

University of Puerto Rico Mayagüez Campus
Electrical and Computer Engineering Department

Final Project: Is the A/C on?
Finite state machine

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General State Machine

The general state machine for the temperature measurement project is divided into four states machines: set up, measure temperature, measure occupancy, temperature display via mqtt/node red, and shutdown.

1) Set up Machine State

a. Initialize system

In this state the system is initializing all the components and connecting to the computer via usb.

b. Connect to Wi-Fi

When the esp32 is connecting to wifi it takes a few seconds and once it is completed, we can read the measure of temperature.

c. Connecting error

If the system has an error when it is initializing or connecting wifi it can display an error and reinitialize the system.

2) Measure Temperature Machine State

a. Read voltage Measure.

Once the esp32 is connected to Wi-Fi and everything is turned on correctly, we can take the voltage reference measurement for our temperature.

b. Calibrate temperature.

in this state with our voltage reference and some measurements previously made, we can calibrate the temperature to be able to know if the air conditioning is on and to be able to send it to the user via node red.

c. Send Temperature to Node red.

By having the temperature measured by the sensor ready, we use mqtt and node red to present it to the user on harryjessy.site.

3) Measure Occupancy

a. Read occupancy

In this state, with a proximity sensor connected to the esp32, we can measure how many people have entered the room and be able to present the number of people to the user.

b. Error in measurement

The system goes to this state if an error occurs in the room occupancy measurement, it can occur due to a cable or lack of synchronization.

c. Display to user

Once we have the occupancy measurement ready and the time required to make the display has passed, the esp32 using mqtt and node red presents the occupancy in the room in that period.

4) Display

a. Connecting to node red: harryjessy.site

To make the display we have to connect to our node red and mqtt which is the means to send the message from one side to another

b. Connecting error

The system enters this state if it understands that there is a problem with time or the connection to mqtt and node red. If we enter this state, we need to re-measure the temperature and occupancy to give a more accurate measurement.

c. Displaying Temperature to User

In this state it is understood that there were no errors in the process and the esp32 can display the temperature and occupancy of the room with the necessary waiting time over and over again.

5) Off

a. Turn off system

General State Machine Diagram

The state machine diagram for the temperature measurement project is presented below:

