

# UbiLAB

A ubiquitous virtual laboratory framework

Multiplier Event 1 - Skopje

Host: Ss. Cyril and Methodius University in Skopje

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## Outline

- **Summary of the project**
- **Participants**
- **Project modules/activities**

## Short summary

- The UbiLAB project aims towards creating a framework for ubiquitous virtual, remote and software laboratories implemented in the cloud - UbiLAB.
- the UbiLAB framework would enable vast possibilities for digitizing actual laboratory experiments and enhancing the reality of students' experience.
- The project envisions an innovative framework, designed to support different types of endpoints: hardware devices, virtual devices, software solutions. The UbiLAB framework will:
  - present a foundation for a rich and diverse set of laboratory experiments;
  - enable customizable modules supporting software and hardware exercises;
  - promote collaborative engagement on several levels;
  - be extensible as open-source software

## Participants



- The Faculty of Electrical Engineering and Information Technology (FEEIT) at the University Ss. Cyril and Methodius in Skopje, N. Macedonia,



- University of Maribor (UM FERI), Slovenia,



- Anhalt University (HSA), Germany.



## Project modules/activities

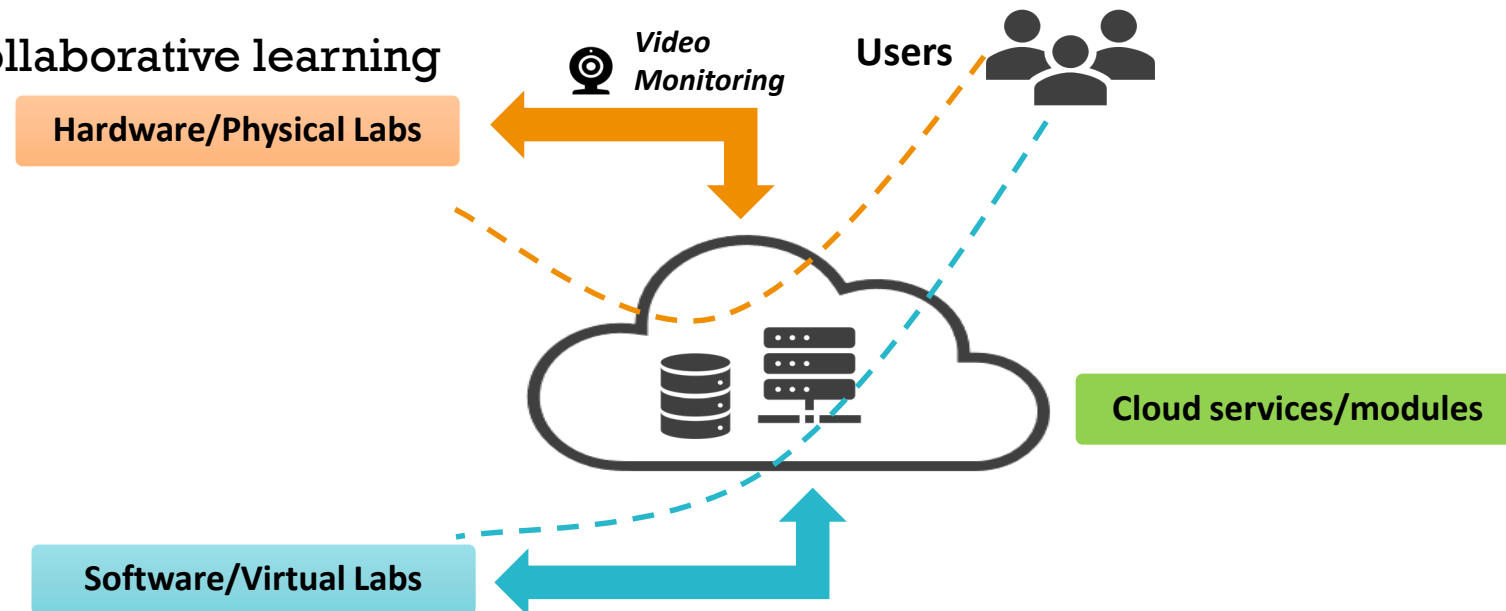
- Project Management and Implementation
- Transnational Project Meetings
- Intellectual Outputs
- Multiplier Events
- Learning, Teaching, Training Activities
- Special Costs

## Project Goals - Intellectual Outputs

- Create a framework for ubiquitous virtual, remote hardware and software laboratories - UbiLAB
- Students to virtually experience the laboratory work and collaborative learning, enhancing the reality of students' experience
- The UbiLAB framework is envisioned as a central hub for remote, virtual, hybrid hardware and software based laboratories
- Also as a complex, modular system, open to designing new and improved modules for supporting various types of laboratories.
- The UbiLAB framework will enable digitizing actual laboratory experiments
- Design a special social module for collaborative learning: students can discuss, share opinion and ideas, compare results

# Project Outputs

- **IO1 - Research and architecture design for the virtual laboratory framework**
- Research and design the framework core. Devise the technologies to use, the core modules, and separate the areas for software, remote, virtual and hybrid hardware laboratory experiments.
- Research and implement in the design – virtualization, cloud environments, augmented reality and IoT technologies.
- Research innovative collaborative learning



# Project Outputs

## ■ IO2 - Development of the core framework elements

- Finalize the design and continue implementation of the UbiLAB framework.
- The experiments to be connected to a framework in the cloud (using all usually available institutional resources).
- Design and implement a core cloud backend for modular generation and configuration of virtual software environments.
- Design and implement a specialized social module for virtual collaborative learning experience.



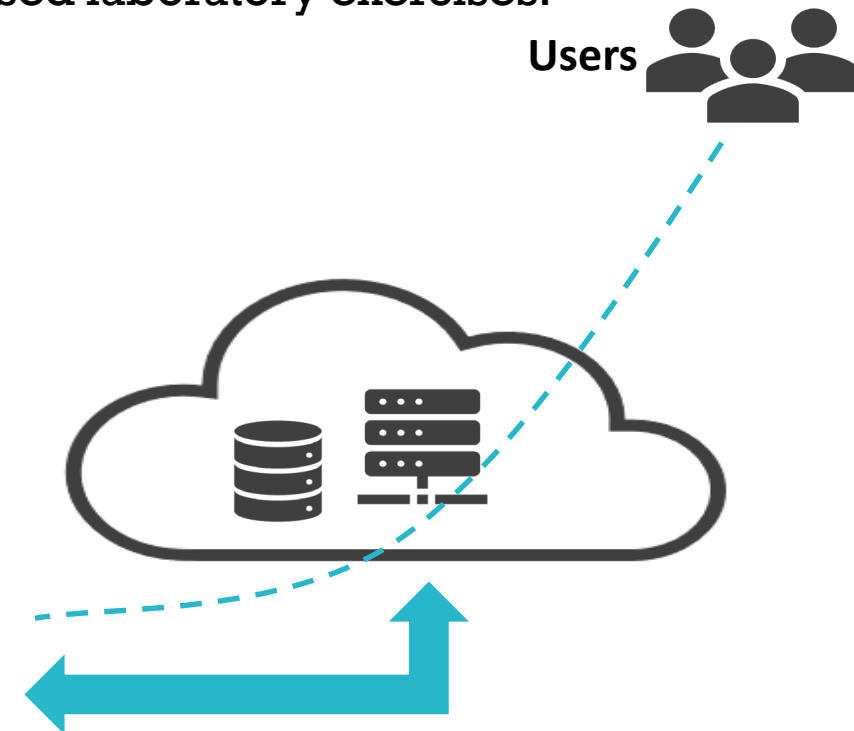
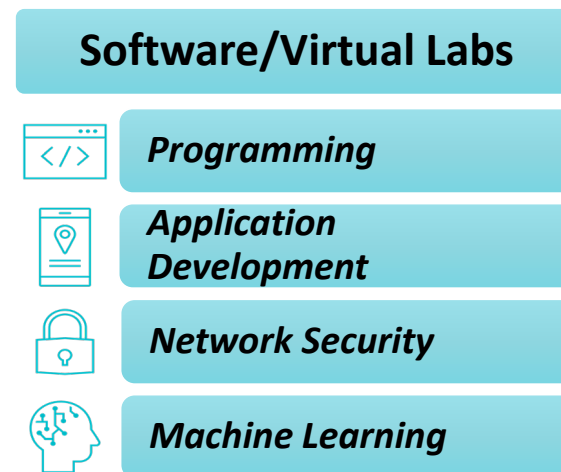
### Cloud services/modules

- Secure Remote Access and Control
- Interactive Video Conferencing
- Web Portal (UI and Administration)
- Lab Scheduling and Provisioning
- Automatic Collection and Testing
- Authentication, Authorization and Tracking
- Collaborative learning experience
- Virtual Lab Builder (VMs and Containers)



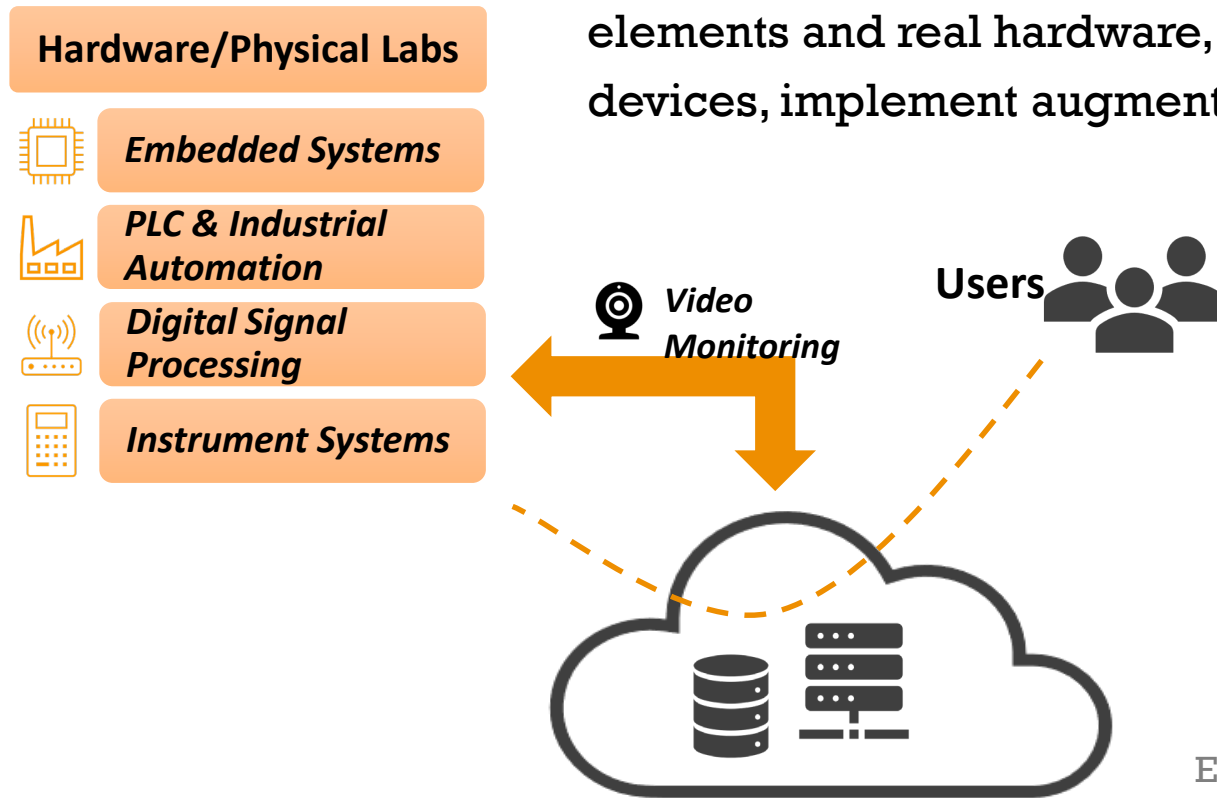
## Project Outputs

- **IO3 - Software-based remote laboratories**
- Extend core cloud backend with specialized modules for specific virtual software environments and implement example software-based laboratory exercises.



# Project Outputs

- **IO4 - Hardware-based remote laboratories**
- Digitize/virtualize laboratory experiments using existing laboratory equipment, create virtual experiments with fully virtually-designed apparatus and simulators, design hybrid experiments with virtual elements and real hardware, include modules for connecting IoT devices, implement augmented reality.



## Project Outputs

- **IO5 - Virtual remote laboratory framework manual and example exercises**
- Create multimedia tutorial packages
- Provide short multimedia introduction to the laboratory experiments and the usage of virtual equipment.



## Multiplier Events

- **ME1** - Virtual remote laboratory framework – **Skopje**
- **ME2** - Virtual remote laboratory framework – **Köthen**
- Dissemination of IO1 and IO2. Impact on scientific and educational institutions.
- Promote the virtual laboratory framework and its toolkits
- Target groups: participants from the academic environment, associate partners, other participants from the education and industry.
- Activities
  - Dissemination presentations
  - Workshop on using the virtual laboratory framework
  - Participants will evaluate the materials to improve the quality of the IOs
- Proof of attendance

## Multiplier Events

- **ME 3** - Virtual remote laboratory framework manual and example exercises
- Dissemination of IO3, IO4 and IO5 and full results from the project
  - Present the intended exploitation of the new virtual laboratory framework.
  - Elaborate a cooperation plan for further exploitation of the project outcomes.
- Target groups: educational institutions related to technical fields, the associated partners, stakeholders, and other interested companies from the industry.
- Activities:
  - Dissemination presentations
  - Demonstrations
  - Workshops



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**U**biLAB

Thank You!

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