

A STUDY ON IOT SMART DOORBELLS

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Abstract:- The purpose of this project is to make home or office or any area secure. When someone presses the doorbell, then the doorbell make a video call to the registered number. If someone roams in front of the door it notifies you by sending message. Then he can see the person who is roaming in front of our door. So, if the person is known we can open the door otherwise we can be alert. And also we can talk to the person through mobile only and the person can reply there itself, Because it contains the audio speaker so that we can hear the outside people talks trough the mobile once we pick up the video call. If someone tries to steal it then the steal alarm will be activated.

Keywords: Smart Doorbell, IOT Doorbell, Security IOT, Smart doorbell, Smart lock, Wireless doorbell, Smart video surveillance.

I. INTRODUCTION:-

Over the past few years, IOT (Internet of Things) became very important in today's technology. And now days, IOT enabled tools are also became an important part in industries. Because, IOT refers to interrelated, internet connected objects that are able to collect and transfer data over wireless network without human intervention. This is why, now all industries are shifting their interest towards IOT based devices. As it is using sensors, It was low in cost and it consumes low power.

II. BACKGROUND: DOORBELL SYSTEM:-

It works in day light and moon light also. Even in dark the video quality and picture quality is high. When someone roan in surroundings. The respective owner will be notified as someone is there. If anyone presses the bell it automatically makes a video call to the respective owner. He can even reply in video call itself and the visitor also can speak to him through Speaker. If any intruder roams then it will send a notification to the respective mobile. If anyone try to steal it then it will alerts the owner by alarming. We can access the doorbell by calling okay Google or Alexa. 36-different tunes are available in the speaker to differentiate the situation. If it is a big house we can increase the chimes number by setting up it.

This project is from QUBO video doorbell. It has features as

1. Instant Visitor Video Call on Phone

2. Intruder Alarm System
3. 1080P FHD Camera
4. 2-Way Talk
5. Works with Alexa & Google
6. 36 Chime Tunes
7. And can also add any no. of chimes if it is a big house.
8. Steal alarm
9. Battery powered (AAA)

III. PROPOSED SYSTEM:-

I want to add some features to this existing device. Although the device has lots of features, still it has reduced existing drawbacks. To avoid those drawbacks we have to change the mode of power supply to the doorbell. Otherwise we have to include some commands in the software to get notify about it.

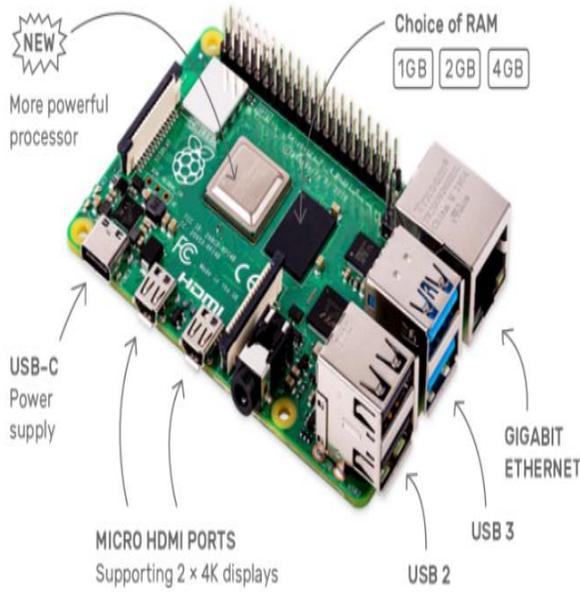
Like, Instead of using batteries, charging feature helps more to this device. Because, if no one in home then how a person can change batteries. Then obviously, if battery ends then the device becomes useless then our motive of security will be spoiled. To get rid of this, the battery percentage should be notified to mobile daily and also should notify when the battery is supposed to dead. So that they can change batteries before itself. Otherwise, the automatic charging system should be added to this so that it automatically charges itself when the battery power reduces, when it reaches the level which we set.

IV. DESIGN AND DEVELOPMENT:-

In the method of collecting information and data, a lot of sources had been referred too. Most of the information was gained from the journals and articles available on internet about security issues and smart doorbells.

The Hardware Parts required in this project are:-

1. Raspberry pi



2. SD card



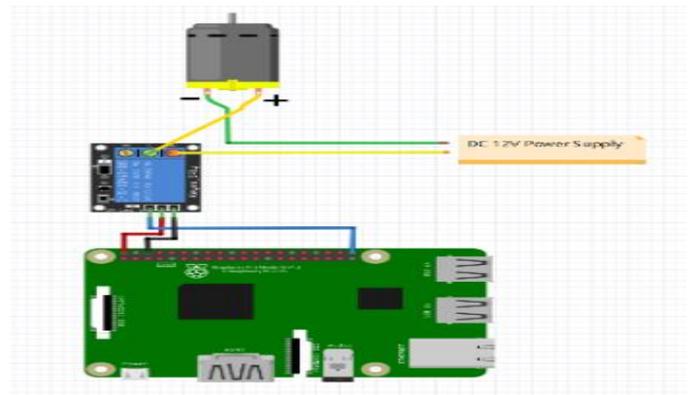
3. PIR sensor



4. Camera



5. DC motor with relay circuit



6. PUSH button



7. Chime

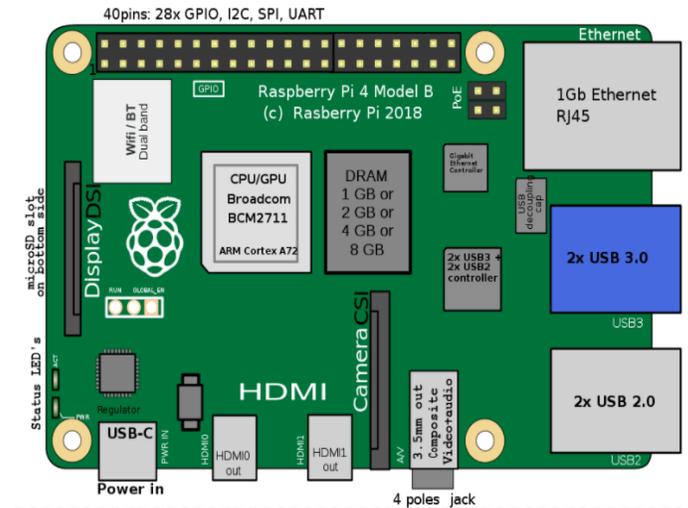
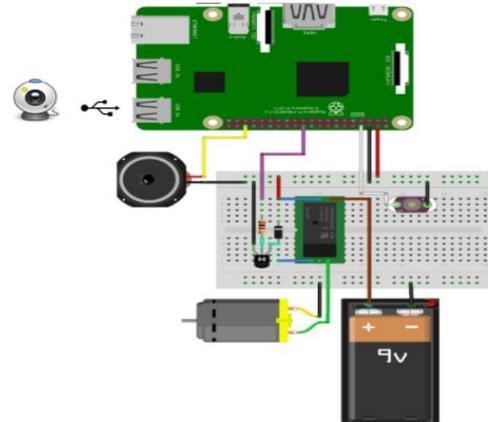


After collecting all data from web and articles, the prototype idea is “Smart doorbells” device for the components required for this made to react properly according to the instructions given to the device it gives output to the respective owner.

V. IMPLEMENTATION TECHNIQUES:-

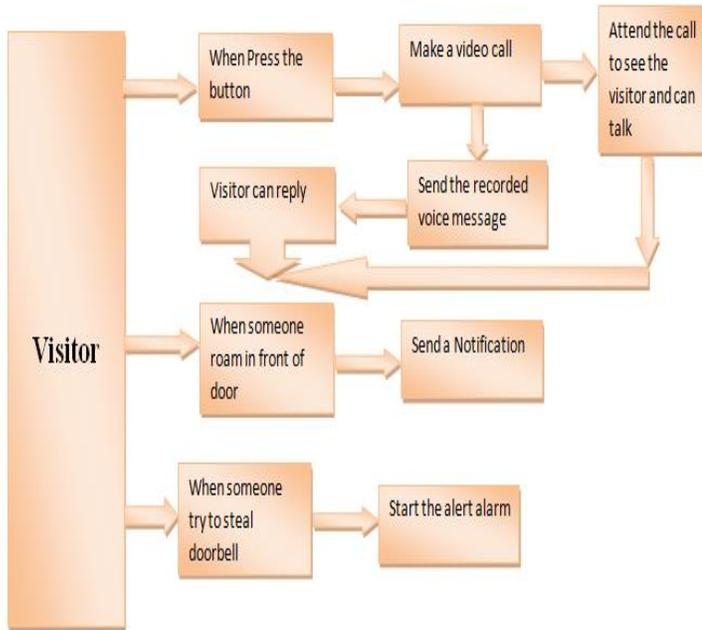
On a Wooden Board, Take a microcontroller board named Raspberry pi which has 28 GPIO (general purpose input-output), 12-C, SPI, UART. Now, take a bread board arranges the relay circuit on it which contains 4 pins. Now connect on of it pin with the DC motor wire. Another wire of the DC motor connects to the bread board. Take a battery connects one of the wires to the relay circuit and another one to the bread board. Now take a push button place it on bread board and connect one of the end to bread board and another end to raspberry pi4 microcontroller. Now take a small LCD which contains three pins. Connect one of the pins to the bread board. And connect the second pin to the camera. And the third pin to the microcontroller and bread board respectively. So that our hardware part of the design implementation completed. Now at last insert SD card into the microcontroller at the respective SD card slot.

Overall circuit diagram:-



Components Used:-

1. 70db audible alarm with capacity 30 m distance.
2. 1080 FHD Camera sensor which place on the doorbell.
3. Head to toe display and day and night clear visibility of picture.
4. Intruder alarm sensor to alert with a loud alarm.



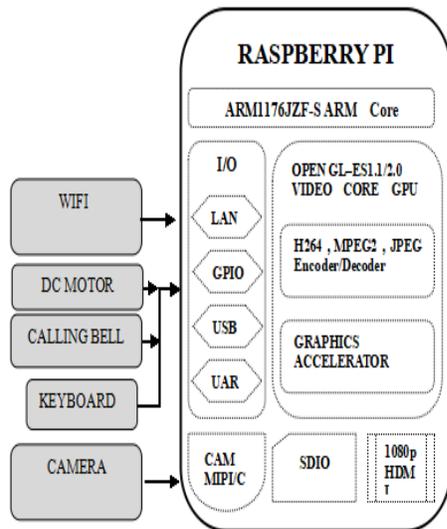
development code for Debian-8. Now insert the SD card into the computer. Find the SD card on the system. And go to Utilities and change format of SD card into FAT-32 for MAC users. Select “Apple SDXC Reader”. Un-mount the volume in the menu. For windows install the win32diskimager and unzip the folder. Now go to utilities. Select the Raspbian image you downloaded. That’s it now the SD card is ready to use.

Now insert the OS installed SD card into the computer of SD card into the computer SD card’s reader. And setup the Wi-Fi by opening terminal and enter the Wi-Fi setup command in the terminal. Now, insert the SD card into the Raspberry pi4 and connect into a router by any Ethernet cable. Replace the IP address by the current raspberry pi4 IP-Address. Set password and time zone. Now, update the Raspberry pi4. Now open the terminal and Write the commands to take pictures of people surrounding of it only if someone is at the sensor.

VI. RESULTS

Firstly we tested the camera, it worked well by clicking a clarity pictures in both day and night. And then I clicked the push button then it made a video call to me, where the picture quality is good. Hence, the camera was successfully tested.

Then, I tested the PIR sensor, when I moved surrounding of the sensor it notified me as someone is there. When I went near of the sensor as in disguise of intruder it notified me. Hence, the PIR sensor worked successfully. Stealing alarm also tested. When I try to dismantle the bell without shutting it, it made a loud alarm with one of the tune. On turning on the DND mode, there are no calls and it was replied with pre-recording audios.



The software parts required in this project are:-

1. Python programming
2. PHP Programming
3. Raspbian Jessie OS
4. Apache
5. Open CV

Coming to the implementation of software, firstly install the Raspbian which is a free Debian- based OS which is optimized for Raspbian pi, Where Jessie is a



And also makes a video call when someone presses the push button. If the person is free to talk he can pick-up the call and can reply to the visitor in the call itself. And visitor also can reply through the speakers attached to the bell. Otherwise, the mobile user can send already recorded voice message to the visitor if anything important.

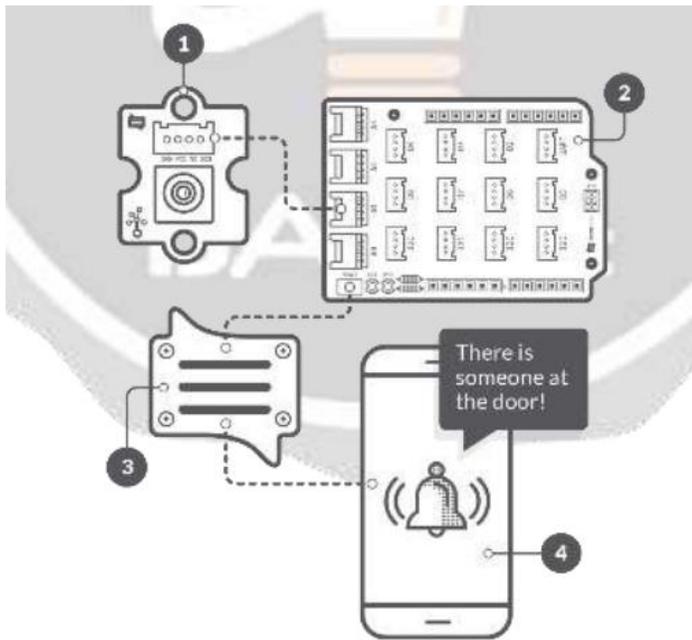


And it also can identify the thieves who are going to steal the bell or who are going to remove the bell by the loud alert alarming sound where we will store some alarming sounds in the processor of the microcontroller using SD card. And also it identifies the intruders through our smart camera sensor and send his photo to our mobile and plays a loud sound so that the intruder scare to the sound and runs away to the house. In this way the issue of security will be resolved.



It has the feature to make the Doorbell calls and notifications silent by using DND (do not disturb) mode. During ant important meetings users can make it into do not disturb mode and also can send pre recorded audio messages to the visitors. And also can access the bell by using ok Google or Alexa. And also I t has a tamper alert.

36- Chime tunes were stored in microcontroller so that we can use our favorite tune among those.



Scenario	Test type	Outcome
Both Day and Night	Camera Test	Visible perfectly
When Visitor rings the bell	Visitor Arrival test	Made a video call
When Intruder arrives	Intruder test	Successfully got notification
When someone try to steal bell	Steal test	Alarm sound has informed.
When in meetings	DND	No calls are there and auto replied with pre-recordings.
When away from phone	Ok Google and Alexa	When I spell those the application was worked

Finally, The Ok Google and Alexa also activated when I spell near the phone and operated the device according to my work.

VII. CONCLUSION:-

Hence, the project named smart IOT doorbells using domain IOT was successfully designed and implemented. The main purpose of this project is for security. The Security was enabled by IOT in doorbells like If someone press the bell without opening door we can see them and then we can open so that we can reduce kidnaps and murders and also thefts. And we can also speak to the persons through this doorbell so that during this covid it was very useful because we can control the corona by social distance through this. If any person as suspicious it sent us a notification so that we can be alert and also we can take any respective security measures. And also we do not have any worry about the device loss even we keep it out. Because, if anyone try to steal it, it alerts us by loud alert alarm. So device is safe. Even they are travelling they can spy on home. It is very useful to monitor the home/ office remotely.

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