Implementation of Automated Door Accessing System with Face Design and Recognition

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Abstract:
Spendable in daily life. The design and development of a home security system, based on human face recognition technology and remotely monitoring technology, to confirm visitor identity and to control door accessibility has been reported in this paper. This paper describes about the implementation and deployment of wireless control system and accessibility in to a home environment for authenticated people only. A wireless network technique ZigBee based and image processing technique PCA based, dedicatedly make the security system alive as per the request. ZigBee module and electromagnetic door lock module combinedly operate the door accessibility, has been designed and developed. Face detection and recognition algorithms, as well as a wireless interface are used to detect and identify visitors and send an email and/or an alert message about the current home environment status via GSM network automatically to the home owner's mobile phone or any communication devices. The concerned authority can control the system through his/her mobile phone or any communication devices by sending AT Commands to GSM MODEM or by taking necessary actions for authentication through email, which is again password protected. Users can monitor visitors and control the door lock on active Web pages enhanced with JavaScript and HTML. This system finds a wide application in areas where physical presence is not possible all the time. The entire control system is built using ARM1176JZF-S microcontroller and tested for actual use in home environment.

I.INTRODUCTION

Nowadays, automatic personal identification in access control has become popular by using biometrics data instead of using cards, passwords or pattern. Most of the biometrics data have to be collected by using special hardware such as fingerprint scanner, palm print scanner, DNA analyzer. And, the target objects have to touch with the required hardware in the stage of data collection. The advantage of this system is that face recognition does not require to be touched with any hard-ware. Face is detected automatically by using face detection technique and the entire face recognition is completed without touching with any hardware. Face detection is the first step of the face recognition system. The performance of the entire face recognition system is influenced by the reliability of the face detection. By using face detection, it can identify only the facial part of an image regardless of the background of this image. In this system, Viola-Jones face detection method is used. Viola-Jones rescale the detector instead of the input image and run the detector many times through the image each time with a different size.
 Viola-Jones have devised a scale invariant detector that re-quires the same number of calculations whatever the size. This detector is constructed using a so-called integral image and some simple rectangular features reminiscent of Haar wavelets [1]. Face recognition commonly includes feature extraction, feature reduction and recognition or classification.PCA is an effective feature extraction method based on face as a global feature. It reduces the dimension of images effectively and holds the primary information at the same time. In this paper, face recognition system is implemented using PCA algorithm. Recognition or classification is done by the measure method such as Euclidean distance, which is used to classify the feature of images present in the database and test image.

In this system, face detection and recognition are implemented by using MATLAB installed on PC. USB to RS232 converter is used as the interface between the PC and 16F887 microcontroller. Edge sensors are used to switch off the motor if the door reaches one of its two end positions. This switching mainly works with an algorithm which is loaded in microcontroller and on the basis of serial port data which is sent by PC after verifying the face.

Automatic entrance or exit door control is widely used in public places such as grocery stores,

businesses, transportation stations, airports, and wholesale department stores to eliminate the need of manually opening and closing actions. Contemporary sensor-based automatic door control technologies include infrared, ultrasonic/radio, or other wireless sensing methods. The first can be further divided into active and passive approaches. The active process emits infrared signals from the controller and captures the reflected signals to determine if there is any object close to the door. This approach is accurate and capable of identifying the position and the speed of the object but its high cost has made it less popular. The passive approach detects the infrared signals radiated by people and is the most widely used for being simple, effective, and low cost. The ultrasonic/radio approach, on the other hand, emits ultrasonic or radio waves to scan the environment and analyzes the returned signals for door access control.

Although these techniques are all successful in detecting objects, they are not capable of understanding the type and the intention of the objects. For instance, a puppy or a passing pedestrian may accidentally trigger the door and cause a false opening action. Frequent false action is not only annoying, and results in air conditioning energy waste, but also reduces equipment lifetime. This calls for the need of an automatic door control system based on the detection and intention analysis of people.

In this project, door control is based on the confirmation that the detected object is indeed a human and the corresponding movement trajectory also indicates that he/she has the intention to go through the entrance. Furthermore, an infrared function has been added to prevent people from being trapped by the door before they leave the passage. In addition, the captured images can also be saved for other applications such as customer analysis and crime investigation.

2. Block Diagram

The door access control and high security system hereby reported, has a GSM module to transmit the data via the public mobile network. PC has been chosen as the processing units. It packs an Raspberry Pi 60 MHz processor. Algorithm has been fed into it and is connected to the internet to access

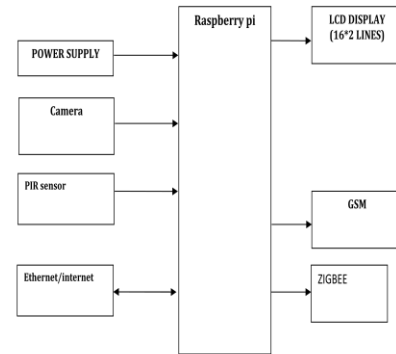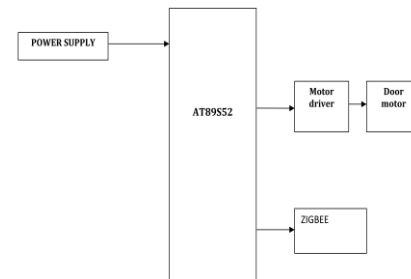nd send email to the consumers.

Fig 1 Block Diagram

Fig .2 Block Diagram

3. System Description

The remote monitoring and controlling of the embedded equipments over the Internet can be mechanized by following certain network architectural design strategies The data transmission of smart camera over the internet can be done by integrating an internet gateway. The virtual home security System is a software. All communication and instructions are checked for security and safety, in the virtual environment, before implementation in the real home environment. The computer unit and the camera are installed in a home. If any visitors arrive, the Raspberry Pi sends an appropriate SMS and/or email including the details to an Internet-based server using user email-id. The server then sends to the home owner the name and photo of visitors for further action. The owner can directly login and interact with the embedded device in real time through webpage without the need to maintain an additional server.

The system monitors continuously, if any visitor arrives then the presence of visitor is detected by the passive infrared sensor. The detected signal

will be given to the ARM microcontroller, then it will give instructions to the computer and from computer to the camera, then the picture is captured. The captured image will be sent back to the computer with internet and it will be directly sent to the owners email which is password protected and also an alert SMS via GSM module to the owners mobile phone. By knowing the visitor, owner can access the door through an sms.

SMS Module

The SIM900A is a GSM/GPRS module which works on various frequencies such as 8S0MHz, 900 MHz, 1800 MHz and 1900 MHz to send SMS. The modem is designed with RS232 level converter circuitry which allows it to be connected to the microcontroller serial interface. It also has TCP/IP stack which enables the microcontroller to connect with internet via GSM. An SMS activation system is implemented to communicate the home owner. The SMS module consists of GSM modem and a control program. The control program, GSM dial up and communication protocol are stored in the embedded gateway and the GSM modem is connected to the Raspberry Pi via serial interface to the switching module. The SMS module acts as an interface between the embedded processor and the GSM network, making the system login to the network and ready to make any data transfer and communication. The module takes the AT command from remote terminal or mobile devices and sends them to switching module via the GSM network.

The experimental setup shown in the Fig. 5.1 is monitoring the environment for visitor entry, the information sends the notification email and/or SMS indicating the update visitor to the authorized users and the user then sent message to control unit for controlling action which is shown from Fig. 5.2 to Fig. 5.5, respectively. The algorithm, read the message and before forwarding to control, will check the existence and safe range of the devices. If the system satisfies safety and security conditions then it will forward the controlling command to perform switching action. For example a message with subject OPEN.
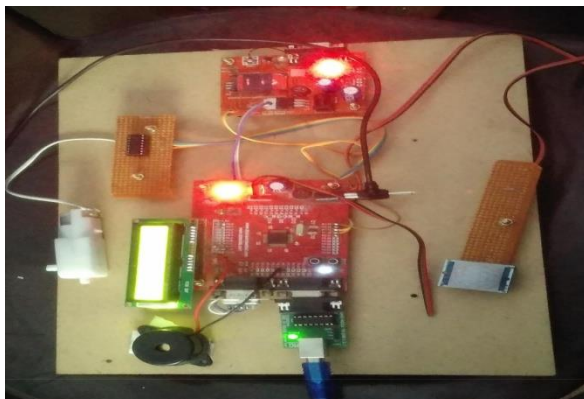
Fig

7.1 Experimental Setup

Fig 3 kit Diagram

Above figure indicates the hardware module of the system. When the PIR sensor detects the visitor it will send the information of its detection to the ARM controller. Then the controller will send an alert SMS to the owners mobile phone via GSM. The image of the visitor to the email id of the owner through pc with internet connection.
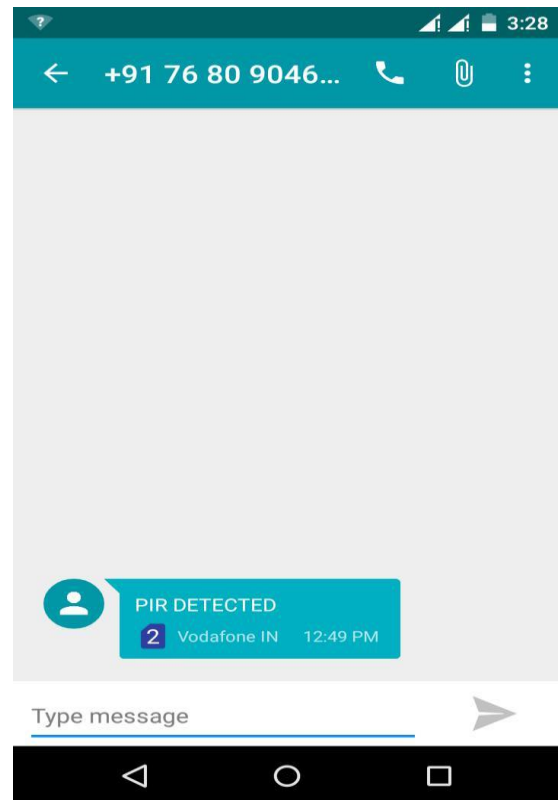

Fig 4   Screenshot of message via GSM to the owner's mobile phone

4 CONCLUSIONS

This project concludes the design and the implementation of an interactive high security system with the GSM and Web enabled measurement and

control systems. The design and development of a high security system, based on human face recognition technology and remotely monitoring technology, to confirm visitor identity and to control door accessibility has given accurate results.The complete system is secured through a login E-mail which is password protected. By this system user can directly interact in real time.The design is completely wireless and integrated with the software to form a low cost, robust and easily operable system. The GSM, E-mail and Web based controlled duplex communication system provides a powerful decision making device concept for adaptation to several scenarios to enhance the security. This system finds a wide application in areas where physical presence is not possible all the time

5 FUTURE SCOPE

The proposed system will further extended to provide the notices from long distance by providing the internet connectivity. Which will allows the system to update notices, any where in the world.

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