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ADVANCED FACE RECOGNITION BASED DOOR LOCKING SYSTEM USING RASPBERRY PI AND EMBEDDED LINUX

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ABSTRACT

Home security and automation have become increasingly more prominent functions on mobile gadgets. The purpose of this paper is to layout and implement less expensive, flexible and fast tracking home safety gadget the use of Raspberry pi with GSM technology. The gadget is designed to hit upon burglary, The photo of person is captured by using Logitech camera and sends to mobile and e-mail in addition to alarm gets on; Also the user can spark off all the alarm device even as going outdoor through the cellular. The messenger has the feasibility of activating and deactivating the alarm device with the additional manipulate for a few home equipment switching using relays. For controlling, raspberry pi module, GSM. it's far simplest applicable for magnetic door lock device.

Keyword:ARM11 Raspberry pi 3 model B, Ardunio, GSM, Logitech Camera, SD card, DC Motor, Motor Drive, Open CV, Embedded, Home Security and appliances.

I.INTRODUCTION

In today's world of connectivity and smart devices there may be an urgent need to adjust our present everyday items and make them smart, additionally it isn't the era where we will blindly consider the old and traditional security features, especially speaking is our door locks. To change and modernize any object we need to take away its existing drawbacks and upload more functionality. Domestic safety is the needed for the development of society as a whole, which in flip will help make our cities clever, so the idea of facial reputation to gain access of the house is a concept that is used to make our location of residing more relaxed. A facial recognition device is a device which captures facial photographs and verifies the identification of a person the usage of a virtual Logitech camera.

Human beings are recognized through their particular facial traits. Within the face recognition method, a given face is in comparison with the faces stored inside the database with a purpose to discover the person. The cause is to discover a face in the database, which has the highest similarity with the given face. Within the area of biometrics, facial reputation generation is one of the quickest developing fields. an in depth examine of OpenCV platform and its inbuilt libraries has been conducted to generate a code, which does accurate and reliable.

Facial recognition with new and efficient use of hardware. Face detection is extra challenging because of some risky traits, as an instance, glasses and beard will impact the detecting effectiveness. Moreover, one-of-a-kind types and angles of lights will make detecting face generate choppy brightness at the face, which will have an influence at the detection system.

II.RELATED WORK

The Python primarily based technology produces a comfortable answer. But the machine requires an intrusive and luxurious stressed installation and use of excessive cease personal computers [1]. in advance gadget become depending on smart phone line using cell phone based totally far flung controller [2]. The remote controlling and tracking of a residence the use of internet calls for a pc or a pc that's large in size and heavy to carry around all day lengthy. So an change may be cellular phones with running gadget on it for faraway controlling and monitoring of a residence

.The machine uses the wi-fi era for conversation among the gadgets. The embedded Bluetooth technology, they form a network wherein home equipment can talk with every different. There are

certain issues concerned inside the design of a domestic automation device. The machine ought to be scalable, in order that new device can effortlessly be included into it [3][4].There are two divisions of protection system; business and home security gadget. Seeing that business safety gadget normally wanted an excessive amount of value to satisfy the expenditure of ordinary own family, so as to price down the expenditure DIY home protection system developed and interfaced with Bluetooth modules [5].

The design of the face popularity gadget the usage of Raspberry pi can make the device smaller, lighter and with decrease electricity consumption, so it's far extra convenient than the computer-based totally face recognition machine. Due to the open source code, it is unfastened to do software improvement on Linux platform. We use Haar cascade algorithm for the face popularity and detection process. Additionally send a security alert message to the authorized man or woman. A face detection system the use of Raspberry Pi became designed. The machine became programmed using Python programming language. both actual time face detection and face detection from unique pix, i.e. object recognition, changed into Improvement scheme is cheap, fast, and noticeably reliable and Raspberry pi takes much less energy and presents enough flexibility to in shape the requirement of different human beings.

III.SYSTEM ARCHITECTURE

A. SYSTEM OVERVIEW

The systems will paintings in two unique components. The first part is for shooting and developing a database by storing the image. And the second one is to evaluate the picture with the saved photos in the database. For feature extraction, we will use Eigen faces method and Euclidian distances will use for popularity of the face. There are a few one-of-a-kind functions that are to be had in GSM verbal exchange which is relaxed for the proposed device like low price, small length, consumer pleasant interface, emergency alarm generated, very brief response time and foremost characteristic is that extensive area insurance. So the user can engage with the device even from a totally far off place far from city regions.

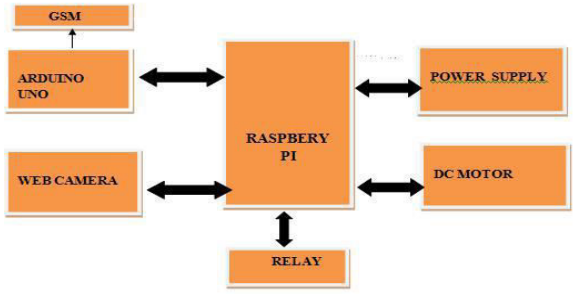

Fig.1 Block diagram of proposed system.

Overall block diagram of the proposed system as shown in Fig.1 The paper 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 our paper.

Within the first step of machine operation, Logitech camera starts off evolved to capture the photo within its insurance and come across the face from the capture photo with the aid of the device. With in parallel technique, fake-picture detector designed by integrating with Logitech camera has checked the detected face that allows you to perceive actual-face or from secondary photograph supply. If the detected face changed into actual image then gadget begins to categorize the consumer as authorized or unauthorized by the usage of Face-recognition approach. For legal consumer system permit to enter in the building while unauthorized user need to wait the decision of legal person's. When the device identified the face as unauthorized consumers face then the system brought the notification alert to the management. After getting the alert, administration consumer checked the stay face and makes a decision the permission choice for the intruder.

The carried out gadget can be greater ,if a blacklisted man or woman attempts to open the door, the gadget will send a message to the admin the usage of GSM module concerning the same and smart things well suited alarm machine also can be used, which notifies intrusion by a loud alarm.

B RASPBERRY PI

Raspberry pi 3 module is a small computer board. Whilst a photo is taken by means of raspberry pi it's far compared with database photo. For the first time when we capture a photo to create a database, the raspberry pi module captures many pictures to create a database inside the machine and this database is compared with the live captured images. After evaluating the 2 picks, based on whether or not the output is effective or poor it offers instructions to the GSM module. We've got raspberry pi which act as a chief controller of our system and small in size, is an open source and its bendy platform for experimentation. When you consider that it's far an open source, changes can be made to it as and when required. The raspberry pi runs on raspbian OS and is software the usage of python 2.7.6, you may set up various specific type of software's for one-of-a-kind purposes. We've used version B of raspberry pi which uses system on chip (Soc) BCM2835. It comes with 512 MB of RAM memory and does not have garage drive however makes use of SD card for booting and long term process, external garage gadgets can be delivered through the USB port, which incorporates an ARM11microcontroller having clock frequency of seven-hundred MHz fig. 2 shows the raspberry pi model B board. It's also connected to a Logitech digital camera that's used as a secret agent camera. First initialize the instructions for the Logitech camera. As soon as tested within the command line the following code will seize a photo and shop it correctly. The sensors which have a digital output are directly linked to the board leaving them to offer the vital data with none postpone. All sensors are directly linked to the raspberry pi.

Fig.2 Raspberry pi model B board

Fig.3 GSM modem board

C. GSM COMMUNICATION

The worldwide gadget for cellular communiqué is used to alert the consumer through sending and receiving the messages, which is managed through AT command. Fig. three suggests the GSM modem board. The size is small and reliable wireless module. It communicates with raspberry pi the use of RS232 serial interface. Twin frequency band operates on 900 MHz – 1800MHz. the security mechanism of GSM is applied in three one of a kind elements. The SIM, GSM handset and GSM community The SIM (Subscriber identification Module) includes the IMSI and The individual subscriber authentication key, the ciphering key generating algorithm, the authentication set of rules, as well as a PIN. The GSM handset carries the Ciphering algorithm. The GSM network contains encryption set of rules. In order for the authentication and protection mechanism to function, all 3 factors are required for the system. Additionally system controls the magnetic door lock the use of GSM through sending message to the raspberry pi. it's far very in all likelihood that GSM will stay the most effective conversation network generation to be followed by way of every and each us of a of the sector.

D. PROGRAM FLOWCHART

If the cost of the sensors exceeds the threshold cost then the alarm message may be ship by using the Raspberry pi thru GSM.

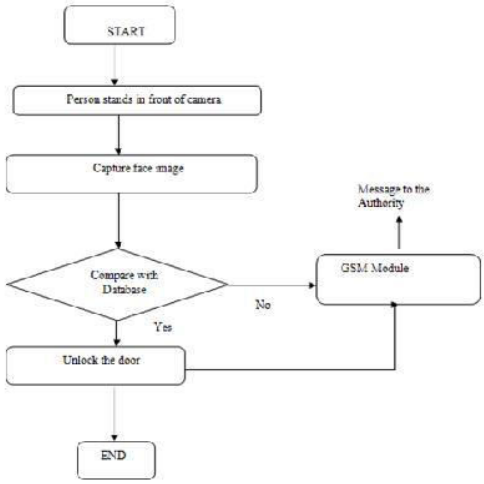

Fig.4 Program flowchart

First initialized camera, Raspberry pi, sensors and GSM after initializing gadget exams the sensor price, if the value is more than the threshold then system will send message and mail to the consumer after that system anticipate the person command the use of message. In order said in advance consumer can also turn on or off unique sensor or home equipment in the domestic.

E. LOGITECH CAMERA

The Logitech camera module used on this device that's directly plugs into the USB port of the Raspberry pi. It far a plug and performs set up which is simple to apply. You may without difficulty make video name son main IMs. It has a 5MP digital camera with excessive decision .It has built-in mikes with the proper sounds gives you a clear communication with none noise. The XVGA video recording device has area chef approximately 1024x768 decisions. In this undertaking, we are using a Logitech camera that's capturing the photograph and gesture control characteristic.

Fig.5 Logitech Camera

IV EXPERIMENTAL SETUPS AND RESULT A. TESTING

Testing is finding out how well something works. In terms of human beings, checking out tells what degree of understanding or ability has been obtained. In pc hardware and software development, trying out is used at key checkpoints inside the general manner to determine whether targets are being met. As an example, in software improvement, product goals are occasionally examined through product person representatives. When the layout is complete, coding follows and the finished code is then examined on the unit or module level by each programmer, at the thing level by way of the organization of programmers involved and on the machine stage whilst all components are combined together. All components are combined together. There are two types of testing and few of them are listed below.

1. Unit Testing

Unit trying out is a level of software program trying out where person gadgets/ components of software are examined. The reason is to validate that every unit of the software performs as designed. A unit is the smallest testable part of any software. It commonly has one or a few inputs and generally a single output. In procedural programming, a unit may be a character software, feature, method, and so forth. In object-orientated programming, the smallest unit is a way, which may additionally belong to a base/ excellent elegance, abstract magnificence or derived/ baby class. The principle device we've got used is Raspberry pi that's used to construct and run the respective features. We are using Raspberry pi because of the compatibility to the ARM processor. The underneath photograph is the testing of the components with Raspberry pi.

Fig.6 Testing the connections with Raspberry pi

2. Integration Testing

An integration check checks how one of a kind additives or subsystems engage with each different. Like a unit takes a look at, it commonly checks for a selected reaction to a particular enter. Integration testing takes as its input modules that have been unit tested, organizations them in large aggregates, applies exams described in an integration test plan to those aggregates, and gives you as its output the included device ready for device checking out. Within the challenge we're integrating camera,

headphones and SDcard with strength deliver. Some of the USB ports are used if necessary.

Fig. 7 Integration of components with Respberry Pi

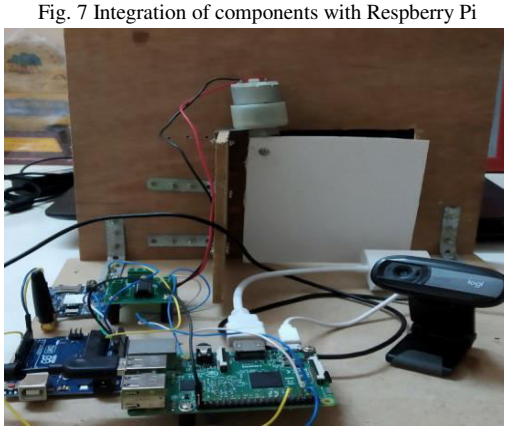

Fig.8 Experimental setup of the system

Fig.8 indicates the overall experimental setup of the device. The hardware additives i.e. Raspberry pi module, Magnetic door lock, Logitech camera, buzzer, GSM The facts is amassed through the photo is immediately ship to the user through SMS and email. The saved photograph is then forwarded thru electronic mail to the user.

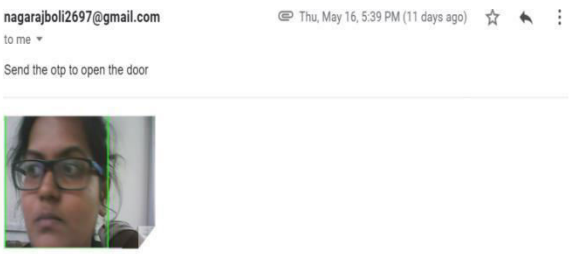

Fig.9 Result display on mobile through Email

Fig.9 suggests the result on cell via e-mail. The above snapshots was taken when there has been a breach within the door, so user can easily perceive in which precisely there is a breach in safety. Messages, notifications, recipient email identity etc. were entered into gadget through python scripts. The Raspberry pi is programmed to function as an alarm device in which it detects intrusion at access factors in conjunction with motion in the domestic and in which electronic mail signals may be dispatched with snap shots to permit real time monitoring of the home. Raspberry pi features consist of wireless wireless technologies and this is the shortcut to display photographs directly on e mail.

V.CONCLUSION

The design of the face popularity machine the use of Raspberry pi could make the system smaller, lighter and with decrease energy consumption, so it is more convenient than the computer-based totally face recognition gadget. Due to the open supply code, it's miles loose to do software program development on Linux platform. We use Haar cascade set of rules for the face recognition and detection manner. Also ship a protection alert message to the legal individual. A face detection gadget the usage of Raspberry Pi turned into designed. The machine turned into programmed the usage of Python programming language. Both actual time face detection and face detection from unique photographs, i.e. object popularity, turned into completed. The performance of the system turned into examined in terms of face recognition rate. This development scheme is cheap, fast, and surprisingly reliable and Raspberry pi takes less power and gives enough flexibility to fit the requirement of various humans.

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