Home Automation & Internet Of Things-

Objective: To represent an interaction between physical world and cyber world by utilizing it through a door bell system. The aims of the project are:

- Live video streaming of the visitor.
- Click a picture of the visitor and send it to Gmail account of the host.
- Lock, unlock of the door and voice message to the visitor.
- Sending sms to the host for offline notification.

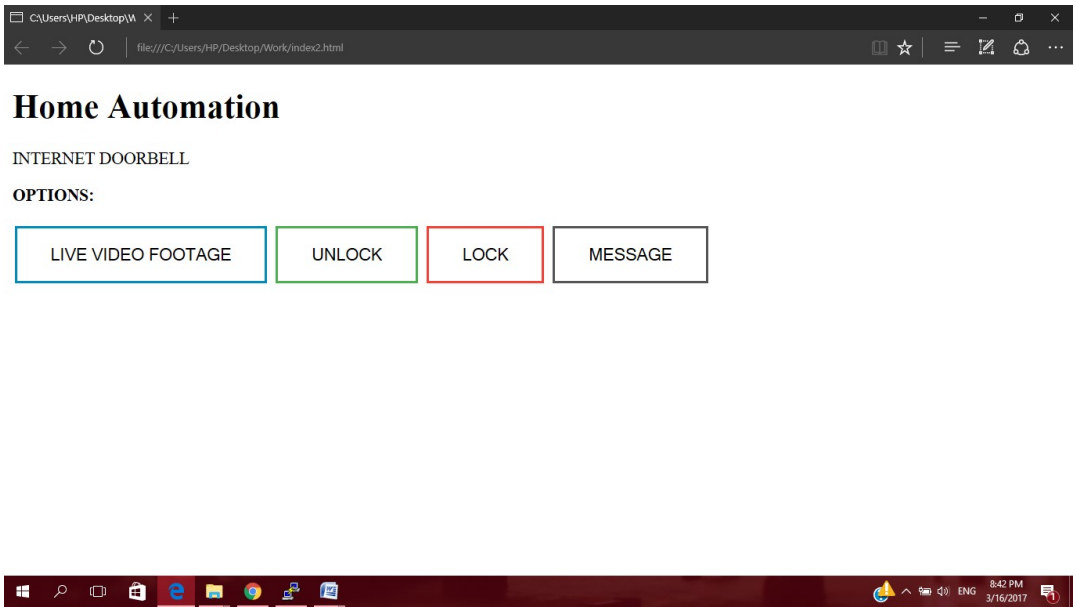
Equipments: Raspberry pi-3, 3 volt normal door bell, Bread Board, Motor Driver L293D, an Android phone used as a camera, Gmail account, Power bank(as power source), Wifi Router, Wireless speaker (connected through Bluetooth to Raspberry pi).

Theory: Firstly, we tapped the output of bell to Raspberry pi (pin no 17). When the doorbell will ring, we take a picture of the visitor and email it to the wanted account with corresponding date and time. We can also video stream the visitor outside your door. If the host is not online, he or she gets a text message via phone. Therefore, in that way, we can keep a registered account of people entering & leaving your apartment automatically.

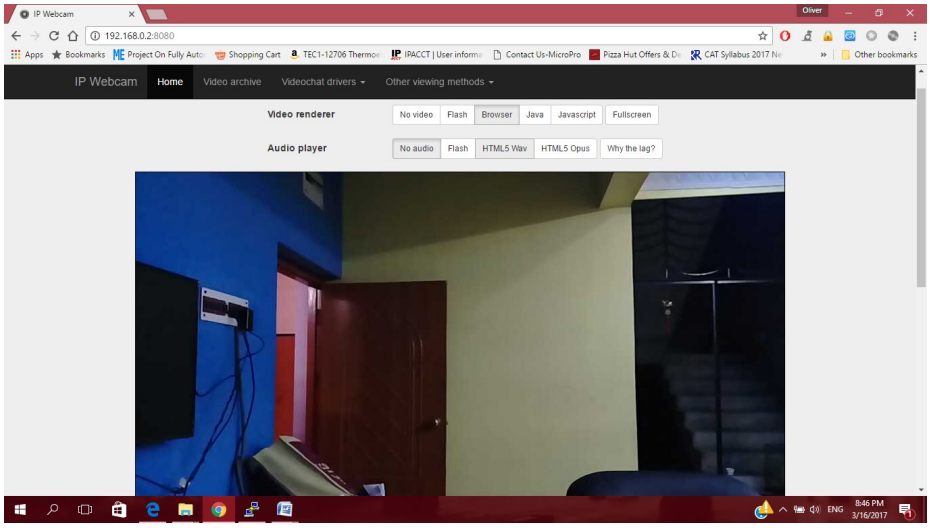
Procedure: The user can access the internet doorbell through his Pc as well as his own android device. The Pc & android device will have their own IPs. The camera & Raspberry Pi also have their own IPs. So, these all have to be connected together by a wifi router. If the user uses PC, he can access the door bell through local host webpage developed by us which is uploaded in Rpi. The webpage will consist of the following portal:

- Live video footage: to live video stream the visitor.
- Unlock: to unlock the door to let in the visitor in our premises.
- Lock: to lock the door when the door is left opened after the visitor is allowed in.
- Message: a voice module which will give the required message if you don’t want the visitor to enter.

The webpage is shown below:

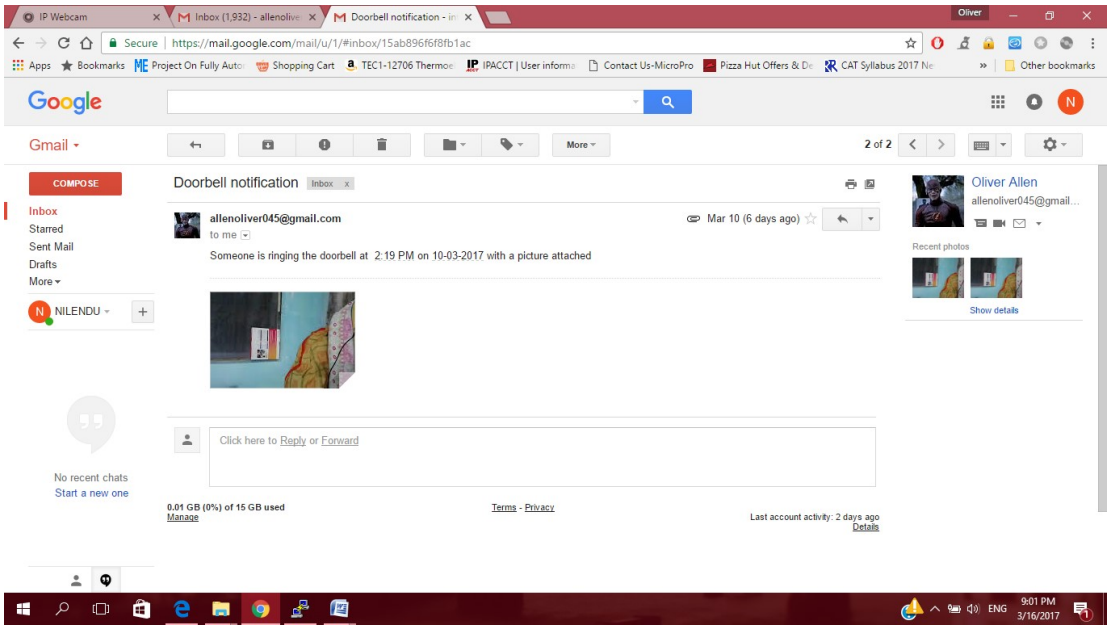


For live video streaming, we would use the 3rd party user interface. Interface for live video streaming is shown below:

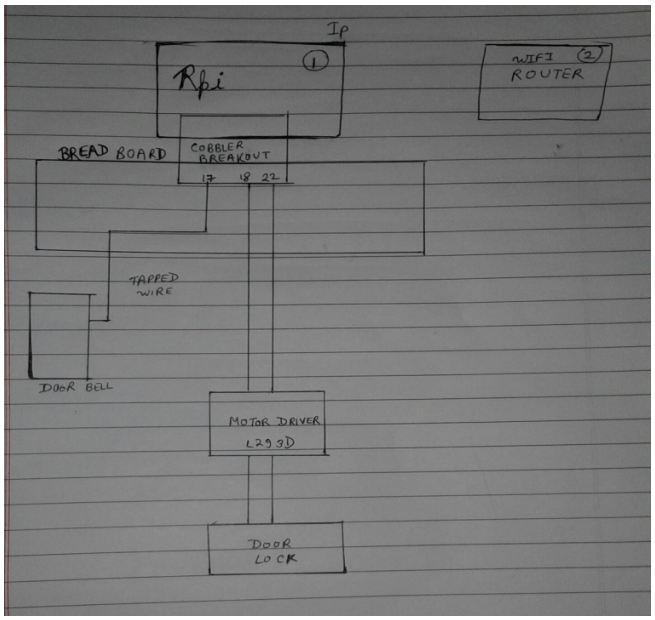


Whenever, our door bell will ring, the camera will automatically start. It will take the snapshot of the visitor and send it to the respective Gmail account. These are all executed by Python codes.

The Gmail message sent is shown below:



The hardware configuration is given below:



The Rpi is connected to the bread board through Cobbler's breakout. The Pwm of the doorbell is tapped into the cobbler's breakout (pin no 17). The door lock is connected to the motor driver (L293D) and motor driver is in turn connected to Cobbler's breakout (pin no 18 & 22).

The waveform of the Pwm from the doorbell is recorded in a CRO and is shown below:

Now, we come to the software end. Rpi is our server and all codes are written in our server using python.

Protocol 1: This takes place immediately after the bell rings. This is done automatically without interaction of the host. The python files are given below:

- DoorBell.py: parent program calling all the python files given below:
    1. snapshot.py: here clicking and saving the picture of the visitor using OpenCv library is done.
    2. Send_Email.py: here the set of codes are used to send the saved snapshot to Gmail.
    3. Sendsms.py: here the codes are used to send sms to the user's phone about the ringing doorbell.

Protocol 2: This takes place manually and needs interaction with the host. It is mainly executed using php or android application. The files are given below:

1. Motor_lock.py: this set of codes locks the door after the visitor is allowed in.
2. Motor_unlock.py: this helps to unlock the door if the host wants the visitor to enter the premises.
3. Voice.py: this uses a voice module to give the required information if the host does not want the visitor to enter the premises.

Conclusion: So here we conclude our project on Home Automation and IoT. The interaction between physical world and cyber world is well represented through this project. This can be used in securing our apartments and offices.

Future Projects: We attempt to add more appliances to our home automation list. We will include internet electric fan, auto water pumping system, smart windows and many such appliances with the help of our Raspberry Pi. We will also update our user interface.