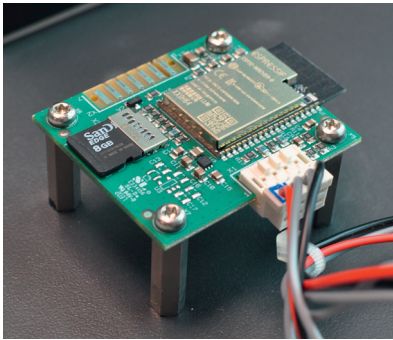


Connecting dishwashers to the Internet of Things (IoT)



Belimed AG developed high-performance dishwashers for the catering industry when it was affiliated with Gehrig Group AG. The devices were previously not connected to a network and performed their cleaning tasks “offline” under supervision of the operator. This project created an IoT platform which allowed “online” networking of the devices as needed or even permanently. This brought

several benefits to the customer including early-stage problem identification (predictive maintenance) and new market possibilities such as Pay-per-Use and the automatic, needs-based delivery of consumables. The mobile app and web application also provide the customer with a constant overview of the devices.

Connectivity module for the cloud interface

konplan was commissioned to develop the firmware for the connectivity module. The module is a small electronic circuit board with an ESP32 micro-controller as its core component which can be integrated with both previous and new dishwasher models. The connectivity module uses a serial interface to communicate with the device and query information such as status, counters, and protocols. On the customer side, it uses Bluetooth Low Energy via a mobile app or a BLE gateway to wirelessly communicate encrypted data with the cloud. This allows the transfer of information between the dishwasher and the cloud. Firmware updates for the dishwasher or the connectivity module can also be made available in the cloud and gradually downloaded “over the air” to the electronic circuit boards.

Requirements Engineering as the key to success

Since there were many stakeholders with various interests involved, Belimed and konplan started by focusing heavily on discussing and defining the use cases. This helped to clarify the interface specifications. In conjunction with development of the firmware, a testing framework was implemented that simulates the interface to the app and cloud. This enabled continuous testing of the firmware to verify that it was working according to the specifications. Soon after, the app and cloud were available for use and the integration was successfully completed with a minimum of effort.

Result

- Efficient crossover between stakeholders
- Scalable OOP firmware

Methodology & Technologies

- Espressif Systems ESP32
- C++, Python
- Bluetooth V4.2 / BLE
- Robot Framework (for Bluetooth Interface Testing)

Scope of Services

- Stakeholder management
- Definition of use cases
- Architecture and concept
- Scalable embedded software design
- Implementation & testing



9 months



2 employees
(konplan)



Analysis, conception,
and development

Our customer:

Belimed
Infection Control

GEHRIG GROUP
Professional Solutions

Further information:
www.konplan.com