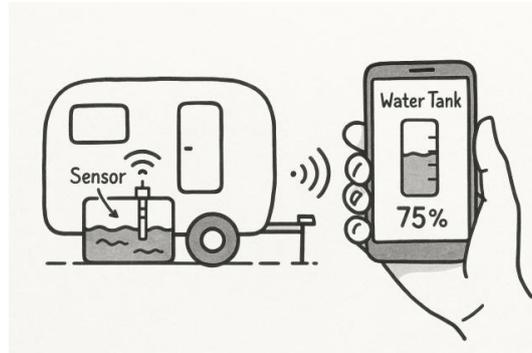


Subject	PP005 Water tank fill level indicator
Advisor	Kiran Govind, Prof. Dr. Kris Dalm

General procedure for practical projects in "DTM/IIE/IME/MZ/WI Practical Project".



Initial situation

In the camping sector, many processes are still carried out manually, and every "identical" caravan and camper consists of parts from different manufacturers. Digitalisation in the camper sector is also at a relatively early stage and is limited to a few manufacturer-specific solutions. One issue is the fill level of water and wastewater tanks in caravans. Here, too, there are only a few solutions from some manufacturers that display the fill level.

Project objective

The objective is to display the fill level of caravan water and wastewater tanks on a smartphone. The system should be retrofittable to common tanks. The following developments are necessary to achieve this:

- Research into the thread size of most water and wastewater tanks for caravans
- Development of a sensor unit that measures the fill level. In addition, the sensor unit (IoT) must be able to communicate directly or indirectly with the smartphone; an architecture and suitable communication technologies must be evaluated for this purpose. A μC will probably also be used (e.g. Arduino Nano or Raspberry Pi Zero).
- Drawing (CAD) and 3D printing (in the OTH's 3D printing lab) of the retrofittable level measurement system as a functional prototype.
- An app must be developed that displays the fill level of the tank. The app should also send push notifications when the fill level of the water tank is below 10% and the waste water tank is above 80%.

Deliverables

- **All documentation, drawings, parts lists, offers, etc. must be submitted in ZIP format to the client at the end of the project. Upload everything to the Moodle course "DTM/IIE/IME/MZ/WI-Practical Project".**
- Physical prototype of the IoT measuring unit for fill levels
- Android app with fill level display and warning messages

Subject	PP006 Get Your Rolls
Advisor	Kiran Govind, Prof. Dr. Kris Dalm

General procedure about practical project in “DTM/IIE/IME/MZ/WI-Practical Project”.



Initial situation

When camping, it's customary to get fresh baked goods in the morning. There's no standard procedure for this; larger campsites have their own bakery, while smaller ones often require pre-ordering and then picking up the baked goods. Other campsite operators, who pre-order baked goods, deliver them directly to campers.

Project objective

The goal of the project is to digitize the ordering and delivery of baked goods while camping. To this end, the following developments will be implemented:

- Development of an Android app that allows you to order a selection of baked goods.
- Development of a server (e.g. Raspberry Pi) that receives and manages orders.
- Development of a mobile robot application using Thymio's mobile robot. The robot delivers the order communicated by the server to the designated location.

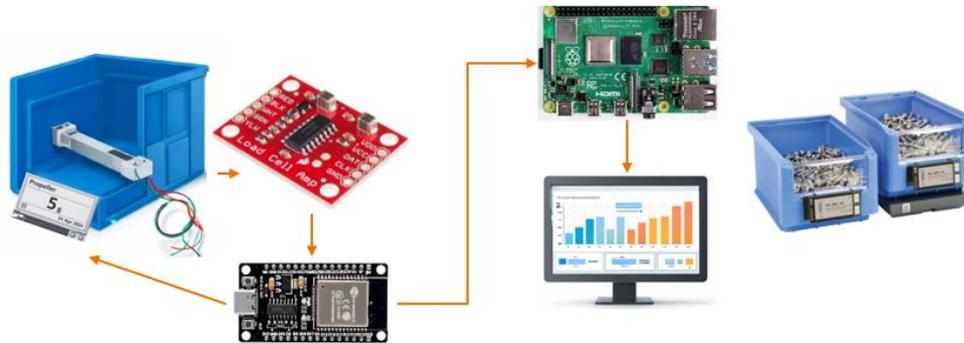


Deliverables

- All documentation, drawings, parts lists, offers, etc. must be submitted in ZIP format to the client at the end of the project. Upload everything to the Moodle course “DTM/IIE/IME/MZ/WI-Practical Project”
- Prototype of a campsite (either on paper or 3D printed) where the mobile robot can deliver baked goods.
- Android App – Ordering Software
- Server with appropriate management software
- Mobile robot program

Subject	PP007 Smart Weight Sensing Bin
Advisor	Kiran Govind, Prof. Dr. Kris Dalm

General procedure about practical project in “DTM/IIE/IME/MZ/WI-Practical Project”.



Note: Image is only for representation

Initial situation

In the PP007, a smart weight sensing bin system is to be developed as part of a student practical project for industrial 4.0 application. The goal of the project is to measure the weight of items placed inside open front-end bin and make this information available locally in display and, optionally, via a networked system.

The system consists of front-open industrial bins (up to 10 units) where load cells for weight detection has to be incorporated. The measured weight is amplified and digitized using an HX711 amplifier/ADC module and processed by an ESP32 microcontroller.

Initially, the weight data is displayed locally on a display, further extended to tablet or HMI through a Raspberry Pi.

Project description

The aim of the project is to create a functional prototype of a smart weight sensing bin system. This includes:

- Selection of a suitable load cell based on requirements
- Integration of the load cell with an HX711 amplifier/ADC module
- Processing of weight data using an ESP32 microcontroller
- Visualization of weight values on a display (OLED and E-paper)
- Visualization of weight data in dashboard and/or HMI

Project conditions and requirements

- The focus is on reliable weight measurement and system functionality
- Cost-effective implementation using commercially available components
- Open-source software and libraries should be used wherever possible
- Load cell selection must match the application’s weight range and safety factor
- The system must provide stable and repeatable weight measurements
- Weight values must be displayed locally in real time
- Electrical connections should follow basic industrial safety standards
- Visualization in dashboard and/or HMI is optional

Deliverables

- Functional smart weight sensing bin prototype with calibrated load cell
- Associated software and source code
- Implementation in local display (OLED and/or E-Paper) and dashboard

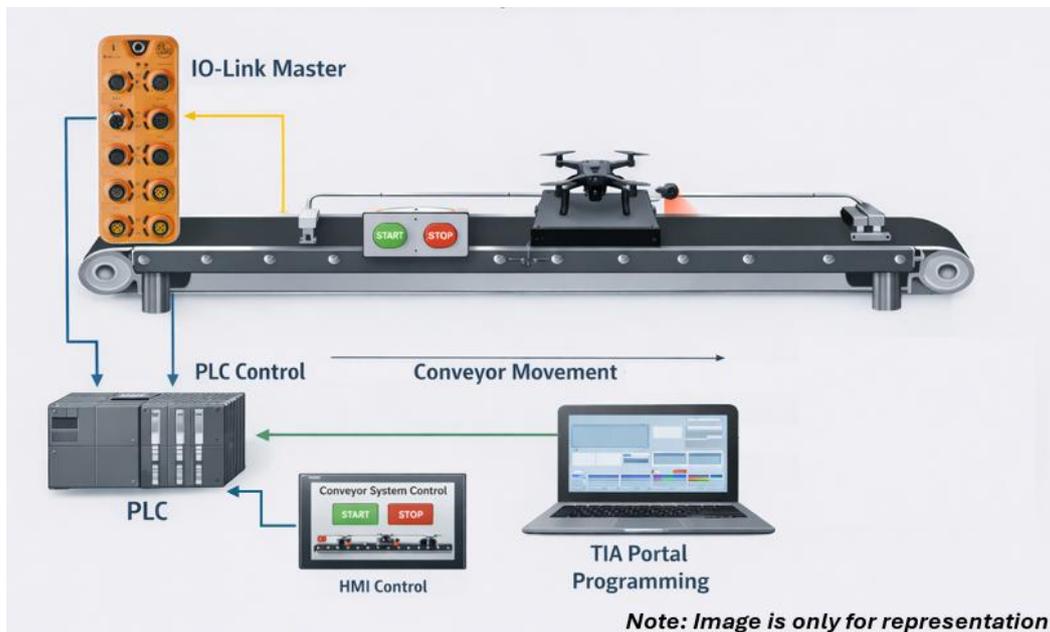
- All documentation, drawings, parts lists, offers, etc. must be submitted in ZIP format to the client at the end of the project. Upload everything to the Moodle course “DTM/IIE/IME/MZ/WI-Practical Project”

References

- <https://www.bossard.com/global-en/services/smart-factory/inventory-management/last-mile-management/>

Subject	PP008 Transfer Belt Automation
Advisor	Kiran Govind, Prof. Dr. Kris Dalm

General procedure about practical project in “DTM/IIE/IME/MZ/WI-Practical Project”.



Initial situation

In the current project phase, a transfer belt system has already been fully installed from a mechanical point of view. The supporting structure and conveyor layout are completed. The system consists of multiple carriers that are used to transport drones or parts through several work cell locations.

At this stage, the electrical wiring of the system is accomplished in another practical project and wiring is being performed. Thus, the initial operational functionality of transfer belt with its connected components must be implemented. All the devices concerning with transfer belt has already been installed at respective location. The system will be controlled using Siemens TIA Portal. In addition, an HMI will be integrated to allow manual control and monitoring of the conveyor system.

Project description

The aim of the project is to implement a functional initial operation of the transfer belt system with PLC and hardware components. This includes:

- Configuration of all devices in Siemens TIA Portal
- Integration of sensors and stoppers via IO-Link communication
- Development of a PLC program to control conveyor movement and stopping logic
- Implementation of start and stop functionality at each cell location
- Updating of HMI interface for global and local control of the conveyor

At the end of the project, a functional and controllable transfer belt system should be available for further use and extension.

Project conditions and requirements

- The focus is on reliable functionality and clear operation logic
- The system must allow controlled stopping of carriers at each cell location
- Sensors and stoppers must be connected via IO-Link to the PLC
- The PLC program must be created and managed in Siemens TIA Portal
- The conveyor must be operable via both local switches and the HMI

Deliverables

- Functional transfer belt system with functioning sensor, carriers and stoppers
- PLC program developed in Siemens TIA Portal and configured IO-Link communication with HMI Visualization
- **All documentation, drawings, parts lists, offers, etc. must be submitted in ZIP format to the client at the end of the project. Upload everything to the Moodle course "DTM/IIE/IME/MZ/WI-Practical Project"**

References

- PP001 Transfer Belt System Implementation (WS24-25)
- Transfer belt system PLC control layout plan

Note: Initial PLC layout plans, transfer belt implementation documentation, and necessary data can be obtained from Kiran.