**CS 6343: Cloud Computing**

**Lab 5: Smart Home and Car Internet of Things**

**Component Diagram**

Enter location (geopy) 

|  |
| --- |
| SD Card |
|  |
|  |

|  |
| --- |
| Breadboard |
| +LED  +GPIO Breakout Board  +Ribbon Cable  +Connecting Wires  +Resistor  +Button |
|  |

|  |
| --- |
| Raspberry Pi 3 |
| +Power Source Input  +Wifi Adaptor  +SD Card Reader |
|  |

Connected via Ribbon cable

Supports

|  |
| --- |
| Monitor |
|  |
|  |

Visual Interaction

Send Location, RPM and Airflow if loc recvd = home loc -1, switch on LED

|  |
| --- |
| AWS Iaas |
|  |
|  |

(through MQTT – Message Broker )

If RPM >=100, prompt user

**Component Details**

**Breadboard**

The breadboard is a way of connecting electronic components to each other without having to solder them together. They are often used to test a circuit design before creating a Printed Circuit Board (PCB).

**LED**

A Red LED stands for Light Emitting Diode, and glows when electricity is passed through it. The longer leg (known as the ‘anode’), is always connected to the positive supply of the circuit. The shorter leg (known as the ‘cathode’) is connected to the negative side of the power supply, known as ‘ground’. LEDs will only work if power is supplied the correct way around (i.e. if the ‘polarity’ is correct).

**Resistors**

We require 220 Ohm Resistor. We must always use resistors to connect LEDs up to the GPIO pins of the Raspberry Pi. The Raspberry Pi can only supply a small current (about 60mA). The LEDs will want to draw more, and if allowed to, they will burn out the Raspberry Pi. Therefore, putting the resistors in the circuit will ensure that only this small current will flow and the Pi will not be damaged. The value of a resistor is marked with colored bands along the length of the resistor body. The value of resistance can be determined the color bands on the resistor.

**Connecting Wires**

Connecting wires are used on breadboards to ‘jump’ from one connection to another. The end with the ‘pin’ will go into the Breadboard. The end with the piece of plastic with a hole in it will go onto the Raspberry Pi’s GPIO pins.

**General Purpose Input/output (GPIO)**

* Pins can be configured to be input/output
* Reading from various environmental sensors
* Ex: IR, video, temperature, 3‐axis orientation, acceleration
* Writing output to dc motors, LEDs for status

**Power Consumption**

* microUSB power connector – 2.5W

**AWS Iaas**

Ec2 instance. This is used to send instructions to Raspberry Pi to switch on LED under specified conditions.

**HDMI**

* Digital signal
* Video and audio signal
* DVI cannot carry audio signal
* Up to 1920x1200 resolution

**Other Software Components:**

* **MQTT message broker**:

To communicate messages from EC2 to Raspberry PI and from Raspberry PI to EC2.

Run ec2.py on your ec2 machine:

Subscribes to topic published by raspberry pi and raspberry pi can keep sending its current location to this topic.

Raspberry Pi subscribes to the topic published by EC2 so that ec2 can communicate to raspberrypi when to switch on LED.

We have simulated a program in raspberry pi to receive the input of home location. This location is shared with EC2 as stated above. Home Longitude is decreased by 1 every second. And every second the location coordinates is communicated to EC2.

EC2 calculates the location at which LED should turn on. This is nothing but Home Longitude – 1. When the location coordinates received from raspberry Pi equals this calculated value, EC2 instructs LED to turn on.

Similarly, Raspberry PI writes RPM information and Airflow information to the topic published by Raspberry PI. EC2 subscribes to this topic and has access to this RPM and Airflow information.

If RPM is greater than 100, EC2 prompts the user saying RPM and Airflow is abnormal.

* geopy library to convert location to coordinates and decrement coordinates by one per second. These coordinates are sent to EC2 and EC2 send information to Raspberry PI to switch on LED light if location information received is equal to Home Longitude -1 .