

The logo for GadgEon, with 'Gadg' in blue and 'Eon' in orange.

Engineering Smartness

SMART RADIATOR VALVE

April 2020

Version 1



Smart Radiator Valve



European start-up wanted to build a smart radiator valve which can lower the cost of heating and save the green house emissions. The valves form a proprietary mesh network to communicate between themselves.

Solution Description

- Smart valve retrofits manually operated conventional valves
- Implemented a BLE mesh like network of devices so that settings can be communicated throughout the building.
- Integrated concurrent BLE Central and Peripheral roles in nRF51822 for implementing communication between valves in a home and communication with user's mobile App.
- Implemented synchronization of operation mode and temperature settings of all valves in a home via BLE mesh like network
- Integrated algorithm for controlling Radiator motor and open window detection logic
- Implemented a smart user presence detection method using user's mobile.

Outcome and Benefits Delivered

- Reduces overall heating costs by 30% compared to conventional radiator valves
- Developed innovative mesh mechanism even before BLE mesh was introduced
- Developed the system under budget constraints of a typical start up



The Business Context and Challenges of the Customer

- Our customer was a Europe based startup company in the building automation market.
- They wanted to develop a smart radiator valve that can retrofit existing valves and reduce overall energy costs
- They were looking for an embedded firmware partner who has extensive knowledge on BLE, power optimization and custom mesh protocol implementation knowledge.



The Solution / System Description

Gadgeon team developed the complete firmware from scratch including design, development, testing and maintenance. Implementation was based on Nordic nRF51822 using nRF SDK for implementing the custom services and use cases.

Technology Used:

BLE 4.0 on Nordic NRF51xx, Central and peripheral role on same BLE chip, OLED

Features of the embedded firmware application

- Room based temperature configuration schedule which can be set from user's mobile App
- Temperature and mode control from mobile App as well as directly from Valve's knob
- Support for automatic detection of open windows to optimize energy usage
- Automatic user presence detection and setting to away mode when appropriate to reduce the energy consumption
- BSP included drivers for rotary encoder, temperature and humidity sensor, OLED display and motor actuator

▶ System / Architecture Description

Implemented a BLE mesh like network of devices that controls radiator valves

- Integrated concurrent BLE Central and Peripheral roles in nRF51822 for implementing communication between valves in a home and communication with user's mobile App.
- Implemented synchronization of operation mode and temperature settings of all valves in a home via BLE mesh like network.



THANK YOU



For More Details, Let's Connect



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