FACE DETECTION BASED THEFT ALARM BY USING MATLAB

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Abstract: The Idea of Designing and Implementation of Security Based ATM theft paper is born with the observation in our real life incidents happening around us. This paper deals with prevention of ATM theft from robbary. So overcome the drawback found in existing technology in our society. When ever robbery occurs, This system uses Arduino controller based embedded system to process real time data collected using the vibration sensor. Once the vibration is sensed the beep sound will occur from the buzzer. Camera is always in processing if suppose mask face detection .The SVM classification technique is used in MATLAB to find and send through arduino kit . RTC used to capture the robber occur time and send the robbery occur time with the message to the nearby police station and corresponding bank through the GSM. Hear LCD display board using showing the output of the message continuously. This will prevent the robbery and the person involving in robbery can be easily caught. Here MATLAB and arduino tools are used to implement the idea and results are obtained.

Keywords: Face detection, Arduino, 3G technology

INTRODUCTION

BIG DATA:

Big data is an all-encompassing term for any collection of data sets so large and complex that it becomes difficult to process them using traditional data processing applications. The challenges include analysis, capture, curation, search, sharing, storage, transfer, visualization, and privacy violations. The trend to larger data sets is due to the additional information derivable from analysis of a single large set of related data, as compared to separate smaller sets with the same total amount of data, allowing correlations to be found to "spot business trends, prevent diseases, combat crime and so on."

Scientists regularly encounter limitations due to large data sets in many areas, including meteorology, genomics, connectomics, complex physics simulations, and biological and environmental research. The limitations also affect Internet search, finance and business informatics. Data sets grow in size in part because they are increasingly being gathered by ubiquitous information-sensing mobile devices, aerial sensory technologies (remote sensing), software logs, cameras, microphones, radio-frequency identification (RFID) readers, and wireless sensor networks. The world's technological per-capita capacity to store information has roughly doubled every 40 months since the 1980s; as of 2012, every day 2.5exabytes (2.5×10^{18}) of data were created. The challenge for large enterprises is determining who should own big data initiatives that straddle the entire organization.

Big data is difficult to work with using most relational database management systems and desktop statistics and visualization packages, requiring instead "massively parallel software running on tens, hundreds, or even thousands of servers". What is considered "big data" varies depending on the capabilities of the organization managing the set, and on the capabilities of the applications that are traditionally used to process and analyze the data set in its domain. Big Data is a moving target; what is considered to be "Big" today

will not be so years ahead. "For some organizations, facing hundreds of gigabytes of data for the first time may trigger a need to reconsider data management options. For others, it may take tens or hundreds of terabytes before data size becomes a significant consideration."

Big data usually includes data sets with sizes beyond the ability of commonly used software tools to capture, curate, manage, and process data within a tolerable elapsed time. Big data "size" is a constantly moving target, as of 2012 ranging from a few dozen terabytes to many peta bytes of data. Big data is a set of techniques and technologies that require new forms of integration to uncover large hidden values from large datasets that are diverse, complex, and of a massive scale.

In a 2001 research report and related lectures, META Group (now Gartner) analyst Doug Laney defined data growth challenges and opportunities as being three-dimensional, i.e. increasing volume (amount of data), velocity (speed of data in and out), and variety (range of data types and sources). Gartner, and now much of the industry, continue to use this "3Vs" model for describing big data. In 2012,Gartner updated its definition as follows: "Big data is high volume, high velocity, and/or high variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization." Additionally, a new V "Veracity" is added by some organizations to describe it.

If Gartner's definition (the 3Vs) is still widely used, the growing maturity of the concept fosters a more sound difference between big data and Business Intelligence, regarding data and their use:

- Business Intelligence uses descriptive statistics with data with high information density to measure things, detect trends etc.;
- Big data uses inductive statistics and concepts from nonlinear system identification to infer laws (regressions, nonlinear relationships, and causal effects) from large sets of data with low information density to reveal relationships, dependencies and perform predictions of outcomes and behaviors.

Big data can also be defined as "Big data is a large volume unstructured data which cannot be handled by standard database management systems like DBMS, RDBMS or ORDBMS".

Big data can be described by the following characteristics:

Volume – The quantity of data that is generated is very important in this context. It is the size of the data which determines the value and potential of the data under consideration and whether it can actually be considered as Big Data or not. The name 'Big Data' itself contains a term which is related to size and hence the characteristic.

Variety - The next aspect of Big Data is its variety. This means that the category to which Big Data belongs to is also a very essential fact that needs to be known by the data analysts. This helps the people, who are closely analyzing the data and are associated with it, to effectively use the data to their advantage and thus upholding the importance of the Big Data.

Velocity - The term 'velocity' in the context refers to the speed of generation of data or how fast the data is generated and processed to meet the demands and the challenges which lie ahead in the path of growth and development.

Variability - This is a factor which can be a problem for those who analyze the data. This refers to the inconsistency which can be shown by the data at times, thus hampering the process of being able to handle and manage the data effectively.

Veracity - The quality of the data being captured can vary greatly. Accuracy of analysis depends on the veracity of the source data.

Complexity - Data management can become a very complex process, especially when large volumes of data come from multiple sources. These data need to be linked, connected and correlated in order to be able to grasp the information that is supposed to be conveyed by these data. This situation, is therefore, termed as the 'complexity' of Big Data.

Big data analytics enables organizations to analyze a mix of structured, semi-structured and unstructured data in search of valuable business

information and insights.

EXISTING SYSTEM

In the existing system, the surveillance cameras are used many other places. It is used to monitor the user activities. But it continuously monitors the activity of the user and where the cameras are fixed. So it utilizes the power and large storage capacity (Hard disk) for store the video footage. It is only store the activities for detect the unwanted activity such that theft, but it is not intimate immediately to the admin or organization. So it is not effective.

PROPOSED SYSTEM

In the proposed system, to implement the system to overcome this problem. It is used to only monitor the user activity and store when the mask face detection is performed the user. So it reduces the storage device. In this system first set the time for each activity in the ATM. When the user enters and the camera detects the user, then it starts the time of the particular event. This paper deals with prevention of ATM theft from robbary.so overcome the drawback found in existing technology in our society. When ever robbery occurs, This system uses Arduino controller based embedded system to process real time data collected using the vibration sensor. Once the vibration is sensed the beep sound will occur from the buzzer. Camera is always in processing if suppose mask face detection .The SVM classification technique is used in MATLAB to find and send through arduino kit . RTC used to capture the robber occur time and send the robbery occur time with the message to the nearby police station and corresponding bank through the GSM. Hear LCD display board using showing the output of the message continuously. This will prevent the robbery and the person involving in robbery can be easily caught.

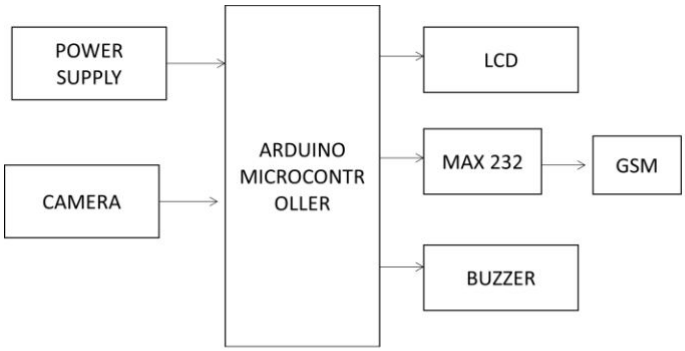
BLOCK DIAGRAM

The below mentioned components are present in the block diagram.

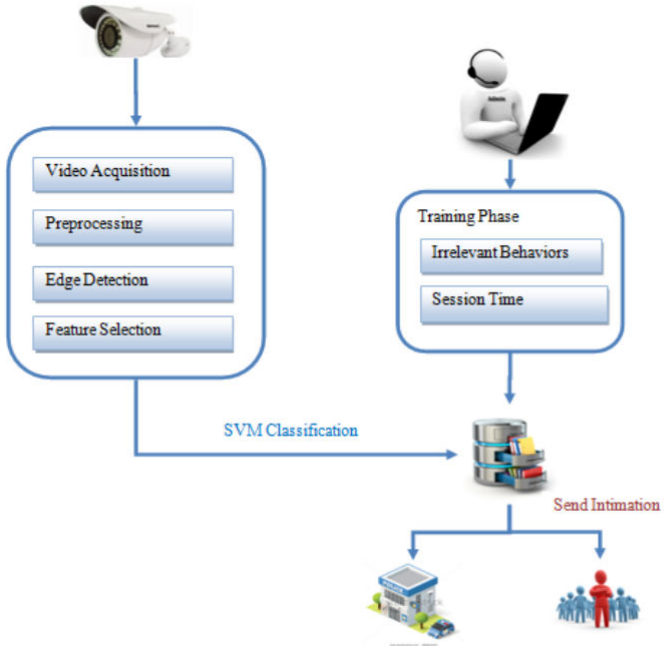
Arduino

GSM

LCD



Architecture Diagram



Modules

- Video Acquisition
- Preprocessing
- Edge Detection
- Classification
- Send Intimation
- Evaluation Criteria

Video Acquisition

video acquisition is a “quick and dirty” way of localizing moving objects in a video shot by a static camera. In this perspective, object detection is often the first step of a multi-stage computer vision system (car tracking, person recognition, wild-life monitoring, etc.). In this paper we can upload the videos. The user uploads the video. The Video can

be obtained for lesions of any size, shape, and composition in an acceptable amount of time and then filtration the Video to remove the noise and segment the video based on similarities. In this module, we can convert the videos into frames. Using video file reader we separate the whole videos into frames in specific size. Each frame is known as realistic moving images based on standard size using video File reader.

Preprocessing

The aim of pre-processing is an improvement of the image data that suppresses unwanted distortions or enhances some image features important for further processing The frames are converting the RGB color to grayscale conversion for noise removal.

Edge Detection

The Canny edge detector is an edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images. Canny edge detection is a technique to extract useful structural information from different vision objects and dramatically reduce the amount of data to be processed. It has been widely applied in various computer vision systems. Canny has found that the requirements for the application of edge detection on diverse vision systems are relatively similar. Thus, an edge detection solution to address these requirements can be implemented in a wide range of situations.

Classification

In this module, is used to classify the abnormal behavior in ATM. To implement the SVM classification for detect the abnormal behaviors. it take the input from the previous step edge detection output. The edges are converted to the feature vectors, and its matching to the training dataset. The SVM algorithm Perform the classification in parallel manner. In machine learning, support vector machines are supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis. Given a set of training examples, each marked as belonging to one or the other of two categories, an SVM training algorithm builds a model that assigns new examples to one category or the other, making it a non-probabilistic binary linear classifier.

Send Alert Message

In the this Module, is used to check the user actions and it detect the irrelevant actions are performed in the inside of the ATM. And it compares the user actions and stored action templates if it is match to send the alert message immediately to the admin and nearest Police station.

Evaluation criteria:

In this module, we can extract the matched objects in database. Then provide the matched objects with frames. Then evaluate the performance of the system using false positive rate metrics. Proposed approach provides reduce number of false positive rates. The SVM is used to reduce the time complexity of the classification.

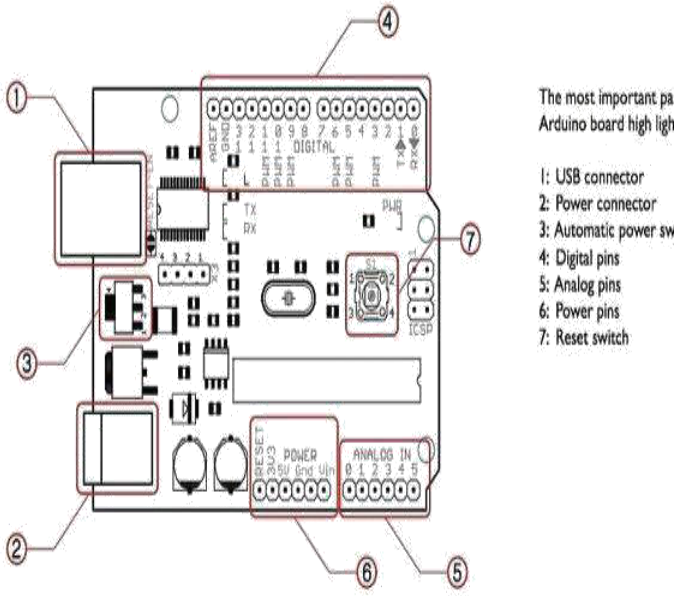
HARDWARE DESCRIPTION

ARDUINO UNO R3 MICROCONTROLLER

The Arduino Uno R3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2(Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Revision 2 of the Uno board (A000046) has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.



Revision 3 of the board (A000066) has the following new features:

1.0 pin out: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

Stronger RESET circuit.

Atmega 16U2 replace the 8U2.

SPECIFICATION

- Microcontroller: ATmega328
- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- Digital I/O Pins:14(of which 6 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 40mA
- DC Current for 3.3V Pin: 50mA
- Flash Memory: 32KB (ATmega328) of which 0.5 KB used by boot loader
    - SRAM: 2KB(ATmega328)
    - EEPROM: 1KB(ATmega328)
    - Clock Speed: 16MHz

SOFTWARE

DESCRIPTION Embedded C

An embedded system is an application that contains at least one programmable computer (typically in the form of a microcontroller, a microprocessor or digital signal processor chip) and which is used by individuals who are, in the main, unaware that the system is computer-based.

Introduction

Looking around, we find ourselves to be surrounded by various types of embedded systems. Be it a digital camera or a mobile phone or a washing machine, all of them has some kind of processor functioning inside it. Associated with each processor is the embedded software. If hardware forms the body of an embedded system, embedded processor acts as the brain, and embedded software forms its soul. It is the embedded software which primarily governs the functioning of embedded systems.

During infancy years of microprocessor based systems, programs were developed using assemblers and fused into the EPROMs. There used to be no mechanism to find what the program was doing. LEDs, switches, etc. were used to check correct execution of the program. Some 'very fortunate' developers had In-circuit Simulators (ICEs), but they were too costly and were not quite reliable as well.

As time progressed, use of microprocessor-specific assembly-only as the programming language reduced and embedded systems moved onto C as the embedded programming language of choice. C is the most widely used programming language for embedded processors/controllers. Assembly is also used but mainly to implement those portions of the code where very high timing accuracy, code size efficiency, etc. are prime requirements.

Initially C was developed by Kernighan and Ritchie to fit into the space of 8K and to write (portable) operating systems. Originally it was implemented on UNIX operating systems. As it was intended for operating systems development, it can manipulate memory addresses. Also, it allowed programmers to write very compact codes. This has

given it the reputation as the language of choice for hackers too.

As assembly language programs are specific to a processor, assembly language didn't offer portability across systems. To overcome this disadvantage, several high level languages, including C, came up. Some other languages like PLM, Modula-2, Pascal, etc. also came but couldn't find wide acceptance. Amongst those, C got wide acceptance for not only embedded systems, but also for desktop applications. Even though C might have lost its sheen as mainstream language for general purpose applications, it still is having a strong-hold in embedded programming. Due to the wide acceptance of C in the embedded systems, various kinds of support tools like compilers & cross-compilers, ICE, etc. came up and all this facilitated development of embedded systems using C. Subsequent sections will discuss what is Embedded C, features of C language, similarities and difference between C and embedded C, and features of embedded C programming.

MATLAB

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses include:

Math and computation

Algorithm development

Modeling, simulation, and prototyping

Data analysis, exploration, and visualization.

Scientific and engineering graphics.

Application development, including graphical user interface building.

MATLAB is an interactive system whose basic data element is an array that does not require dimensioning. This allows you to solve many technical computing problems, especially those with matrix and vector formulations, in a fraction of the time it would take to write a program in a scalar noninteractive language such as C or Fortran.

The name MATLAB stands for matrix laboratory. MATLAB was originally written to provide easy access to matrix software developed by the LINPACK and EISPACK projects. Today, MATLAB uses software developed by the LAPACK and ARPACK projects, which together represent the state-of-the-art in software for matrix computation.

MATLAB has evolved over a period of years with input from many users. In university environments, it is the standard instructional tool for introductory and advanced courses in mathematics, engineering, and science. In industry, MATLAB is the tool of choice for high-productivity research, development, and analysis.

GSM technology

GSM refers to second-generation wireless telecommunications standard for digital cellular services. First deployed in Europe, it is based on TDMA (Time Division Multiple Access) technology. GSM uses three frequency bands: 900 MHz, 1800 MHz and 1900 MHz. Dual-band phones operate on two out of three of these frequencies, while tri-band phones operate on all three frequencies.

GSM (Global System for Mobile Communications, originally Groupe Spécial Mobile),

It is a standard set developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. The GSM standard was developed as a replacement for first generation (1G) analog cellular networks, and originally described a digital, circuit switched network optimized for full duplex voice telephony.

This was expanded over time to include data communications, first by circuit switched transport, then packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS).Further improvements were made when the 3GPP developed third generation (3G) UMTS standards

followed by fourth generation (4G) LTE Advanced standards."GSM" is a trademark owned by the GSM Association.

Mobile Station

The mobile station (MS) consists of the physical equipment, such as the radio transceiver, display and digital signal processors, and a smart card called the Subscriber Identity Module (SIM). The SIM provides personal mobility, so that the user can have access to all subscribed services irrespective of both the location of the terminal and the use of a specific terminal. By inserting the SIM card into another GSM cellular phone, the user is able to receive calls at that phone, make calls from that phone, or receive other subscribed services.

The mobile equipment is uniquely identified by the International Mobile Equipment Identity (IMEI). The SIM card contains the International Mobile Subscriber Identity (IMSI), identifying the subscriber, a secret key for authentication, and other user information. The IMEI and the IMSI are independent, thereby providing personal mobility. The SIM card may be protected against unauthorized use by a password or personal identity number.

Base Station Subsystem

The Base Station Subsystem is composed of two parts, the Base Transceiver Station (BTS) and the Base Station Controller (BSC). These communicate across the specified bis interface, allowing (as in the rest of the system) operation between components made by different suppliers.

The Base Transceiver Station houses the radio transceivers that define a cell and handles the radio protocols with the Mobile Station. In a large urban area, there will potentially be a large number of BTSs deployed. The requirements for a BTS are ruggedness, reliability, portability, and minimum cost.

The Base Station Controller manages the radio resources for one or more BTSs. It handles radio channel setup, frequency hopping, and handovers, as described below. The BSC is the connection between the mobile and the Mobile service Switching Center (MSC). The BSC also translates the 13 kbps voice channel used over the radio link to the standard 64 kbps channel used by the Public Switched Telephone Network or ISDN.

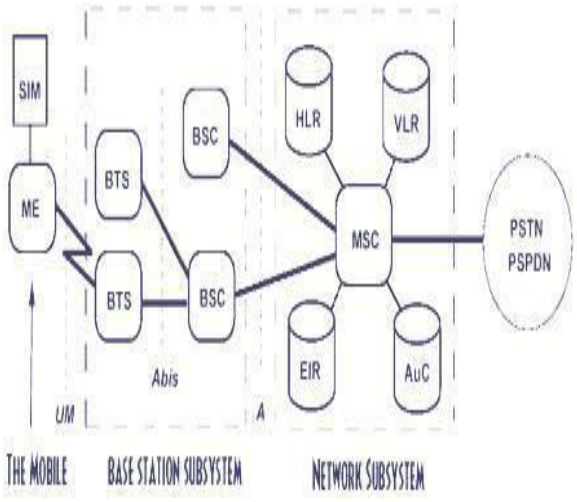
Network Subsystem

The central component of the Network Subsystem is the Mobile services Switching Center (MSC). It acts like a normal switching node of the PSTN or ISDN, and in addition provides all the functionality needed to handle a mobile subscriber, such as registration, authentication, location updating, handovers, and call routing to a roaming subscriber. These services are provided in conjuction with several functional entities, which together form the Network Subsystem. The MSC provides the connection to the public fixed network (PSTN or ISDN), and signalling between functional entities uses the ITU Signalling System Number 7 (SS7), used in ISDN and widely used in current public networks.

The Home Location Register (HLR) and Visitor Location Register (VLR), together with the MSC, provide the call routing and (possibly international) roaming capabilities of GSM. The HLR contains all the administrative information of each subscriber registered in the corresponding GSM network, along with the current location of the mobile. The current location of the mobile is in the form of a Mobile Station Roaming Number (MSRN) which is a regular ISDN number used to route a call to the MSC where the mobile is currently located. There is logically one HLR per GSM network, although it may be implemented as a distributed database.

The Visitor Location Register contains selected administrative information from the HLR, necessary for call control and provision of the subscribed services, for each mobile currently located in the geographical area controlled by the VLR. Although each functional entity can be implemented as an independent unit, most manufacturers of switching equipment implement one VLR together with one MSC, so that the geographical area controlled by the MSC corresponds to that controlled by the VLR,

simplifying the signalling required. Note that the MSC contains no information about particular mobile stations - this information is stored in the location registers.



SIM Subscriber Identity Module
HLR Home Location Register

MS Mobile Station

VLR Visitor Location Register

BTS Base Transceiver Station

EIR Equipment Identity Register

BSC Base Station Controller
AC Authentication Center

MSC Mobile services Switching Center

PSTN Public Switched Telecomm Network

VLR Visitor Location Register

ISDN Integrated Services Digital Network.

CDMA technology

CDMA (Code Division Multiple Access) digital wireless technology employs a special coding scheme (whereby each transmitter is assigned a code), which allows multiple users to share common access to the network. Using 'spread spectrum' technology, a signal is spread across a broad spectrum of radio frequencies, allowing for a signal with wider bandwidth and increased resistance to interference.

The advantages of CDMA

CDMA provides wider coverage than GSM and allows for a larger cell area. CDMA-enabled calls can be placed in low signal strength conditions, thus CDMA phones offer better reception/coverage in rural areas.

3G technology

Third generation (3G) technology is the newest and most innovative technology available today. 3G mobile-phones and networks offer high data rates, wide bandwidth and increased capacity, all of which are required to support the new range of mobile-phone services. These include: internet access, multimedia applications, global roaming and access to such services as: sports news, the latest films, video messages, and online gaming.

CONCLUSION

In this video surveillance system, the proposed solution contributes to make full use of detected and alarmed events by smart monitoring cameras. In contrast to the traditional video surveillance system, the proposed solution contributes to make full use of detected and alarmed events by smart monitoring cameras, which thus effectively improves the performance of intelligent surveillance system, promotes the ability to danger pre-alarming, and greatly saves the storage space for surveillance video data. Meanwhile, the surveillance video data relevant to specific cases will be scaled down, which will greatly improve the efficiency for discovering valuable investigation clues. Several practical cases demonstrate that our approach outperforms the existing solutions. An effectively improves the performance of Surveillance System in ATM.

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