



Design of Embedded Systems

ESSTA, Energy Saving Smart-home distributed
Temperature control Application

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1 Introduction

The goal of this project is to realize a smart-home application to control the temperature of different room in order to minimize the consumption of the entire building.

The system is composed by two differ modules

- A central unit
- A room module

2 Room Module

The aim of this module is to periodically get the temperature and the motion inside a room, act on the valve in order to achieve a goal temperature and send the status of the room to the Central unit.

The module is composed by:

- Temperature sensor
- Humidity sensor
- Motion sensor
- Valve actuator
- Wireless communication module

2.1 Temperature control

The module act on a servomotor that control a valve in order to adjust the temperature of the room. The valve is set to different positions based on the temperature error (difference between the actual temperature and the desired themperature):

- if the temperature error is below then `-COLD_VALUE` the valve is moved in `OPEN_POSITION`
- if the temperature error is below then `-WARM_VALUE` the valve is moved in `3/4`
- if the temperature error is between a `[-APPROCHING, APPROCHING]` the valve is moved in `HALF_POSITION`
- if the temperature error is greater then `WARM_VALUE` the valve is moved in `1/4` position
- if the temperature error is greater then `HOT_VALUE` the valve is moved in `CLOSED_POSITION`

2.2 Energy Saving mode

In order to minimize the consumption the module keep tracks on the precense of people inside the room using a motion sensor. If a motion is detected the module know that and set the desired temperature room temperature to the one set by the user. If there is the number of motions detected by the sensor is not sufficient to say that someone is inside the room then the module set the desired temperature to a value equal to the user desired temperature minus a default value (-1°).

2.3 Functional requirements

3 Central Unit

Appendices

References

[1]