# Automatic Door Opening System

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*Abstract*: **To own a reliable security system, it is important to secure our assets as well as to protect our privacy. A key, identification (ID) card or password is used by the traditional security system to access an area such as home and workplace. Moreover, people operate keys, security cards, countersign or pattern to access the door by integrating various technologies such as RFID and biometrics which includes face recognition, thumb scanner, iris scanner, palm scanner, etc. The objective of this paper is to serve the users for enhancement of the door security by capturing the image of a client when they press the doorbell. The proposed system mainly consists of subsystems namely capturing image, sending SMS notification, image detection and recognition for automatic door opening, it will be easy to find out who visited when no one was there at home. Owner can modify the database according to his needs. For safety purpose the captured image from web camera will be saved in database for knowledge of the owner to see the date as well as time while person is pressing the doorbell. The door lock can also be accessed remotely from any locations using smart phone through SMS notification.**

*Keywords*: **Raspberry Pi, Internet of Things (IoT), SMS Gateway, Rely, Latch, Doorbell, Web Camera, Mobile Devices, Home Security.**

## 1. Introduction

Nowadays security and safety is becoming more and more popular day by day and it is getting improved and used for the ease in our life. The design of this system secures one's home with the help of integrated part of some technologies. The aim of this project is to design a system which will control door by using smart phone operated by Mobile device. It consists of web camera to detect intruder, Raspberry Pi3 which have in- built Wi-Fi module, LAN Cable and a Mobile device for collaborating with system. Owner can control the door by using smart phone. When individual presses the doorbell, web camera gets the signal then it captures the image of an individual and sends to owner's mobile device via Raspberry pi using IOT (Internet of Things). This proposed work is to authenticate the person standing outside the door and person will be allowed to enter the house only if he is authorized. This project requires two Internet connections one at raspberry end and other at user end. This technology symbolizes in a wide spectrum of networked products, systems, and sensors, which take advantage of advancements in computing power, electronics miniaturization, and network interconnections to offer new capabilities which was not previously possible. The large-scale implementation of IOT devices promises to transform many aspects of the way we live. For consumers, new IOT products like Internet enabled appliances, home automation components, and energy management devices are moving us toward a vision of the "smart home", offering more security and energy efficiency. This technology promises to be beneficial for people with disabilities and the elderly, enabling improved levels of independence and quality of life at a reasonable cost.

Wireless network is one of the technologies that have been used to provide remote monitor and control for the home appliances. The system works by taking snaps for the guest through a code and camera pi positioned in the doors then, such snaps will be sent to the owner. The proposed system can be extended to be used for different properties and facilities such as banks and office. A remote access control system comprises of the internet to control the devices and appliances at home or office with the person controlling them from anywhere around the globe. In our proposed system, a Raspberry Pi board is used as the platform for monitoring and controlling the door lock. The door entry system proposed here consists of a switch for guest monitoring, camera for guest authentication, SMS will be sent to the owner and responses will be given to the guest.

## 2. Related work done

Optimized Door Unlocking Using IOT is very secure solution for unlocking the door within Wi-Fi range. This system plays a major role in helping reduce the work by using Raspberry pi 3, especially for children, old aged people and physically challenged. The proposed work is to send a signal to door from a Computer or Tablet or mobile devices by using Raspberry pi 3 having Wireless system. This allows the user to unlock a door from outside a house with a Wi-Fi range available. Like Raspberry pi is interfaced with relay to obtain the related result from the owner. It logs all the intrusion data into owner's databse. Using Raspberry pi, Home Based Security Control System is designed and implemented. Due to network connectivity, the owner can give response from anywhere. So the user can interact with home security system when user presses the doorbell. The SMS Gateway is used to alert the owner by sending the image and receiving the messages, which is controlled by the owner's command that is allow/deny.

## 3. Methodology

When a guest arrives at the home and finds the door to be

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locked, he/she presses the switch at the door. This switch has been implemented using a pushbutton switch in the system developed. The GPIO 24 pin to which the switch is connected is continuously monitored by the system. In case a key press is detected the system proceeds with the next steps of the program. The system designed to interacts with the owner using SMS. For example, when the guest presses the doorbell. The image of the guest is captured by the webcam and sent to the primary host and if needed to the secondary host. The reply received determines whether the door is to be unlocked or not. The algorithm used for the implementation of the proposed system is shown in Figure using a flowchart. The implementation of the design of the proposed system was done using the Raspberry Pi Model B board. The Raspberry Pi is a single-board computer developed in the UK by the Raspberry Pi Foundation. It is a board with features which are very useful in electronics projects. The board features an on-board 10/100 Ethernet RJ45 jack, Dual USB Connector port, 3.5 mm jack, HDMI Audio Output and 26 dedicated GPIO pins, including a UART, an i2c bus, a SPI bus with two chip selects, i2s audio, 3.3 V, 5 V and ground. The board supports video output through the HDMI and RCA Video Ports. The requirements of the project included switch interface, internet connectivity, USB webcam support, 3.5 mm speakers support and actuator interface. Hence, this board was a desirable choice for the system. It is powered using 5 V via Micro USB connector. It is powered using 5 V via Micro USB connector. Its power ratings are 5 V DC, 700-1500 mA. The software was developed on the embedded Linux based Raspbian OS. The programming of the Raspberry Pi has been done using the Python Programming Language. The different tasks have been accomplished by importing the necessary library modules and using the appropriate functions.
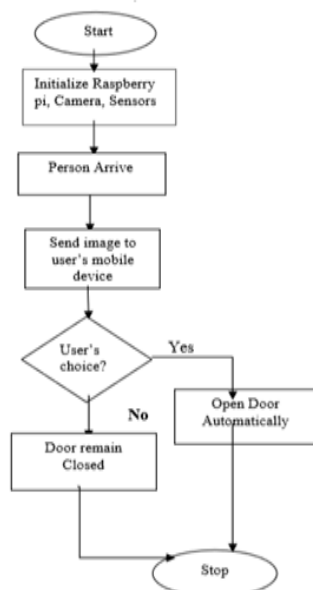


Fig. 1. Flow chart

Flow of working of the system and flow of the programmers are shown in these following steps: Steps Included:
- Start
- Initialization of Raspberry pi, Camera, Sensors.
- If any person comes, camera captures the picture/image and sends to the user's mobile device. User gets notification and opens/closes door according to his/her convenience.
- If system crashes go to step (VI).
- Backup plan(biometric)
- End

## 4. Literature survey

Hteik Htar Lwin and et al. Have proposed a door lock access system which comprised mainly of three subsystems: namely face detection, face recognition and automatic door access control. Face recognition is implemented by using the Principal Component Analysis (PCA). The door will open automatically for the known person due to the command of the microcontroller. On the other hand, alarm will ring for the unknown person. Drawback of this system is input images are taken through a web camera continuously until the 'stop camera' button is pressed [1]. Someone is required at the location to check unauthorized person's images or status of the system and take further action. Personal computer (PC) is connected with the microcontroller, the whole system will not work if PC is crashed or Non-Function.

Sadeque Reza Khan and et al. Have proposed a system contains sensors to detect obstacle, touch, heat, smoke, sound. The whole system is controlled by a PIC microcontroller 16F76. It collects information from the sensors, makes a decision and sends SMS to a corresponding number by using a GSM modem. If it finds any interruption in its sensors like if the IR is interrupted then PIC will send a SMS to the home owner and another SMS to the Police Station. In the same way for fire interruption a SMS will be sent to the fire brigade and another to the home owner [2]. In this system require extra hardware components like Sensors, GSM Modem. Alerts are sent through only SMS.

B. Udaya Kumar and et al. presents the implementation of a low cost wireless home security system using ZigBee protocol and remote access through internet [3]. A ZigBee based star network with two nodes had been established employing Xbee radio, ARM7, PIC, and MBED microcontroller. The detection of the intruder motion, gas leakage detection and visual surveillance of the home were provided with the help of Passive Infrared Sensor (PIR), Gas sensor (GH-312) and Camera (LS_Y201). Problem is here multiple micro controllers are used, usage of ZigBee based network to communicate with the base station is limited to 100-150 meters long distance only. Base station is dependent on only Ethernet for internet connectivity. J. Shankar Kartik and et al. Have proposed two systems are proposed, one is based on GSM technology and other uses web camera to detect the intruder. The first security

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system uses a web camera, installed in house premises, which is operated by software installed on the PC and it uses Internet for communication. The camera detects motion of any intruder in front of the camera dimensions or camera range. The software communicates to the intended user via Internet network and at the same time it gives sound alert. The second security system is SMS based and uses GSM technology to send the SMS to the owner [9]. Mae. Y and et al. presented the system; it monitors everything by moving cameras. The system can increase the efficiency of monitoring and can eliminate the blind spots of fixed cameras. In this system, a mobile manipulator is developed which is equipped with cameras at the arm end for purpose of monitoring [6]. Jayashri Bangali and et al. Have proposed a system which is aimed at the security of Home against Intruders and Fire. The proposed system is controlled by an Atmega644p microcontroller. It collects information from the sensors, makes a decision and sends SMS to a corresponding number by using a GSM modem. If it finds any interruption in its sensors (for example IR sensor) then microcontroller will send a SMS to the home owner. In the same way if the temperature is increased above certain point or gas sensor sensors is ON, a SMS will be sent to the home owner 'Fire at home' giving the indication of fire [4]. This system operated by software in PC to detect the intruder that is it is not stand alone system, dependent on the PC. Security alerts are sent by extra GSM Modem not from the internet

## 5. Proposed system

The proposed system is completely standalone and wireless to form a reliable, robust, easily operable, and low price security system. The internet communication has been achieved by connecting through USB cellular data card. The battery power source has been provided to make this whole system as standalone security device. Conclude that various operations are successfully tested and results are documented. This proposed system can be enhanced by using the infrared image scanner camera to find concealed weapon detection under the clothes of the human body. It can also be used this security system by making required modification to the system in an area like banking sector to provide more security to the lockers, based on their facial authentication and keep track of account holders record of information when and who is accessed the lockers. In this way it can enhance the proposed system effectively by making some modifications according to requirements.

## 6. Features of the proposed system

### A. Raspberry pi-3

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi foundation. Raspberry Pi-3 Model B  released in February 2016 is bundled with on-board Wi-Fi, Bluetooth and USB Boot capabilities. As of January 2017, Raspberry

Pi 3 Model B is the newest mainline Raspberry Pi. Raspberry Pi boards are priced between US$5-35. It includes various features such as ARM compatible central Processing unit (CPU) and an on- chip graphics processing unit (GPU, a video core IV). CPU speed ranges from 700MHz to 1.2GHz for the Pi 3 and on board memory range from 256 MB to 1 GB RAM. Secure Digital (SD) cards are used to store the operating system and program memory in either the SDHC or MicroSDHC sizes. Most boards have between one and four USB slots, HDMI and composite video output, and a 3.5mm phone jack for audio, Lower level of output is provided by a number of GPIO pins which support common protocols like PC. The model B has an 8P8C Ethernet portend the Pi 3 and Pi Zero W has on board Wi-Fi 802.11n and Bluetooth.

1) *Web-cam*
   - 16 MP interpolated resolution
   - Excellent quality & fashionable style
   - True plug and play USB interface
   - High quality CMOS sensor
   - Clear, sharp still picture & motion video
   - Support external microphone
   - Auto white balance & exposure
   - Adjustable lens

2) *Relay*
   - RW Series Relay covers switching capacity by 10A is spite of miniature size to comply with User's wide selection.
   - RWH is approved C-UL & TÜV safety standard.
   - The employment of suitable plastic materials is applied under high temperature condition and various chemical solutions.
   - Complete protective construction is designed Form dust and soldering flux.
   - 12A at 120VAC for RW & 12A at 240VAC for RWH are UL approved.

3) *Mobile*
   - Requires an android operated phone.
   - Requires a mobile which has a feature of internet.

## 7. Conclusion

In this paper, we presented a novel door entry system based on SMS along with a sophisticated design also provides the flexibility of remote access control while ensuring security. Our proposed system uses a webcam for capturing the guest's image and sends to the host for authentication. The use of SMS not only adds convenience but also ensures a level of security by means of an ID and password based authentication. The command to open the door is known only to the host. This adds another layer of security. Since our proposed system is based on SMS, it is a device platform flexible and easily handle able system without any overhead and hence can be used by any smart device with internet connectivity.

## References

[1] Hteik Htar Lwin, Aung Soe Khaing, Hla Myo Tun, "Automatic Door Access System Using Face Recognition", International Journal of Scientific & Technology Research Volume 4, Issue 06, June 2015.

[2] Sadeque Reza Khan, Ahmed Al Mansur, Alvir Kabir, Shahid Jaman, Nahian Chowdhury, "Design and Implementation of Low Cost Home Security System using GSM Network", International Journal of Scientific & Engineering Research, Volume 3, Issue 3, March 2012.

[3] B. Udaya Kumar, D. S. Murty, Ch. R. Phani Kumar, "Implementation of Low Cost Ethernet Based Home Security Using Wireless Sensor Network", Journal published at Algorithms Research, March 2013.

[4] Jayashri Bangali, Arvin Shaligram, "Design and Implementation of Security Systems for Smart Home based on GSM technology", International Journal of Smart Home, Vol.7, No.6, August 2013.

[5] V. Karri and J. S. Daniel Lim, "Method and Device to Communicate via SMS After a Security Intrusion", 1st International Conference on Sensing Technology, Palmerstone North, New Zealand, (2005) November 2123.

[6] Mae. Y, Sasao. N, Innoue. K, Arai. T, "Person Detection by Mobile Manipulator for Monitoring", SICE 2003 Annual Conference, pages-2801-2806.

[7] http://downloads.sourceforge.net/project/opencvlibrar y/opencv-2.4.zip.

[8] https://www.raspberrypi.org/products/model-b

[9] J. Shankar Kartik, K. Ram Kumar and V.S. Srimadhavan, "SMS Alert and Embedded Network Video Monitoring Terminal", International Journal of Security, Privacy and Trust Management (IJSPTM), Volume 2, October 2013.