IMPLEMENTATION OF WIRELESS REMOTE CONTROLLED VISITOR AT THE DOOR RESPONSE SYSTEM USING GSM AND RASPBERRY PI TECHNOLOGY

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Abstract: The main objective of Wireless Remote Controlled door answering system is to display the relevant message to the visitor who rings the door-bell, or approaches close to the door, irrespective of the owner being within the premises or away with use of GSM, Raspberry Pi 2 and many other components. The identity of the visitor is conveyed to the owner, and the system is controlled using SMS that can be sent by the owner's mobile and the appropriate response sent by the owner by message can be displayed on the screen outside the home. The technologies used in this implementation are: Linux Operating System- Raspbian, AT Command Set and Python 2.0.

IndexTerms **- Wireless Remote Controller System, Door Answering System, GSM, Raspberry Pi 2, Smart System, Automatic Visitor Answering System.**

I. INTRODUCTION

With the onslaught of the 21st century, monitoring and surveillance of homes and offices has become more of a necessity than a luxury of the rich and famous. Portable and small size devices which are low cost and low maintenance are everyone's dream. Security system and 24x7 monitoring over the internet is provided by multiple vendors in the market but the greatest difficulty is the lack of two-way communication or conveying the visitor when the Owner will be available next. A lack of response to unknown visitors may leave them frustrated or confused. Imagine a scenario where you have been waiting for a courier to arrive for an entire day only to find out that you missed it when you made your five minute grocery store run and now you will have to go to the courier office the next day to collect it. These day-to-day problems are no surprise to us, but in our project we have tried to solve some of these problems and make life a little easier for ourselves.

1.1 Aims and Objective

This Implementation has been designed keeping in mind some of the common problems faced by individuals, professionals and working parents and the aim is to provide a user-friendly and economical two-way communication medium between the visitor and the owner of the premises in real time.

1.2 Solution

Considering the existing problem, the following are the requirements for the scope of the solution of the problem: (1.) Internet access. (2.) Network connectivity of the service provider. (3.) Consideration that all visitors will be in the frame of the web-camera. (4.) Electricity [in case of loss of electricity, not more than 24 hours]

The solutions provided by system are: (1.) No visitor remains unanswered, as he receives a response within a short time. (2) Owner is informed of everyone who comes to his door whether he is in or away. (3) Pictures of every person who comes close to the door are conveyed immediately. (4) Owner can convey a message that he is away for a short time only. (5) Owner can give different messages to different persons who may come. (6) Visitor does not need to make a telephone call from his own mobile. (7) Owner can convey a message as to how long the visitor needs to wait before the door is opened, even when he is busy within the premises. (8) The visitor can communicate without knowing or dialing the owner's phone number.

II. REQUIREMENT GATHERING

Requirement gathering is an essential part of any project and project management. Understanding fully what a project will deliver is critical to its success. It includes three types of activities

(1.) Eliciting requirements (2.) Analyzing requirements: determining whether the stated requirements are clear, complete, consistent and unambiguous, and resolving any apparent conflicts. (3.) Recording requirements: Requirements may be documented in various forms.

2.1 Functional Requirements

1. Triggering of the system by pressing doorbell or by sensor. Capturing image using camera.
2. Sending image by mail/other using Wi-Fi module.
3. Sending message from registered mobile number.
4. Displaying message on the LCD screen.

2.2 Non-Functional Requirements

1. Performance: Response time will not be more than 3 minutes.
2. Availability: No visitor leaves without a response.
3. Usability: No prior learning is required and easy to use.
4. Manageability.
5. Reliability.

2.3 System Requirements

1. Wi-Fi
2. Mobile phone with SMS facility
3. Web camera
4. Doorbell

III. TECHNICAL FEASIBILITY

Technical Feasibility refers to the ability of the process to take advantage of the current state of technology with a view to pursuing further improvement. Technical feasibility will be addressed by the following explanation.

Module	Feasibility Test
Triggering of the system by pressing doorbell or by sensor.	Connection of doorbell and sensor with RPI using wired connections.
Capturing image using camera.	RPI sends a signal to capture image and receives the image for further processing using the ―fswebcam‖ and ―mencoder‖ package
Sending image by mail/other using Wi-Fi module.	RPI uses ―sendxmpp‖ and python libraries for sending message and image on hangouts/others and it uses the ―smtplib‖ package to send the email
Sending message from registered mobile number.	SIM 300 is a GSM modem with a simple serial interface. SIM 300 modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. With this module one can send/receive SMS, connect to internet via GPRS and receive calls.
Displaying message on the LCD screen.	Message display will be controlled by the microcontroller and it will be displayed on the LCD screen

Table -1: Technical Feasibility

IV. ARCHITECTURE MODEL

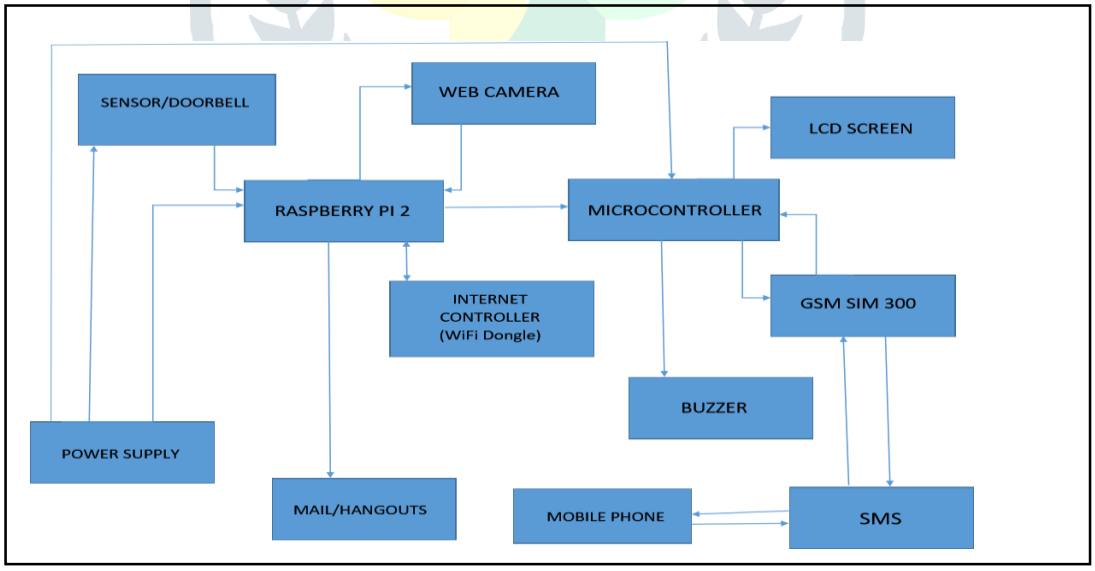


Figure: 1. Block Diagram of System

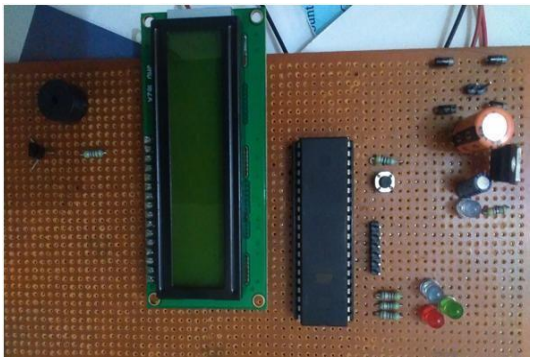
The architecture model shows the communication between the various components of the system. It depicts the flow of information in a user friendly manner and gives the overall picture of how the system functions.

V. MODULES OF THE IMPLEMENTATION

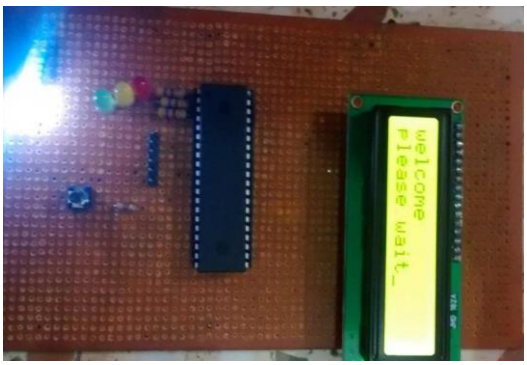
(1.) Interfacing of Microcontroller with LCD
(2.) Interfacing of Microcontroller with GSM Module.
(3.) Wireless Connection establishment between GSM and Mobile phone.
(4.) Sending SMS through the Microcontroller using GSM Module.
(5.) Receiving SMS through the Microcontroller.

(6.) Interfacing of Webcam with RPI.
(7.) Interfacing of Microcontroller with RPI.
(8.) Sending image/video by email/other.
(9.) Building the doorbell and sensor.

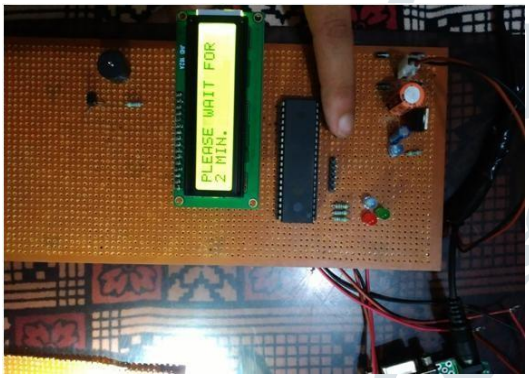
VI. WORKING MODEL



Working Model 1: Components on the board

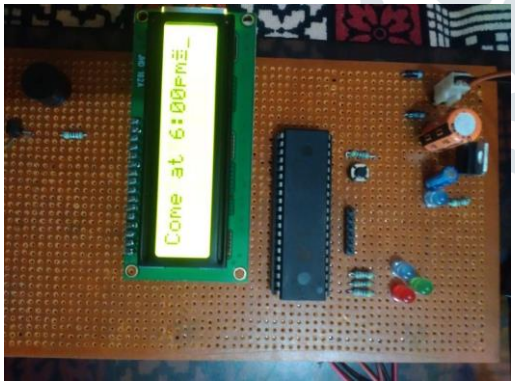


Working Model 2: Message displayed on the LCD when interfaced with Microcontroller

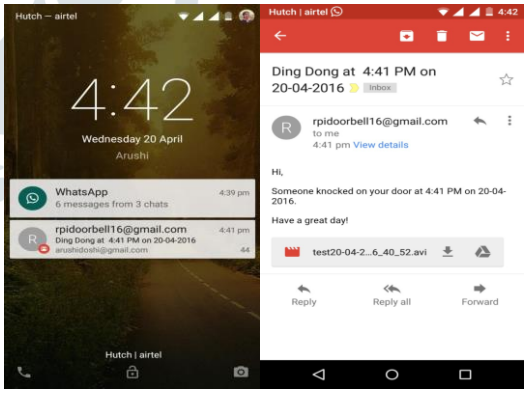


Working Model 3: Doorbell pressed and system and the corresponding reply by the owner

Working Model 4: Message received from the Message sent by the system

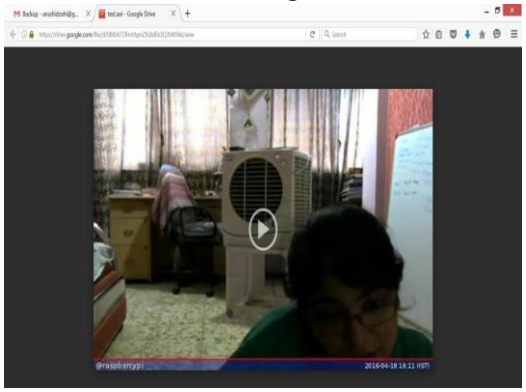


Working Model 5: Message received and displayed on the screen.



Working Model 6: Snapshot of Email received containing the attached file

Working Model 7: Connected RPI with Webcam



Working Model 8: Snapshot of the video Backup in Google Drive.

VII. TEST CASES

This is an evaluation of whole implementation, Table 2 illustrated the Test Cases respect to Expected Result and Actual Result. By this Table we should predict the accuracy Of the system.

Sr.No.	Test Case	Expected Result	Actual Result
1	System Startup	LCD should light-up and display message	As Expected
2	Pressing the doorbell	LCD should display wait for 2 mins and send the SMS to the registered mobile.	As Expected
3	Blocking of the laser on the sensor	LCD should display wait for 2 mins and send the SMS to the registered mobile	As Expected
4	Receiving the signal of Microcontroller on RPI	RPI Starts the script to capture images	As Expected
5	Image Capture, sending the email and backup on Google drive	RPI captures the image, sends the email on the registered email ID and also performs backup of the file on Google Drive	As Expected

Table -2: Test Cases

VIII. CONCLUSION

After completing the entire implementation. We successfully conclude that the above implementation will provide a complete and low cost solution of monitoring the door, alerting the Host of a Visitor's presence and will also alert the Visitor about the availability of the Host. The whole working model is useful combination of Hardware and Software.

IX. FUTURE WORK

In the future Voice Message Facility can be included. The Visitor can leave a voice message at the door for the Host. Facial Recognition. A Facial Recognition algorithm can run on RPI and a database of frequent visitors can be maintained and upon detecting a face the message stored in the database can be displayed thus making it a truly stand-alone door controlling system.

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