TEAM JBM

Michail Filippou
Xenias Dimitrios
Xiros Vasilios

Introduction

In this file we would like to demonstrate you our idea about a smart university using IoT technologies with many features and abilities to be improved in the future. We didn't manage to implement all these ideas to the infineon boards we had due to configuration and connectivity issues. We managed to write some codes and also to connect our hardware but we don't have something completely created to demonstrate except the face recognition project we made (explained below) which we are about to use our laptops only. Although we would like to describe you our idea and the project we wanted to create.

First of all, the task was to create a project,which should had included the application of IoT technology into our daily lives. IoT is a technology with a very big hype nowadays and a very promising future ,which is the reason of the extended research in many Universities, and the investment from many sponsors.

IoT, briefly, is an extension of the the Internet connectivity into physical devices and everyday objects. These devices are being equipped with embedded electronics, which give them the capability of interacting and communicating each other over the Internet, and of course the whole procedure is being remotely monitored and controlled by a central system.

So we collect data from many sensors for example, we work with them and we extract results for our system as a part of a data analytics procedure, or with these results we give commands to other devices so as to do whatever we want, depending on the data that we have.

Our Idea

As we understand, IoT has many applications. We thought to use this technology within A University. To be more specific, we want to create the Smart University! This University should have the following sensors:
- Sensors of temperature and pressure
- Light sensors
- Sound sensors (we didn't have one in the finals)
- Distance sensors (we didn't have one in the finals)
- And one mini robot as an assistant for our measurements

Our mini car will be going around the university checking the temperature and light levels and sends data via esp's 32 wifi to the server. With this way, we save number of sensors to be used into the whole building, by attaching one sensor of each type in a moved robot.

Also every room/amphitheater in the university will have similar sensors to keep the lighting and the temperature in normal levels. So, depending on our measurements, if the weather outside is in normal level and inside is not, then the windows will automatically open.
If the lighting both inside and outside is low then the lights inside a room will turn on.
In order to save energy, if a room is empty from students then the air condition will be turned off, as the lights too.

In every room there would be 2 doors. By putting one distance sensor in every door we can count how many people are in there. Of course the distance sensors in the doors may not find and recognize every person (for example if two people leave at the same time and pass the door together). So we have the idea to implement a face recognition system. This system will be installed in every room. It needs a database with a picture of every student in college. This program vectorize every picture and using machine learning algorithms can recognise someone who appears in a picture. So with a cam above the table will recognize who and how many students are inside the amphitheater. The number of students who are seated in the room can be calculated from some sensors in every row of seats. So depending on the measurements from the distance sensor that have been put in every row, we can calculate this number.

Finally, we use some sound sensor in order to check the noise in classrooms and if needed increase the volume of teacher's microphone. Teacher also controls the functionality of lights. He can put them in auto mode as explained above, or just dim them.

Connection

All these data can be transferred from the sensors which will have an esp microcontroller, in order to be centralized in the system.The connection will be in a master-slave architecture, with sensors be the slaves, the central system the master, and the other stuff such as air-condition and lights are slaves too.

Students will have the opportunity to connect with their credentials via a UI and see information about their classes, crowd in the university, weather and climate etc.

Admin will have the ability to let the system runs automatically or change something manually.

Teachers could volume up the microphone, collect data for the students who attended their lecture and take statistical datas.

The folder we uploaded contains the code file named room.ino is about to run in every room in the university. The other file named car.ino contains the code to be installed in the mini car. Also the folder named face recognition contains all the stuff about this feature we made and it needs a camera which is about to be installed in every room.

User-cases

We have 3 types of users in our system. The admins, the students and the teachers. Admins are going to have the full control of the system.They are going to use the robot, they are going to have direct access to the data and the configuration of the system.The second type of users are the students.They are going to have access to the statistics such as temperature of

the class, the people inside it and all the analytics but they are not able to view the raw data neither to configure the robot. Finally, teachers will have extra features to use and learn about their lessons etc.