSETS AND GOODS TRACKING AND MONITORING	Core System, Temperature, Humidity, Pressure, VOC, Light Sensor, Accelerometer	Indoor/ Outdoor
	**UC6**	MITIGATING THE IMPACT OF CURRENT AND FUTURE EPIDEMICS	Core System, Temperature, Humidity, Pressure, Light Sensor, Accelerometer, Magnetic Sensor, CO_2, LED, VOC	Indoor/ Outdoor/ Wearable

Operational Scenarios

Defined operational scenarios (www.amanda-project.eu) represent a realistic picture of the use of a smart multi-sensing autonomous card. The scenarios are a realistic reflection of the end-users needs and possible use of the ASSC.

*Continuous occupancy monitoring in an outdoor parking lot

*Continuous monitoring of vibrations affecting structures

Nineteen operational scenarios are defined.
Each operational scenario is linked to one of the six defined use cases.

Table of Operational Scenarios

No.	Name	Version	Related to Use Case
SC01	Heating, ventilation and air conditioning	Indoor	UC1
SC02	Automated lighting control	Indoor	
SC03	Detection of dangerous gases and alerting	Indoor	
SC04	Fire Detection	Indoor	
SC05	Continuous occupancy monitoring in an indoor parking lot	Indoor	UC2
SC06	Continuous occupancy monitoring in an outdoor parking lot	Outdoor	
SC07	City air quality and weather monitoring station	Outdoor	UC3
SC08	Continuous monitoring of vibrations affecting structures	Outdoor	
SC09	Access control	Wearable	UC4
SC10	Personalised thermal comfort monitor	Wearable	
SC11	Employee positioning	Wearable	
SC12	Monitoring environmental and vibration conditions in cargo area	Outdoor	UC5
SC13	Products tracking in warehouses	Indoor	

Table of Operational Scenarios

No.	Name	Version	Related to Use Case
SC14	Patient tracking in hospitals	Wearable	UC6
SC15	Equipment tracking in hospitals	Indoor	
SC16	Sensing of transportation conditions	Outdoor	
SC17	Crowd counting: object recognition in indoor areas	Indoor	
SC18	Patient monitoring: CO_2 concentration	Wearable	
SC19	Contact tracing	Wearable	

AMANDA Project

In the time of COVID-19, we continue with our work and research, ready to fulfil our promises. The challenges are as significant as the times we are in, but we are convinced that the result of our work will be a widely accepted innovative product.

*AMANDA partners, June 2020

*The Plenary meeting, Oxford, UK, December 2019

AMANDA Project

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AMANDA

The world in your hands