Biometric recognition based system for safety enhancement in school children transport

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ABSTRACT

This project proposes a biometric recognition based system to enhance the safety of school children during transportation. In the existing, monitoring of school children is necessary due to lack of their skill to protect themselves. And parents are not aware of their ward during their transportation. Due to this, many incidents that cause harm to both children and parents take place. Here, we introduce fingerprint recognition for safe boarding of children. All the transportation details of the ward are brought to their parent's knowledge and also the institution is been intimated with bus activities. Transportation details include boarding or not boarding of their children, excess number of students in the bus and accidents of the bus which are sent as notification messages and seen through android app. This ensures a secured transportation for the children which cause reassurance among parents.

1. INTRODUCTION

School buses transfer millions of children daily in various countries across the world. Children safety is of utmost importance to their parents. While there are many issues that might disturb the parents regarding the travel safety of school going children. Due to their lack of skills to protect themselves, may end up in a situation that endanger their life. Nowadays due to increase in number of kidnapping cases and road accidents, parents and school always worry about their children. The supervision of the regularity of students during their entry and exit from the bus is difficult to be controlled by drivers or a supervisor in bus. Human oversight or supervisor absence may also lead to chaos. So here we focus on a risk associated with daily bus trip to and from the school. This intends to look into introducing access safety with respect to school buses that helps the children to have a secured transportation.

2. RELATED WORK

I. RFID-based system for school children transportation safety enhancement

This paper presents a system to monitor pick-up/drop-off of school children to enhance the safety of children during the daily transportation from and to school. The system consists of two units, a bus unit and a school unit. The bus unit is used to detect when a child boards or leaves the bus. This information is communicated to the school unit that identifies which of the children did not board or leave the bus and issues an alert message. The system has a web-based database-driven application that facilitates its management and provides useful information about the children to authorized personnel. This system is proposed to tack the children using a child module that transmits the tracking information to a database and a mobile device.

II. Motion Vector Estimation of Video Image by Pyramidal Implementation of Lucas Kanade Optical Flow

Motion vector estimation is an important parameter for video segmentation. Effective video compression can be achieved by choosing a correct approach for the calculation of motion vector. Here in this paper we propose an optical flow motion vector estimation through iterative Lucas-Kanade Pyramidal implementation for both large & small motion In image pyramid representation a group of pixel information is gradually reduced to a value of one pixel information for both current & reference frame. The velocity & displacement at each pixel is obtained by using Lucas-Kanade equations. The original image is recovered by warping reference frame towards current frame using flow vectors i.e. velocity & displacement by using image warping techniques. The process is repeated until convergence. An iterative implementation is shown which successfully computes the optical flow for a number of synthetic image sequences.

III. Detection of abnormal moving vehicles for intelligent driver assistance system

Driving in nighttime environment is a difficult work due to low visibility, drowsy` and impaired drivers. It is crucial to make a good algorithm to detect automatically abnormal moving vehicles surrounding the host vehicle to indicate early collision warning. This paper proposes an efficient approach to detect on-road abnormal moving vehicles in nighttime. Oncoming, change speed, change lane, roadside parking, and overtaking vehicles are detected. The proposal method is useful for vehicle behavior analysis system of IDAS (Intelligent Driver Assistance System). Firstly, all motion vectors of moving objects are estimated from frames. Most of safety moving vehicles are eliminated by using a new proposal threshold range and ROI setting. The remaining motion vectors are grouped by using K-means clustering algorithm to obtain segment abnormal vehicle candidates. The segmented candidates are classified using learning algorithm Support Vector Machines (SVMs) and various features to eliminate non-vehicle candidates. The experimental results show that the proposal method is high ability to detect the abnormal moving vehicles in front of the host vehicle in nighttime driving. It is useful to be the first processing step for behavior analysis systems in Intelligent Driver Assistance Systems.

4. EXISTING METHODOLOGY

In existing system, manpower is required in the school bus for monitoring the school children during transportation. He/she (manpower) must be aware to care each student by noticing carefully whether that particular child has boarded and got down. In case if the child has not boarded they assume that the child is absent.

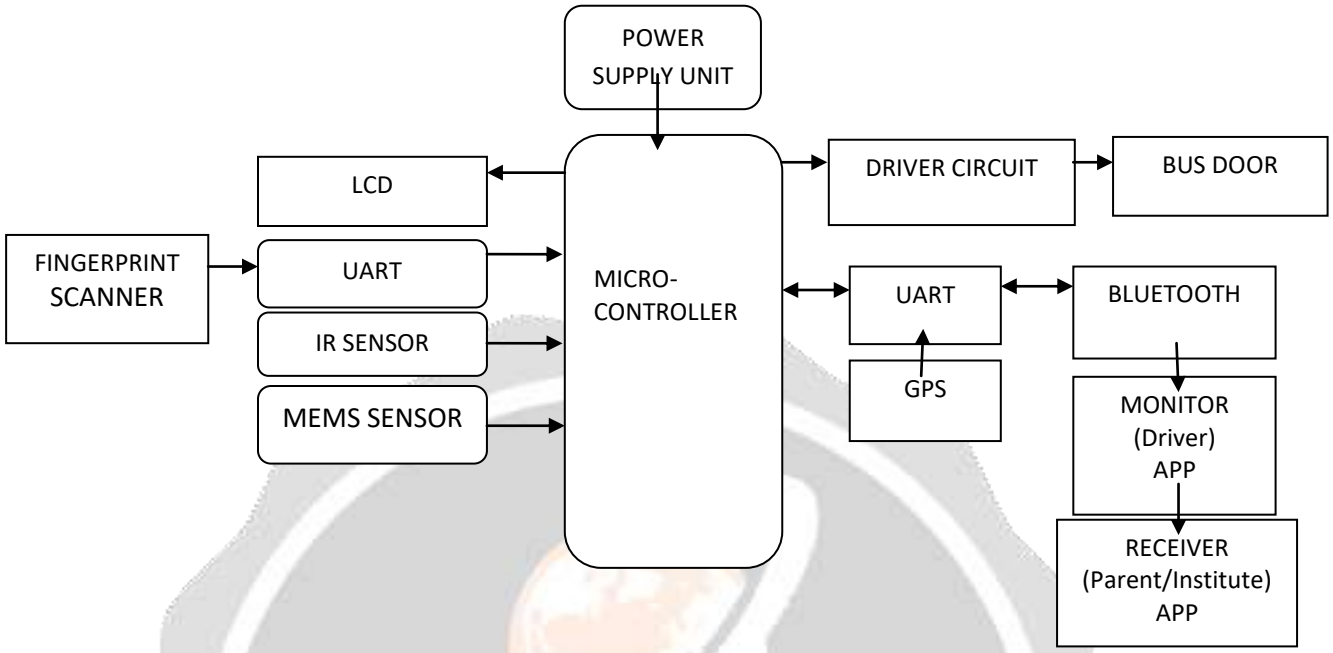
5. PROBLEMS IN THE EXISTING SYSTEM

i. It is not reliable for a person to know the details of all the students.
ii. And also there is no safety precautions present in the bus.
iii. Details of the student will not be known to their parents during school transportation ie, parents will not know whether their ward has boarded the bus.
iv. Manpower cannot be always right about the child's absence, because children are being kidnapped and if there is no immediate intimation about their ward the situation turns to be serious and becomes worse.

6. PROPOSED WORK

In this project technology is involved in the bus transport system for school children safety. It is based on biometric recognition technology. Here we introduce fingerprint (Biometric) recognition technology for safe boarding of the students. The respective parents will be intimated with the boarding of their child in school bus and also notification will be sent when their ward gets off the bus in their bus stop. An app will be provided in each parent's mobile and message with location details will be sent to their app accordingly. In case of any accident to the bus or when the number of students exceeds the bus capacity, notification will be sent to school.

6.1 BLOCK DIAGRAM:



6.2 BLOCK DIAGRAM EXPLANATION:

6.2.1 Power supply

First the AC mains supply passes through an isolating switch and safety fuse before it enters the power supply unit. In most cases the high voltage main supply is too high for the electronic circuitry. It is therefore stopped down to a lower value by means of a transformer. The main voltage can be stepped up where high DC voltages are required. From the transformer, the AC voltage is fed to a rectifier circuit consisting of one or more diodes. The rectifier converts AC voltages to DC voltage. This DC is not steady as it from a battery. It is pulsating. The pulsations are smoothened out by passing them through a smoothing circuit called a filter. In its simplest form the filter is a capacitor and a resistor.

6.2.2 Microcontroller

All the functions required on a single chip. A microcontroller differs from a microprocessor, which is a general-purpose chip that is used to create a multi-function computer or device and requires multiple chips to handle various tasks. A microcontroller is meant to be more self-contained and independent, and functions as a tiny, dedicated computer.The microcontroller includes a CPU, RAM, ROM, I/O ports, and timers like a standard computer, but because they are designed to execute only a single specific task to control a single system, they are much smaller and simplified so that they can include used, but the predominant architecture is CISC (Complex Instruction Set Computer), which allows the microcontroller to contain multiple control instructions that can be executed with a single macro instruction. Some use a RISC (Reduced Instruction Set Computer) architecture, which implements fewer instructions, but delivers greater simplicity and lower power consumption.

6.2.3 IR SENSOR

IR sensor is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. So, IR sensor is used to count number of students. When the number exceeds the bus capacity (threshold value) in the bus which may lead to accidents, message will be sent regarding the strength to the school management.

6.2.4 MEMS

MEMS components although are arranged in arrays usually consist of a central unit that processes data (the microprocessor) and several components that interact with the surroundings such as micro sensors. MEMS sensor is used incase of accidents for detecting the angle of the bus, to make the management aware of the accident.

6.2.5 DRIVER CIRCUIT:

The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays. It consists of seven NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diode for switching inductive loads. The collector-current rating of a single Darlington pair is 500mA. The Darlington pairs may be paralleled for higher current capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED gas discharge), line drivers, and logic buffers.Here the data regarding the fingerprints, IR sensor, MEMS sensor are sent to the driver circuit and received in the application created for specific login IDs.

6.2.6 PIC16F877A

It is a 40 pins microcontroller IC. It consists of two 8 bit and one 16 bit timer. Capture and compare modules, serial ports, parallel ports and five input/output ports are also present in it.It features 200 nanoseconds instruction execution, 256 bytes of EEPROM data memory, self-programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port. So all the hardware components are interfaced with the PIC microcontroller, thus the data regarding the placement of fingerprint on the scanner and sensor data are sent to the microcontroller and thus the notification is sent via Bluetooth module interfaced with the microcontroller.

6.2.7 BLUETOOTH

Bluetooth is a wireless technology standard for exchanging data over short distances (using short wavelength UHF radio waves. It can connect up to seven devices, overcoming problems that the older technologies had when attempting to connect to each other. Bluetooth as IEEE 802.15.1,is standard specification for small-form factor, low-cost, short range radio links between mobile PCs, mobile phones and other portable devices. The technology allows users to form wireless connections between various communication devices, in order to transmit real-time voice and data communications.

6.2.8 LCD

A **liquid-crystal display** (**LCD**) is a flat-panel display or other electronically modulated opticaL device that uses the light-modulating properties of liquid crystals. The preset letters and symbols is displayed on the LCD according to the process of the system.

6.2.9 DC MOTOR

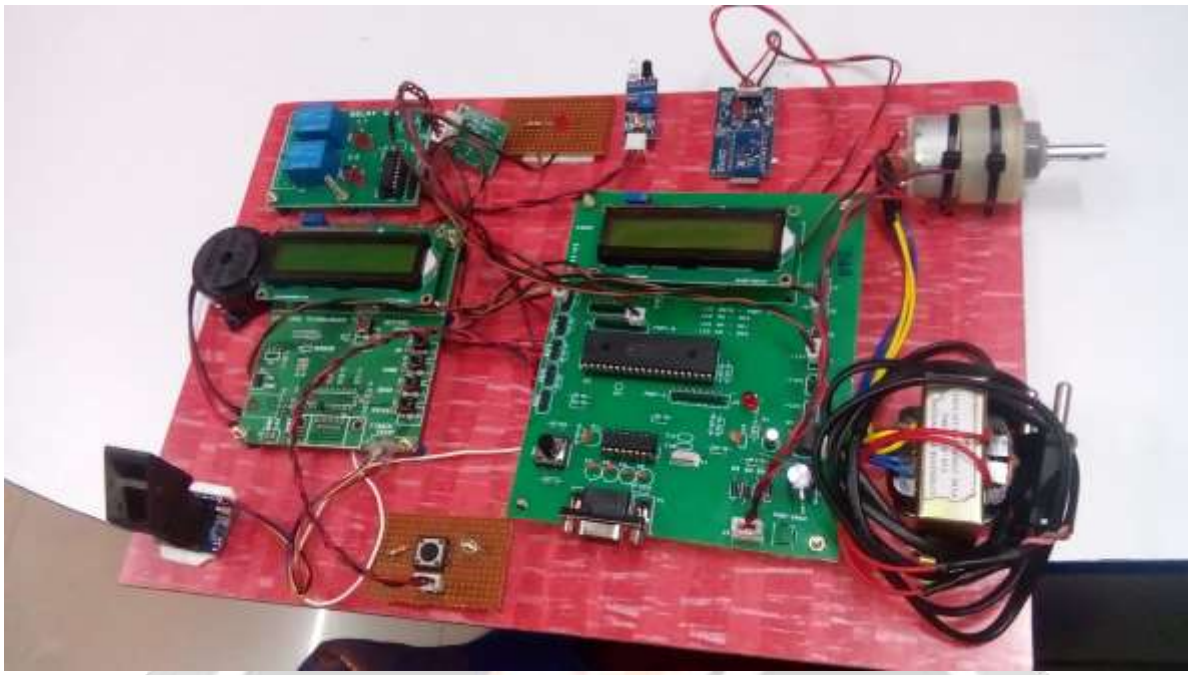
A DC motor is designed to run on DC electric power. . We in our project, are using brushed DC Motor, which will operate in the ratings of 12v DC 0.6A which will drive the automated door opening system for authenticated person to enter/exit the bus. Once the authorized child places his/her fingerprint on the scanner, the system checks immediately and performs operation by running the dc motor and thus the door opens. Similarly this process is repeated when the child gets off. Notifications are sent to the respective parent's application login from the driver circuit.

Driver mobile

7. SOFTWARE USED

Embedded C is designed to bridge the performance mismatch between Standard C and the embedded hardware and application architecture. It extends the C language with the primitives that are needed by signal-processing applications and that are commonly provided by DSP processors.

8. RESULT:



In app notifications:-

- When the child is boarded- 'Child boarded'
- When the child is not boarded- 'Child not boarded'
- When bus capacity is exceeded- 'IR value exceeded'
- When the bus meets with accident- 'Accident occured'

The first two messages are sent to the parents login id while the last two messages are sent to the institution login id.

6.CONCLUSION:

In this project the safety issue of children during transportation has been proposed. The main advantage of this method is that the parents can be aware of their child's presence in the school bus during transportation. Experimental results shows that our system yields a good performance. This project has been done by embedded hardware interfaced with android app. This system consists separate login id for parents and institution.
The current status of the child and the bus gets updated and is sent from the driver circuit to respected login id's in the app as programmed through notifications.

7. FUTURE WORKS:

In our project we are intimating the parent about their child's safe boarding with location and intimating the institution about the accidents and excess student count in the bus . Further this project can be extended to intimate the institution and parent about other features during transportation using various sensors interfaced with the hardware.

9. REFERENCES

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