Semester Project 3
Q&A Session 3 / WiFi2BLE API Update

Semester project: Distributed Software Systems with Embedded Elements

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General Seminar: 4th December, U101, 8:00-12:00

Project Development (Weeks 43-50)				
43	3rd Semester	TEK EXPO: deadline registration for selected projects	25-10-24	Semester coordinator
43-	Project group	Weekly sprints		Groups, supervisors
44	3rd Semester	Midterm Evaluation	30-10-24	Semester coordinator, group representatives
49	3rd Semester	General seminar: presentation of project statuses, exam info	04-12-24	Groups, supervisors, semester coordinator
-50	Project group	Weekly development sprints		Groups, supervisors

→Each group presents their project status and results
- → Duration: 10 minutes
- → Content: few slides + demonstration

→The presentation schedule will be announced soon

Project Case Study: Desk Usage Supervision

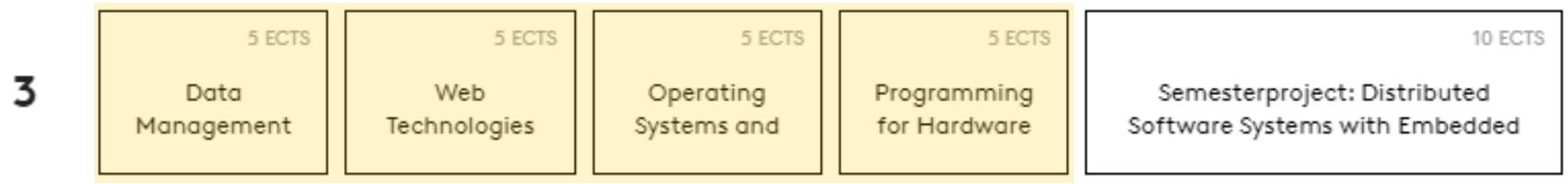
Generated by AI

- → Obtain, visualize and analyze desk usage data for health, occupancy and maintenance
- → Motorized desks are commonly used in office spaces as they can improve user working comfort
- → Greater gains could be achieved by learning from the desk data, for example about the desk moving distance and frequency

Project Purpose

→The purpose of the project is to have students gather knowledge on practical application of the concepts that they have been taught in the following courses:

- → **Data Management** (Sadok Ben Yahia)
- → **Web Technologies** (Mubashrah Saddiqa)
- → **Operating Systems and Distributed Systems** (Gaurav Choudhary)
- → **Programming for Hardware Constrained Environments** (Tommy Bjerre Nielsen)



Semester Project Objectives

→In the project the students shall develop a distributed system with embedded elements that incorporates knowledge provided during the 3rd semester courses

→Learning objectives

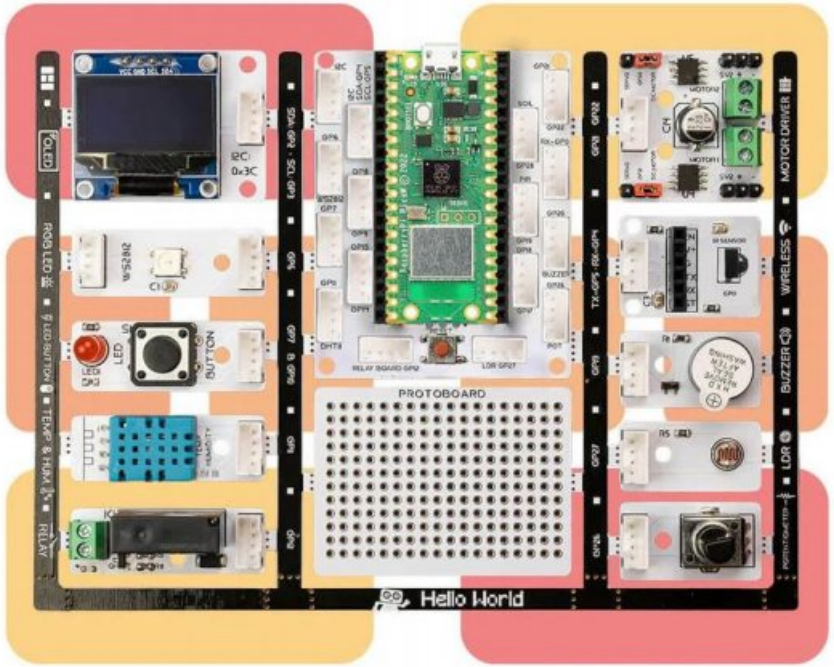
- → Analyze requirements for a **distributed software system** with embedded element
- → Design, implement and validate a distributed software system with **embedded elements**
- → Test and verify that the implemented system fulfills the **requirements**
- → Collaborate in **teams** using **modern tools** for software engineering
- → Disseminate **knowledge** in the group and in writing

Suggested Project Realizations

→ Main subsystems
  → Services: data collection, analysis, office & desk management, visualization, reporting
  → Storage: data persistence, data manipulation
  → User interface: user interaction with the system, responsive, desktop &

→ Use the power of knowledge 💪
  → Data modeling & management, database design
  → Distributed web applications & technology
  → Containers, deployments, micro-services, networking, REST
  → Embedded systems, constrained programming, product integration

Part of your distributed application
(NOT part of a desk)



Problem-oriented Project Work

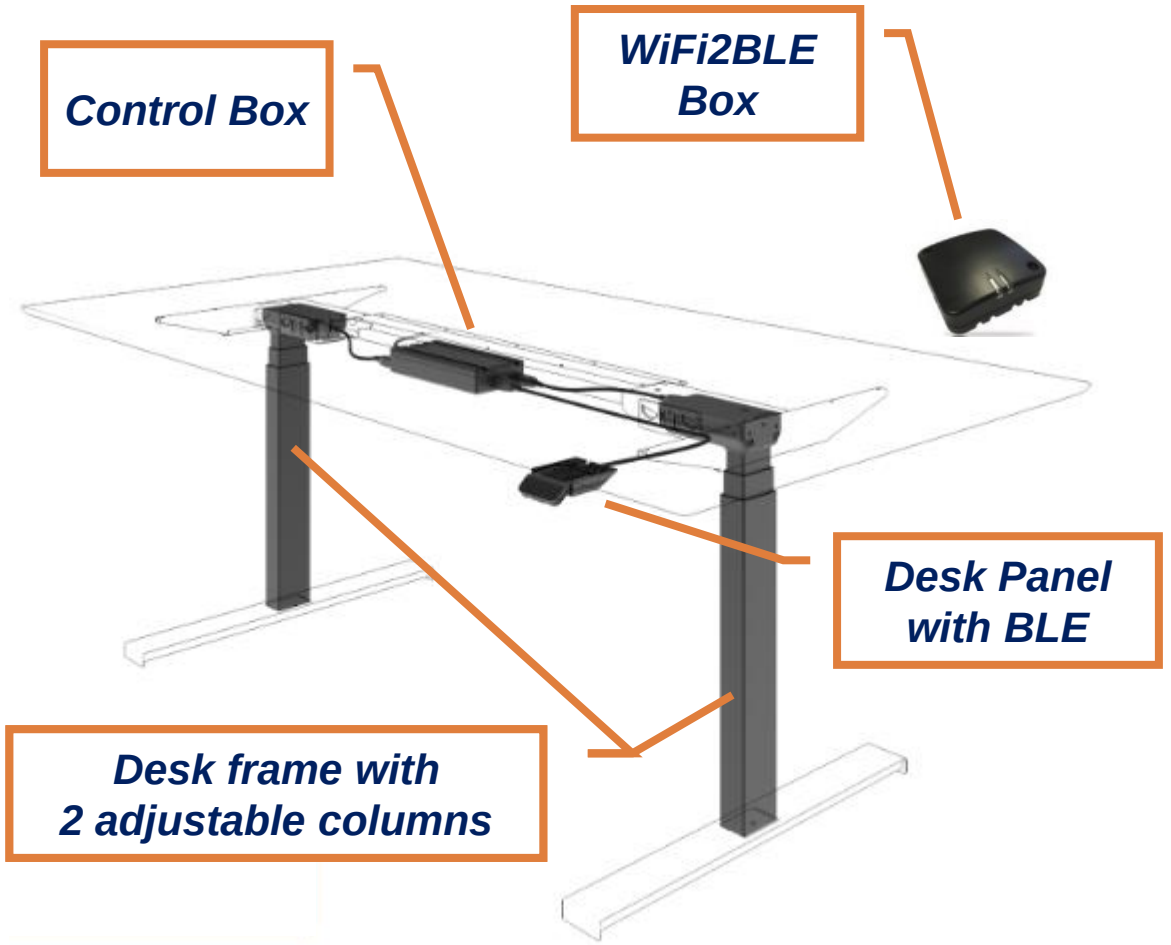
→ The project work is problem-oriented, which means that it is guided by a problem that the project groups themselves choose and formulates within the framework provided by the project case

→ It is expected that different project groups will have different views and target different problems since certain needs and solutions are unknown in the original case study

→ Thus, the common case study leads to different project results

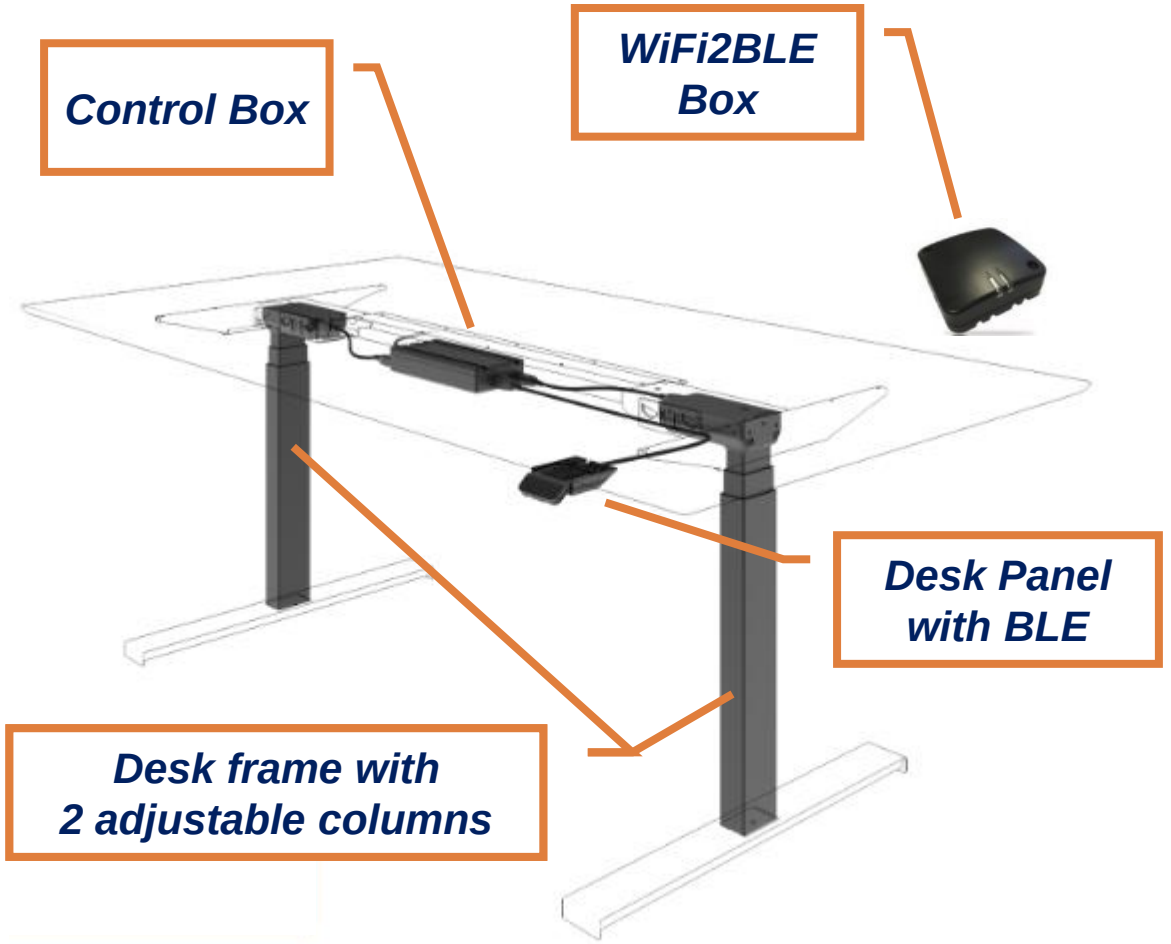
Desk System Operation

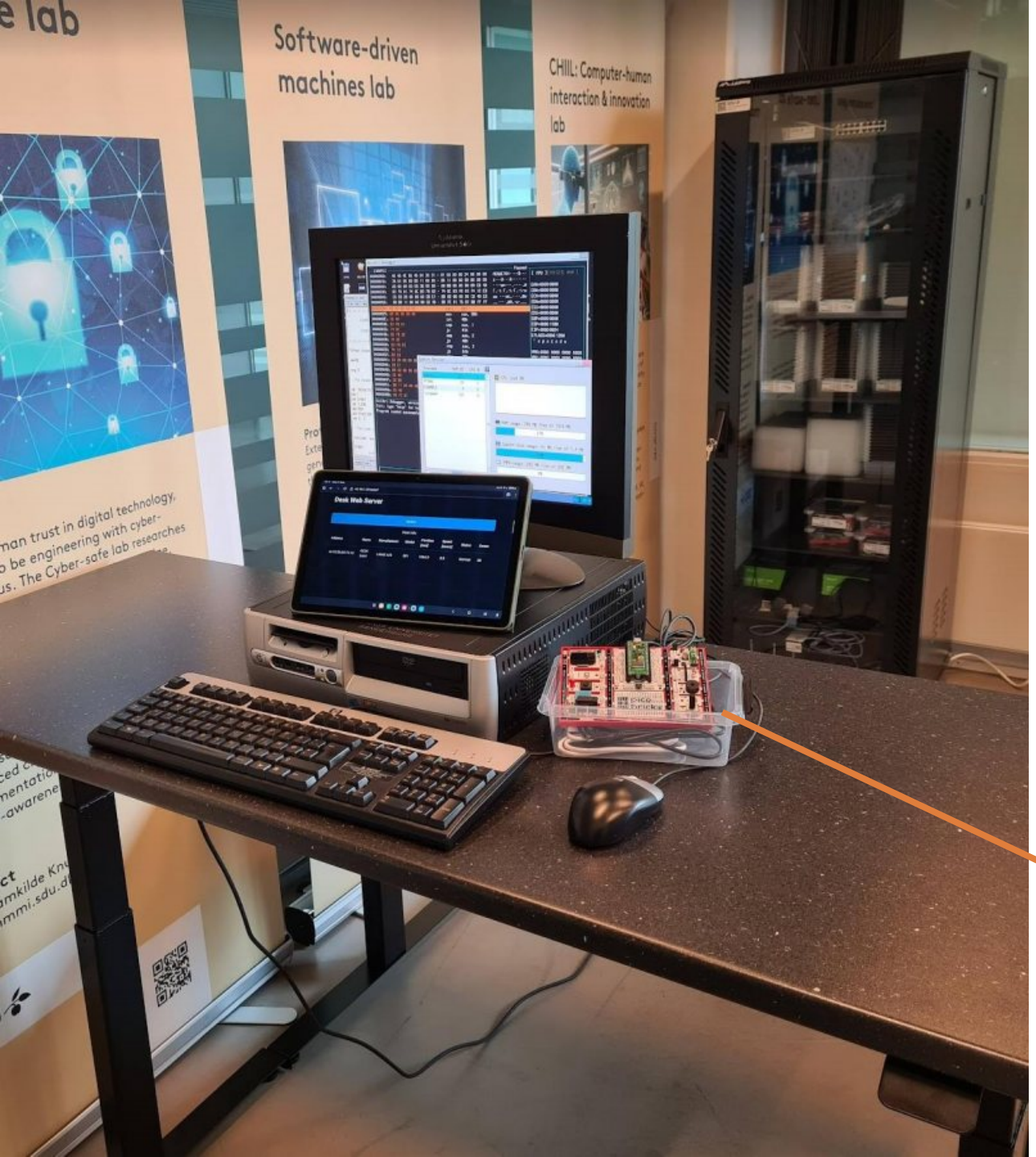
- → Desks columns are controlled by the intelligent **Control Box** that is connected to the **Desk Panel**
- → The **Desk Panel** accepts user commands to adjust desk height up and down
- → The **WiFi2BLE Box** exposes desk information over a Wi-Fi by translating the desk Bluetooth Low Energy (BLE) protocol to a Web API
- → This allows for monitoring and controlling desks remotely
- → **Desk Panel** has as built-in anti-collision sensor, display, and storage of favorite positions



Web API Data

- → Number of desks connected to WiFi2BLE Box
- → Desk ID, Name, Manufacturer
- → Position
  - → Get and Set
- → Speed
- → Status
- → Last errors with timestamps
- → Activation counter
- → Sit/stand counter





The Test System

→ Two desks from Linak are still in the A1.07
→ The desks will be available in J-block in the teaching lab eventually
→ Web API spec in the form of REST API and simulator available

→ Contact the project coordinator

Embedded elements 😉

Python WiFi2BLE Simulator

→ Simulation of the **WiFi2BLE Box** Web API

→ To speed up project development and testing

→ Get independent of the hardware and NDAs

→ Mitigate the Project Coordinator temporary “disabilities”

→ Requirements: Python 3

→ Includes all features

→ Needs testing

REST API Basics

→ Base URL for HTTP: `http://127.0.0.1:8000`
  → Assuming local execution
  → For testing only

→ Expecting path format: `/api/<version>/<api_key>/<endpoint>`
  → Versioned API, `<version>`: v2
  → “Secured”, `<api_key>`: 32 characters, for example: `E9Y2LxT4g1hQZ7aD8nR3mWx5P0qK6pV7`

→ Object type: JSON
  → Content type: application/json

→ See **README.md** for details

Linak Deskline® Troubleshooting Guide

Error codes

ERROR CODE	NAME	DESCRIPTION	POTENTIAL CAUSE	TROUBLESHOOTING
E01	Position Lost	The desk has an unknown position and needs to be initialized	» Position error » New Desk Leg added	• Initialize the system (**P1**)
E02	General Overload Up	Overload in upward direction has occurred	» Obstruction » Bad leg or motor cable	• Check all cable connections, (**P2**) initialize the system (**P1**) • Troubleshoot components by initializing 1 at a time (only possible with Plug & Play configuration) (**P4**)
E03	General Overload Down	Overload in downward direction has occurred	» Obstruction » Bad leg or motor cable	• Check all cable connections, (**P2**) initialize the system (**P1**) • Troubleshoot components by initializing 1 at a time (only possible with Plug & Play configuration) (**P4**)
E08	Watchdog	Indicate that software failed to kick watchdog	» Program fault	• Unplug mains cable for 15 sec • Initialize the system (**P1**) • Replace Control Box
E93	DeskSensor 1 – Activation	Detected trigger from LIN bus safety limit switch, e.g. DS1	» Hit obstruction	• Remove obstruction

Thank you