ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Smart Home Security System

Karri Sahitya Naga Krishna Lekha
Department of Electronics & Communication Engineering, Sreenidhi Institute of Science and Technology, Hyderabad, Telangana-501301, India.

Nakka Venkata Karthik
Department of Electronics & Communication Engineering, Sreenidhi Institute of Science and Technology, Hyderabad, Telangana-501301, India.

S.K. Satyanarayana
Department of Electronics & Communication Engineering, Sreenidhi Institute of Science and Technology, Hyderabad, Telangana-501301, India.

Abstract

Nowadays, there is a growing interest in the smart home system using Internet of Things. One of the important aspect in the smart home system is the security capability which can simply lock and unlock the door or the gate. In this paper, we proposed a face recognition and password security system using Raspberry Pi which can be connected to the smart home system. In recent days home security and remote monitoring have become necessary and important with the advent of new concept like internet of things and development of advanced authentication and security technologies.

In this paper we are design and development of intelligent web based door lock system using face recognition technology, for authentication, remote monitoring of visitors and remote control of smart door lock. The main objective is implement face authentication of captured image using camera by open cv platform on raspberry pi. To provide higher security than the present level of security. This system uses face detection and local binary pattern histogram (LBPH) for face recognition. This system transmit live picture of the visitors via email. The system has been developed and tested using raspberry pi board using camera by open cv platform on raspberry pi.

I. INTRODUCTION

Securing homes has become one of the concerning issues that facing many people. With the expanded duration of leaving the home due to work, study and other duties, homes are being more vulnerable for several threats especially being burgled.

Apart from the threats, there are different cases where securing or monitoring the house is very critical such as the existence of elderly individuals or kids with baby sitter. For this manner, home security system or so-called Home OS has been proposed in order to provide more secure arrangements. Such concept aims to turn the home into a smart in which different tasks especially monitoring can be performed remotely. Monitoring and controlling some tasks inside the house would have the ability to provide maximum safety [1]. As a solution for this problem, wireless communication has been emerged to provide more flexible platform where the installation cost is significantly lower than the wired one.

Therefore, it has been applied for different security home systems in order to provide an alarm for critical threats such as intrusions or other environmental risks such as gas leaking or fire [2]. Recently, electronic door lock systems are one of the most popular security systems that is being installed for many residents and business places. The key characteristic behind such systems lies on the reliability in which the authorized individuals can gain the permission to access the doors throughout a secure system that has an interactive interface. The major drawbacks in a common door lock are that anyone can open a conventional door lock by duplicating or stealing the key and its simply impossible if we want our friends and family to enter our house, without being actually present over there.

Cite this article as: Karri Sahitya Naga Krishna Lekha, Nakka Venkata Karthik & S.K. Satyanarayana, "Smart Home Security System", International Journal & Magazine of Engineering, Technology, Management and Research, Volume 6, Issue 5, 2019, Page 9-14.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Thus why not just eliminate these problems. So, to simply convert this normal door lock into a smart lock, which can open the door whenever we turn up in front of the gate or when we want it to open up for someone else without being physically present, we need to modify the door. So an era has come where devices can interact with its users and at the same time ensure of their safety and keep improvising themselves.

Face Detection:

Many kinds of face detections are acclimated in affluence apparatus accident management, surveillance eventualities, gaming,human-computer interaction, etc. Viola associated Jones devised an formula, accepted as haar appearance classifiers, to apace acquisition any object, as able-bodied as animal faces, abuse Haar classifier cascades that breadth assemblage accurate Haar-Like options. Altered types of agency breadth assemblage out there for audition the face for identification and recognition. Face apprehension is application haar like features, so we'll plan with face detection. Initially, the blueprint lots of absolute pictures (images of faces) and abrogating pictures (images while not faces) to drillmaster the classifier. Then we'd like to abstract options from it.

Face Recognition:

Face acceptance applications is categorized into the three categories: verification, identification and watch. Face acceptance allotment is advised to be a one. The arrangement can analyze face angel to the face image(s) of a agnate registered character aural the advice to anatomy alarm on whether crumbling or not acceptant the character claim. In distinction, the face identification assignment may be a one: N analogous drawback. The face angel is conferred to the arrangement while not accessory amount mark affirmation and as well the arrangement can seek through the absolute identities aural the advice of face to analyze the conferred face image. Usually, it's advised that the conferred face angel belongs to at atomic one of the capacity aural the information.

Lastly, the watch account assignment is about absolute just like the identification task. But in watch account task, the catechism capacity aboveboard ad measurement usually beyond than the capacity aural the advice and appropriately the catechism accountable adeptness not abide aural the information.

II. RELATED LITERATURE AND COMPARISON WITH EXISTING MODELS

Since 2010 the industry has seen a dawn of work being done in fields of Artificial Intelligence, Machine Learning, Neural Networks, IoT, Big Data Analytic all with a common goal to make things easier, self-supervising and to interconnect all kinds of devices by making everyday objects interconnected and interoperable. A need has been felt in the field of digitalizing conventional security tools and thus a lot of work has been modeled on making daily life locks smart by introducing locks movable with the help of stepper An intensive study of literates implementing Smart Locks had been done and literature implementing Door Locks with the help of GSM phones [1] and stepper motors have been studied. Also, literature regarding smart display has been thoroughly reviewed [2].

The fault in existing models is a complexity of a system and unnecessarily relying on extra components. Our model is unique with its one of a kind combination of functionalities offered and the simplicity of the model. A major difference is in the overhead reduction by the application as it detects the face out of the image and sends it directly to application program interfaced with our application, which has not been provided in any existing model and the efficient use of solenoids, which also eliminates the use of stepper motors. So, we have avoided the use of unnecessary components like stepper motors and drivers as done in existing models and also we have given newer and unprecedented features of facial recognition as an access point control system with a combination of relay module with a solenoid to open the gate and unique and interactive User Interface.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Also rather than using a low-quality Raspberry Pi Interfaced Camera we have used USB attachable HD WebCam to do efficient and reliable facial recognition. The objectives of the proposed work is to implement a working model of a smart door and to give solutions to the problem faced by people in day to day incidents of burglary or losing the key and also to promote and ignite the work being done on IOT systems and implementing it with the help of key research areas of Neural Networks and IoT APIs and protocols.

III. SYSTEM DESIGN AND FRAMEWORK

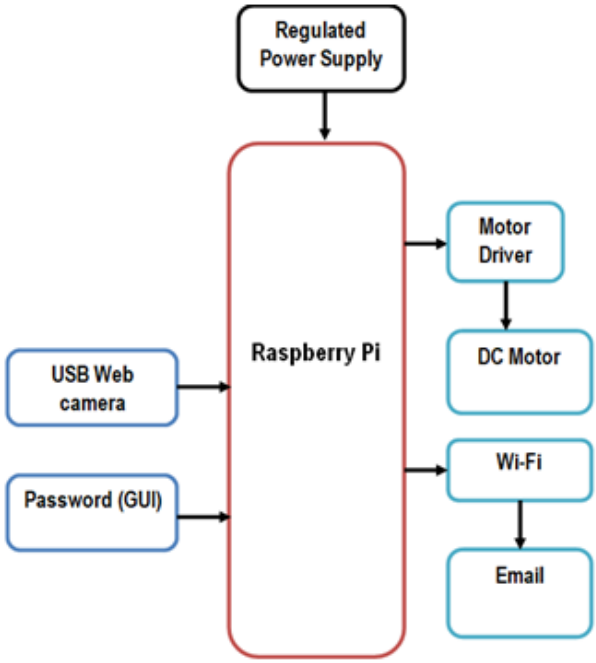

Fig.1: Proposed block diagram

Raspberry Pi Basic Hardware Setup:

The Raspberry Pi board contains a processor and graphics chip, program memory (RAM) and various interfaces and connectors for external devices. Some of these devices are essential, others are optional. It operates in the same way as a standard PC, requiring a keyboard for command entry, a display unit and a power supply. Since raspberry Pi board operates like PC it requires 'mass-storage', but a hard disk drive of the type found in a typical PC is not really in keeping with the miniature size of RPi.

Instead we will use an SD Flash memory card normally used in digital cameras, configured in such a way to 'look like' a hard drive to RPi's processor.

RPi will 'boot' (load the Operating System into RAM) from this card in the same way as a PC 'boots up' into Windows from its hard disk.

The following are essential to get started:

- SD card containing Linux Operating system
- USB keyboard
- TV or monitor (with HDMI, DVI, Composite or SCART input)
- Power supply (see Section 1.6 below)
- Video cable to suit the TV or monitor used

USB Web Camera:

A webcam is a video camera that feeds or streams its image in real time to or through a computer to a computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and emailed as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there. Unlike an IP camera (which connects using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops.

L293D Motor Driver:

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC). It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, Hence H-bridge IC are ideal for driving a DC motor. In a single L293D chip there are two h-Bridge circuit inside the IC which can rotate two dc motor independently.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Due its size it is very much used in robotic application for controlling DC motors. Given below is the pin diagram of a L293D motor controller.

IV. SOFTWARE IMPLEMENTATION

LINUX:

Linux or GNU/Linux is software operating for computers. The operating system is a collection of the basic instructions that tell the electronic parts of the computer what to do and how to work. Free and open source software (FOSS) means that everyone has the freedom to use it, see how it works, and changes it.

There is a lot of software for Linux, and since Linux is free software it means that none of the software will put any license restrictions on users. This is one of the reasons why many people like to use Linux. A Linux-based system is a modular Unix-like operating system. It derives much of its basic design from principles established in Unix during the 1970s and 1980s. Such a system uses a monolithic kernel, the Linux kernel, which handles process control, networking, and peripheral and file system access. Device drivers are either integrated directly with the kernel or added as modules loaded while the system is running. User interfaces are based on the X Window System, often simply called "X". It provides network transparency and permits a graphical application running on one system to be displayed on another where a user may interact with the application.

Raspbian OS:

- Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. However, Raspbian provides more than a pure OS: it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi.
- The initial build of over 35,000 Raspbian packages, optimized for best performance on the Raspberry Pi, was completed in June of 2012. However, Raspbian is still under active development with an emphasis on improving the stability and performance of as many Debian packages as possible.

V. RESULTS

Fig.1: Experimental hardware setup

Fig.2: Setting up Web camera through Raspberry pi

Fig.3: Interfacing monitor as a display unit

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Fig.4: Running application for face and password unlock

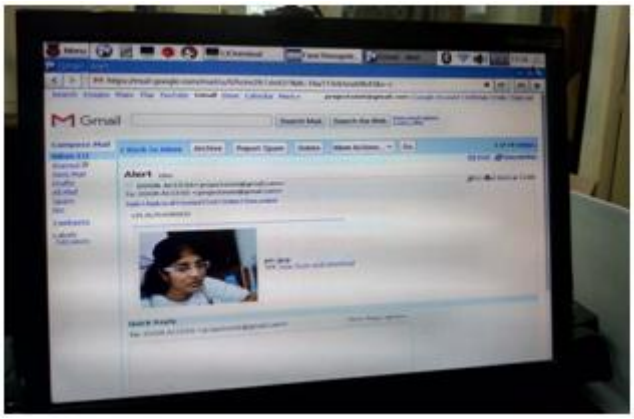

Fig.5: Getting Email alert as photo

VI. APPLICATIONS

- Military and aerospace software applications
- Communications applications
- Electronics applications and consumer devices
- Industrial automation and process control software

VII. CONCLUSION

The Face recognition and acceptance was done on the application LBPH and raspberry pi module. The complete smart home security is provided in this project. This system mainly focuses door lock control and security purpose using raspberry pi module. Face recognition system using Gmail to adds an advantage to the application .development of this idea in such environment, it could play main role in recent times.

Smart door lock is one of the most popular digital consumer devices because of the user convenience and affordable price. In actuality, it is replacing a lot of conventional types of locks. This report tries to propose a door access and monitoring control system which consist of different stages.

REFERENCES

[1] Faizi A (2008), “Robust Face Detection using Template Matching Algorithm, “University of Toronto, Canada.

[2] Feng P (2004), “Face Recognition based on Elastic Template,” Beijing University of Technology, China, M H Yang, D J Kriegman, and N Ahuja. Detecting faces in images: survey. IEEE Trans. on PAMI, 2002.

[3] Hadid A, Heikkilä M, Ahonen T and Pietikäinen M (2004), “A Novel Approach to Access Control based on Face Recognition”, Machine Vision Group, InfoTech Oulu and Department of Electrical and Information Engineering. University ofOulu, Finland.

[4] Rodriguez Y (2006), Face Detection and Variation Using Local Binary Patterns, Ph.D. Thesis, ~Acole Polytechnique Federale de Lausanne.

[5] Nosaka R, Ohkawa Y and Fukui K (2012), “Feature extraction based on co-occurrence of adjacent local binary patterns,” in Proceedings of the 5th Pacic Rim conference on Advances in Image and Video Technology - Volume Part II, PSIVT2011, pp. 82-91.

[6] Y. Jiang, S. Liu, X. Yang, and L. Liao, "Application of fish face algorithm to face recognition system," in Conference Anthology, IEEE, 2013, pp. 1-4.

[7] I.-K. Hwang and J.-W. Baek, "Wireless access monitoring and control system based on digital door lock," IEEE Transactions on Consumer Electronics, vol. 53, 2007.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

[8] Y. T. Park, P. Sthapit, and J.-Y. Pyun, "Smart digital door lock for the home automation," in TENCON 2009-2009 IEEE Region 10 Conference, 2009, pp. 1-6.