Security System for Industrial Gate And Generation of Gate Pass

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Abstract— This paper gives description of face recognition system which automatically identifies and/or verifies the identity of a person from digital images. The basic flow of system is the image is captured by camera. The PCA algorithm detects the face and extracts its features. After the extraction, system compares the captured images with data base images. When the system found the person to be authorized then the system opens the gate automatically. But if the person is unauthorized then the system does not allow to entering in the industrial campus as well as it will generate the gate pass for the person.

Keywords- *Raspberry pi module, Raspbian Os, Open CV, Python.*

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I. INTRODUCTION

In this system we are designing the security system which generates the gate pass by the face recognition. Initially when the person entering in the industrial campus the digital image of the person is captured by the camera and the facial details are extracted. These details are compared with the data base which verifies whether the person is authorized or not. Here the system is connected to the gate which operates the operation of the gate. When the person found to be authorized the system automatically opens the gate, along with this the system keep the record of that person. But if the person found to be unauthorized the system will not open the gate and proceed for the gate pass generation. If the person is authorized the system will allow the person to enter in the campus without any generation of gate pass. But if the person is found to be unauthorized then the system will generate the gate pass for the person. This system can be implemented in the industries, military areas, government sectors etc. where the security is the majority concern.

II. LITURATURE REVIEW

As we are going to implement the Security System with gate pass generation, one has to find the previous system that have been built in past by various researchers to improve the quality and features of our proposed system. Also, we have to take some of the technological review, so that we could not have to face the serious problem in the development of our proposed system.

Paper 1: Raspberry pi based face recognition system for door unlocking.

A Face Recognition System is a system which automatically identifies and/or verifies the identity of a person from digital images or a video frame from a video source. We use OPEN CV library that can be formulated as given images of a scene identify or verify one or more persons in the scene using a stored database of faces. The basic flow of the face recognition system is the image is captured by camera. The PCA algorithm detects the face and extracts its features. After the extraction, system matches the captured images with data base images.

In the decision box the result of the matching is decide which is face match or the no face match. After that SIM300 GSM module sends an security alert to the authorized person which is entry successful or unauthorized person trying to unlock. Tools used are normal and widely applied for current applications and python as the main programming language & Linux based operating system, one can use C, JAVA or Perl also..

The aim of this project is to provide a high security system using face recognition on Raspberry Pi board and send an alert to the authorized person via GSM module, this will increase the security of this project[1].

The main drawback of this system is that this system is restricted only for home automation.

Paper 2: An Efficient Attendance Management System based on Face Recognition using Matlab and Raspberry Pi 2.

An attendance management system is proposed here using Matlab R2014a and Raspberry pi 2 using computer vision toolbox as:

1. Formation of students' database.
2. Capturing of class room video.
3. Frame selection from the video.
4. Face detection by Viola-Jones algorithm
5. Features extraction by LBP and HOG algorithms.
6. Face recognition by comparing with database stored features.
7. Marking of attendance in database.

The drawback in this system is that this system is not efficient in real time implementation.

Paper 3: Human Motion Detection and Tracking for Real-Time Security System

People detection and tracking is one of the important research fields that have gained a lot of attention in the last few years. Although person detection and counting systems are commercially available today, there is a need for further research to address the challenges of real world scenarios. There is lot of surveillance cameras installed around us but there are no means to monitor all of them continuously. It is necessary to develop a computer vision based technologies that automatically process those images in order to detect problematic situations or unusual behavior. Automated video surveillance system addresses real-time observation of people within a busy environment leading to the description of their actions and interactions. It requires detection and tracking of people to ensure security, safety and site management. Object detection is one of the fundamental steps in automated video surveillance. Object detection from the video sequence is mainly performed by background subtraction technique. It is widely used approach for detecting moving objects from static cameras. As the name suggests, background subtraction is the process of separating out the foreground objects from the background in a sequence of video frames. The main aim of the surveillance system here is, to detect and track an object in motion by using single camera. Camera is fixed at the required place background subtraction algorithm is used for segmenting moving object in video. If human entity is detected the tracking lines are formed around human and the object is tracked. According to [5], the system when realizes the human entry, it is processed in a second and the alert is produced for the security purpose. The main aim is to develop a real-time security system.

III. OBJECTIVE

The main objective of proposed system is to provide security to the industrial campus. We introduce the face recognition by capturing the image of person and comparing it with the data base. The authorized person will be allowing by the system to enter in the campus and if the person is found to be unauthorized then it will proceed for the generation of gate pass.

This system is divided in two parts , the face detection system and the generation of the gate pass for the unauthorized person.

IV. PROPOSED SYSTEM

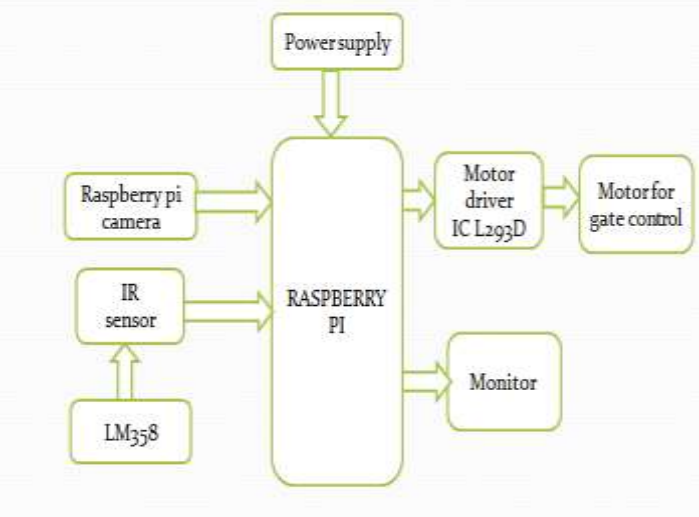


Fig. 1: Block diagram of security system for industrial gate

The above figure shows the block diagram of the security system for industrial gate. The system works as follows:

The proposed system can be operated in two different sections, i.e. one for capturing and creating a data base and the other section is to capture the image and which is used for identifying or comparing the images in the database. Here in the second section we use Eigen faces methodology of face recognition for finding the matches.

Camera module is Pi camera interfacing to the raspberry pi module. It is used for captures an image and send captured image to the Raspberry pi module.

When image taken by the raspberry pi camera it is compared with the available data base. At the first time when we capture the image to create a data base raspberry pi module capture different types of the images to create a data base in the system and this data base is compared with the live captured image. After comparing two images output is positive/negative then it gives commands to motor.

If the person is authorised then the raspberry pi board gives the command to the motor and unlock the door. But if the person is unauthorised then the system proceed for the generation of gate pass through GUI.

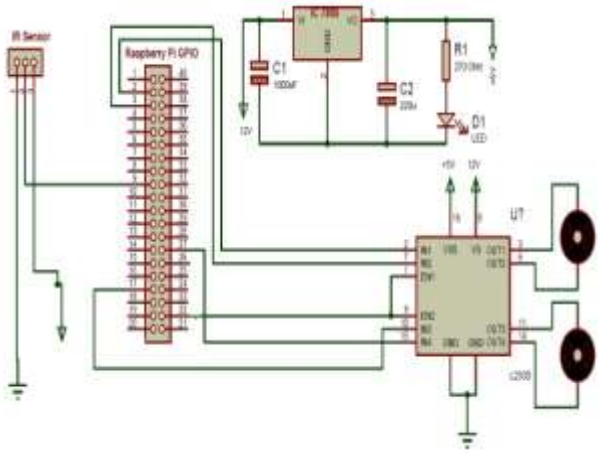


Fig. 2: Circuit diagram of security system for industrial gate

V. HARDWARE DETAILS

1. RASPBERRY Pi :

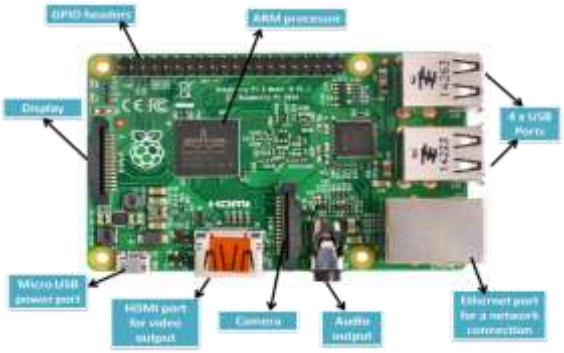
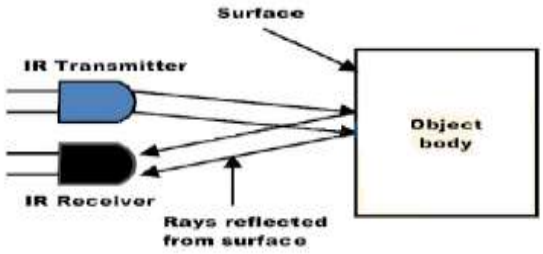


Fig. Raspberry pi board

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It's capable of doing everything you'd expect a desktop computer to do. The Raspberry Pi has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras.

The system includes raspberry pi 2 model B module with raspberry pi camera module for capturing the classroom image/ video. Raspberry pi 2B is a credit card sized minicomputer. It has 900 MHz quad-core ARM Cortex-A7 CPU, ram of 1 GB, 4 USB ports out of which one port is connected for Wi-Fi connector, 40 GPIO pins for interfacing external devices, CSI (camera serial interface) port for camera connection. Raspberry pi have its own camera which is light in weight and small in size. It has a still resolution of 5 MP. It can operate in both image capturing and video mode with the resolution of 1080p30, 720p60, 640p480. The properties of camera such as region of interest, frame rate, mode of operation etc. can be changed in Matlab when setting up connection.

2. IR SENSOR:



An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. These types of radiations are invisible to our eyes that can be detected by an infrared sensor.

The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode. The resistances and these output voltages, change in proportion to the magnitude of the IR light received.

3. Raspberry-pi camera:

A raspberry-pi camera is a video camera that feeds or streams its image in real time to or through a computer to 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 email as an attachment. When sent to a remote location, the video stream

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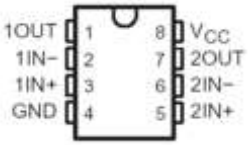
may be saved, viewed or on sent there. Unlike an IP camera (which connects using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops.

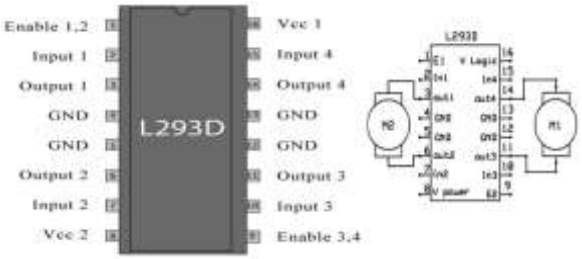
4. IC LM358 :



The LM358 is a low power dual operational amplifier integrated circuit. The LM358 is designed for general use as amplifiers, high-pass filters and low, band pass filters and analog adders.

The LM358 consists of two independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages.

5. MOTOR DRIVER L293D IC



L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher current signal. This higher current signal is used to drive the motors.

VI. SOFTWARE DETAILS

1. 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.

2. Embedded Linux:

Linux OS running in embedded system is known as Embedded Linux. Linux OS occupy only up to 100KB space in memory. Now days most ES based on 32 bit processor like ARM, PowerPC, Cold Fire etc. have sufficient amount of flash and RAM memory.

3. Open CV:

Open CV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. Open CV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD-licensed product, Open CV makes it easy for businesses to utilize and modify the code.

4. Python:

Python is an interpreter, interactive, object oriented programming language. It is often compared to Tcl, Perl, Scheme or Java. It is a scripting language like php or asp for developing applications Python is an interpreter, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding; make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

VII. RESULT

Image captured

Detected face

VIII. ADVANTAGES

1. It provides security and authentication.
2. Less costly and much efficient.
3. Smaller system.
4. Gives transparent way of security.

IX. APPLICATIONS

1. This system can be use where the security of campus is required.
2. This system can be use at research centers, industries and other high security areas such as Military sectors, Government sectors, etc.
3. This system can be use where unauthorized person is not allowed.

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