Projeto de Formatura – Turmas 2016

PCS - Departamento de Engenharia de Computação e Sistemas Digitais

Engenharia Elétrica – Ênfase Computação

Tema: **Smart Shower**

Project Goal

The Smart Shower project has the goal of developing an automated water temperature control system based upon concepts taken from Internet of Things (IoT). Our project differentials are:

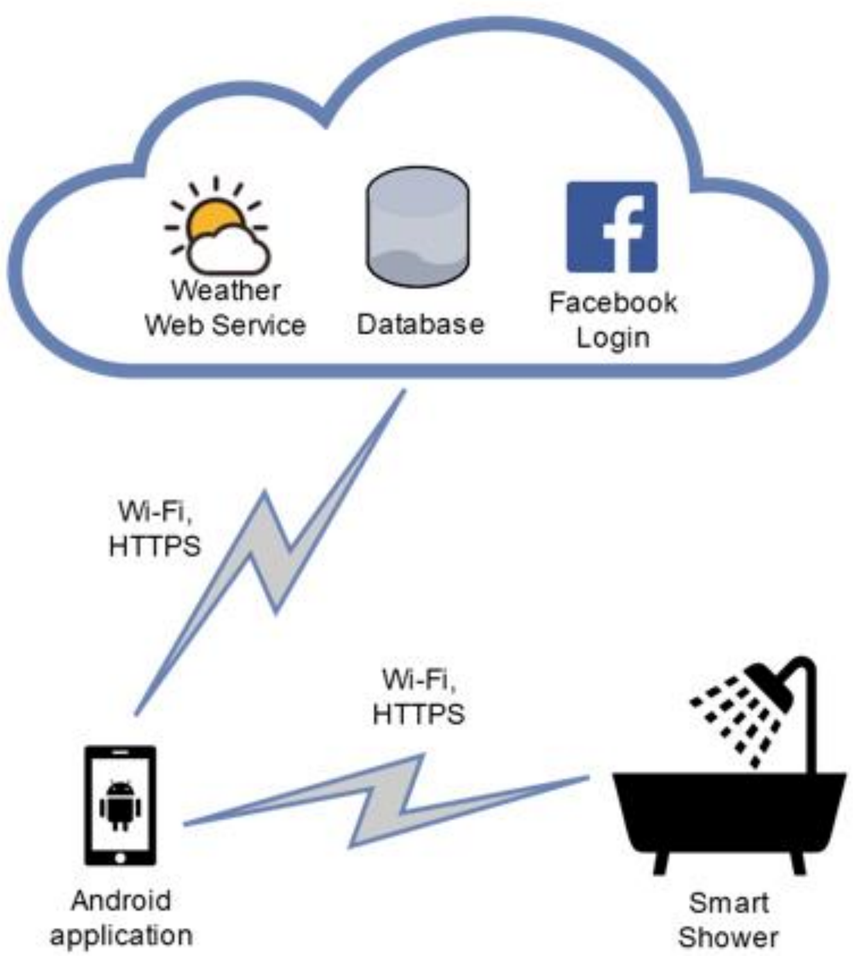
- It promotes increase of user well-being and convenience through the automated control of the water heating elements;
- It makes temperature control easy and practical;
- It makes use of emerging technologies (IoT, Android development);
- It can include users' real temperature feeling (thermal sensation) into the system's temperature prediction.

Motivation

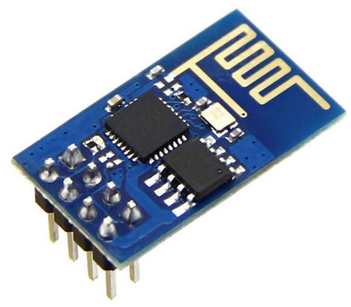
The motivation of this project is completely user-oriented, to solve most of the inconveniences of traditional shower systems. Below are the main ones:

- Comfort increase – once the ideal water temperature is achieved, users will always take showers with the preferred temperature without feeling too cold or too hot;
- Usability – Water temperature adjustment will become a lot easier and more practical compared to current shower systems;
- Energy economy – The system is designed to predict the ideal temperature for each shower, thus avoiding overheating of the water;
- Smart – The system can predict the preferred temperature for each shower, based upon weather conditions at the shower and individualized historical data.

System Architecture

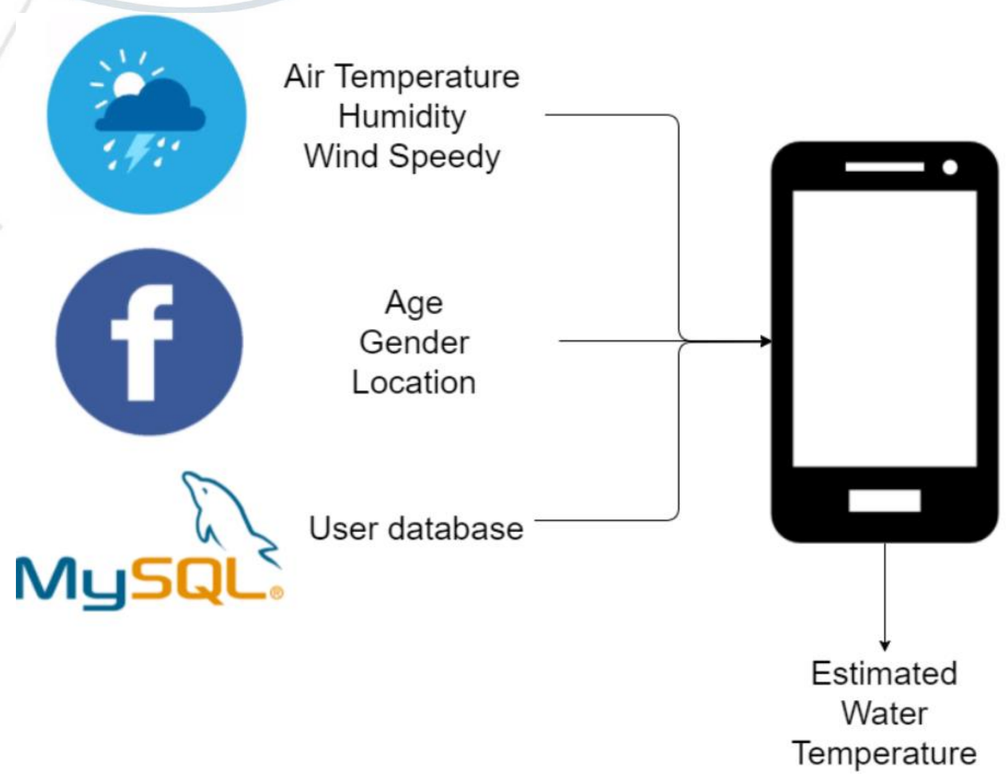


The main components of the system are the smart shower (conventional shower modified to include embedded circuitry which enables IoT integration), an Android application responsible for the temperature prediction and setup, a cloud-based database which stores historical data of the shower, a web service from which the system can fetch weather condition data, and an optional Facebook Login to improve usability.



For the circuitry modification we will use a microcontroller called ESP8266. It has built-in Wi-Fi connectivity, and we will use it together with sensors and actuators to control water temperature of the shower. The module will be programmed using simplified Lua scripts and a NodeMCU firmware, which makes development for IoT applications very straightforward. It will also be able to receive commands from the application so that the ideal temperature could be set for the user. We will use existing Wi-Fi infraestructure for the system, and a RESTful API for the communication between the ESP8266 and the Android application.

Android



The software will automatically calculate the apparent temperature based on wind speed and humidity and will utilize the apparent temperature combined with the user's database to automatically estimate the temperature of the water bath.

The user will have the option to set the water temperature if he does not like the estimated. The system will save the new data and use it to adjust the user preference for future estimations.

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