Automatic Theft Detection System under Video Surveillance

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Abstract - *An embedded system is so important in today's automation .Security system is most important and needed in all kind of places to avoid any misbehaves. Here introducing a new method using fingerprint authentication in the home, bank and all other places with low cost, low power and also avoid memory usage. This was with the combination of GSM SIM 800A,Pyro electric infrared sensor(PIR),Fingerprint sensor and Arduino microcontroller. In this method PIR is placed in the top of the ceiling of the locker. The main goal of our project is to avoid storage space of camera and very less power consumption. This system consists of smart invisible door lock system to stop the thief inside the room and chloroform sprayer is used to spray chloroform in the room.*

Key Words: Arduino Microcontroller, Matlab, Camera, PIR, Fingerprint sensor, chloroform, GSM, Embedded C..

1. INTRODUCTION

Surveillance is mainly done for anti-thief and stopping crime activities. For this surveillance embedded system and automation system is majorly implemented. In embedded any of the controller or processor are used to program the chip like PIC16F877,ATMEGA328,ARM7TDM15

In our project we provide security system using Arduino UNO microcontroller PIR and actuators chloroform and avoid CCTV camera storage device to provide with low cost and low power conception GSM.In this project we use GSM SIM800A module for data transmission to the authorized person about the thief entered in the house. This is very cheapest method when compared to older method. The chloroform is used make the thief unconscious for several minutes.

2. RESEARCH DESCRIPTION

2.1 POWER SUPPLY UNIT:

Power provide could be a relevancy a supply of electric power. a tool or system that provides electrical or alternative kinds of energy to associate output load or cluster of hundreds is termed an influence provide unit or

PSU. The term is most ordinarily applied to electricity provides, less usually to mechanical ones, and infrequently to others.

2.2 Voltage Regulator(IC 7805):

7805 is a 3 terminal linear voltage regulator IC with a hard and fast output voltage of 5V that is beneficial in a huge variety of applications. Currently, the 7805 Voltage Regulator IC is synthetic via way of means of Texas Instruments, ON Semiconductor, STMicroelectronics, Diodes incorporated, Infineon Technologies, etc.

2.3 Motor Drives:

Motor drives are circuits used to run a motor. In different words, they're normally used for motor interfacing. These pressure circuits may be without problems interfaced with the motor and their choice relies upon the form of motor getting used and their ratings (current,voltage).

2.4 PASSIVE INFRA-RED SENSOR:

A Passive Infrared sensor (PIR sensor) is an digital tool that measures infrared (IR) mild radiating from gadgets in its subject of view. PIR sensors are regularly used with inside the creation of PIR-primarily based totally movement detectors. Apparent movement is detected whilst an infrared supply with one temperature, inclusive of a human, passes in the front of an infrared supply with some other temperature, inclusive of a wall.

2.5 ARDUINO:

An Arduino is absolutely a microcontroller primarily based totally package which may be both used at once through

buying from the seller or may be made at domestic the use of the components, due to its open supply hardware feature. It is largely utilized in communications and in controlling or working many devices. It became based through Massimo Banzi and David Cuartielles in 2005.

The Arduino Uno is a microcontroller board primarily based totally at the ATmega328. It has 14 virtual input/output pins (of which 6 may be used as PWM outputs), 6 analog inputs, a sixteen MHz crystal oscillator, a USB connection, a energy jack, an ICSP header, and a reset button.

2.6 GSM :

GSM is a cellular conversation modem; it's miles stands for international device for cellular conversation (GSM). The concept of GSM become advanced at Bell Laboratories in 1970. It is extensively used cellular conversation device with inside the world. GSM is an open and virtual cell era used for transmitting cellular voice and statistics offerings operates on the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

2.7 Mobile Phone:

The world mobiles are no longer for sending a text or making a call. From budget to state of the art smartphones indigenous names to global big wigs-a whole universe of mobiles await you on flipkart. Whether your looking for water drop notch screens, a high screen to body ratio, AI-powered sensational cameras, high storage capacity, blazing quick processing engines or reflective glass designs, rest assyred you won't have to venture anywhere else for your smartphone needs.

2.8 EMBEDDED C:

Embedded C is a hard and fast of language extensions for the C Programming language with the aid of using the C Standards committee to deal with commonality problems that exist among C extensions for exceptional embedded systems. Historically, embedded C programming calls for nonstandard extensions to the C language so as to assist exclusive capabilities consisting of fixed-factor arithmetic, more than one wonderful reminiscence banks, and simple I/O operations. In 2008, the C Standards Committee prolonged the C language to deal with those problems with the aid of using presenting a not unusualplace trendy for all implementations to stick to. It consists of some of capabilities now no longer to be had in ordinary C, consisting of, fixed-factor arithmetic, named deal with spaces, and simple I/O hardware addressing. Embedded C makes use of maximum of the syntax and semantics of trendy C, e.g., main() function, variable definition, datatype declaration, conditional statements (if, switch, case), loops (while, for), functions, arrays and strings, systems and union, bit operations, macros, etc.A Technical Report became posted in 2004 and a 2nd revision in 2006..

2.9 ARDUINO SOFTWARE (IDE):

The Arduino Integrated Development Environment or Arduino Software (IDE) carries a textual content editor for writing code, a message area, a textual content console, a toolbar with buttons for not unusual place capabilities and a chain of menus. It connects to the Arduino and Genuino hardware to add packages and talk with them.

3. METHODOLOGY

The proposed access monitoring and control mechanism at home is implemented using Raspberry Pi 3 which has 4× ARM Cortex-A53 processor operating at 1.2GHz, Broadcom Video [9] Core IV graphics processor, 1GB LPDDR2 (900 MHz) built in R AM, one 10/100 Mbps Ethernet port, 2.4GHz 802.11n built in wireless adapter and a 32GB class 10 micro Secure Digital (SD) Card as the hard disk storage[1]. The Pi works on a Raspbian Operating System (OS) optimized for Raspberry Pi. The OS is burned on to the SD card from a laptop which is then inserted into the Pi. The algorithms are implemented using Java as the programming platform and MySQL as the database. Java 7 JDK (Java Development Kit) and MySQL are installed in the Raspberry Pi from Debian repositories using the APT (Advanced Packaging Tool) commands with root user permissions.
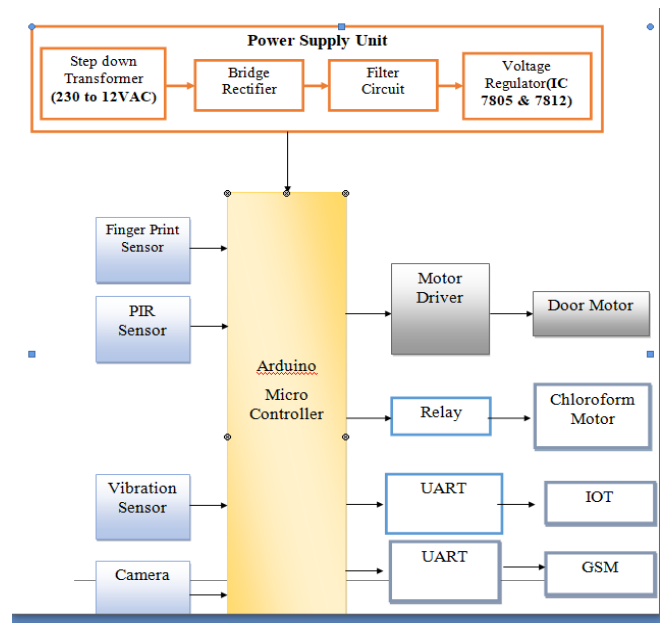

Fig : Architecture of project

The power to each of the Arduino Uno boards is routed through a power bank. The power banks needs to provide a 9V–1000mA DC output to the Arduino boards. Any

reliable power bank which has 5000mAh or higher capacity with 5V– 1000mA USB power output would be enough to provide the power backup [2]. The 5V output power from the power bank is boosted to 9V when connected to the Arduino board through a USB to 2.1mm DC 9V Booster Cable. The power bank is plugged into the apartments 230V–50Hz AC power supply through a 5V–1000mA AC to DC adapter. Even when the power to the apartment is cutoff the Arduino Uno boards and the sensors are still active and will be able to identify intrusion attempts by drawing power from the power bank. Compared to AA or AAA batteries power banks offers reliable and durable power supply over time without replacement. Moreover, power banks are relatively cheap, readily available and can supply power to the Arduino boards and sensors for a week without recharging.

All the ZigBee communication is implemented using ZigBee Series 1 module. ZigBee module at the Pi is configured as the ZigBee Coordinator (ZC) while the modules attached to the microcontrollers is configured as the ZigBee End Device (ZED)[3]. The data rate of all the ZigBee modules are set at 9600 bits per second (bps).

All the ZigBee modules implemented uses AES encryption, to enhance security, the coordinator is configured not to allow unsecured joins to the network, so under no circumstances the encryption key is sent as plain text over the air. Each ZigBee module is programmed using a free XCTU software utility which allows communication with Digi RF modules.

MQ 9 sensor uses a supply voltage of 5V and a load resistance of 10 kΩ, it can measure carbon monoxide concentration from 200 ppm to 1000 ppm along with LPG and methane gase[4]. MQ 9 sensor can work under temperatures from -20oC to 50oC, relative humidity of 95% and oxygen concentration ranging from 2% to 21%. As the concentration of carbon monoxide gas increases the measured voltage also goes up.

The ratio of air resistance Rs to Ro gives the concentration of measured gasses. Air resistance Rs, can be calculated using the equation:

Where Vcc is the supply voltage and V is the voltage measures across the sensor. From the MQ 9 sensor data sheet it is clear that the ratio of Rs to Ro in clean air is 9.9, so the value of Ro is obtained from the Rs value calculated by putting the sensor in clean air, using the equation: The sensor was left in clean air for 24 hours to be stabilized before Ro value is calculated; the calculated Ro value is 2.05. The sensor board is then moved and installed to its working area. The calculated Ro value is used to calculate the Rs to Ro ratio during its operation.

The force sensor is connected to the board using a 10 kΩ resistance and uses a 5V supply voltage. Force sensor is made of Polymer Thick Film (PTF) which decrease in resistance when pressure is applied to the surface of the sensor. In the experiment, bed occupancy is determined by measuring the voltage across the resistance. Force Sensor Resistance (FSR) is calculated using the equation: ( ) Where

Vcc is the supply voltage, V is the voltage measures across the sensor and R is the connected resistance. Using FSR, conductance and the applied force is calculated. The motion sensor is deployed 2.5 ft. from the front door and proximity sensor at 3 ft. from the front door so they will only sense activities inside the home.

The verification of the user is done using a laptop connected to the Pi using a wireless modem. The Pi is accessed from the laptop by means of Secure Shell (SSH) via a username and password. The user enters an eight character password to verify his identity[5]. Once the alarm is triggered it can be killed using a 12 character password.

The door observation time for the main access door is set as 15 seconds, identity verification timer is set as 90 seconds and the time for the user to get back into the home after stepping out leaving the main door open before changing home state (home state change timer) is set as 120 seconds

4. Model Evaluation Criteria

This system is based on Embedded and Networking based Technology. In our proposed system, When the switch is On and The PIR sensor that detect the thief when steels the home locker .The output of the PIR sensor is send into the Arduino microcontroller when thief's detected. If the owner forgot to get key then he can open using fingerprint authentication [8].If door opened when fingerprint unauthorized then the invisible door locked and actuator rotate in Forward for 5 seconds that time chloroform is pressed and again it rotate in the Reverse directions.GSM SIM 800A module which is the transceivers that sends the data of "Thief entered into the home" from the Arduino microcontroller and the mobile act as the receiver. After a one minute Exhaust fan get activated to exhaust the chloroform in the home

5. OUTPUT

6. CONCLUSION

The project has designed as a smart surveillance system capable of capturing video, images, recording it and transmitting to a mobile phone. It will provide safer environment for the owner to avoid being lost. It is encrypted and authenticated on the receiver side, so that it will offer only the owner so that he could view the details. Necessary action could be taken within some part of time in the case of any burglary activities takes place. In Future a copy will be sent to owner and to police station simultaneously and implementation of automatic iron gate lock will be imposed where the escape of the burglar will be stopped when he wears mask to avoid the chloroform gas.

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