IOT Based Overload Monitoring and Controlling System for Public Transport

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Abstract - There has been an issue of overload passenger monitoring despite having stationed police at different locations for manual checkups. The has led to many injuries and death due to passengers being overloaded. This project aims at developing a system for monitoring and reporting .Excess passengers in public transport. It is based on global system for mobile communication (GSM) modem. This paper includes GSM modem, liquid. Crystal display (LCD) and buzzer alarm as output from microcontroller and passive infrared ray (PIR) sensor as input. If the number of passengers. Become above the required, the microcontroller send data's to the GSM modem. GSM modem transmit the information to a database and then to .The respective authority such as traffic police. The central database stores all information for the system Such as different traffic police stations with .Respective contact numbers, user name and message sent by the system. This helps to control excessive passenger, hence reduces the number Of deaths and severe injuries.

Key Words: GSM modem, Arduino , IR sensor, data base, buzzer and LCD.

I. INTRODUCTION

The most important asset of man today is time. It happens many a times that people wait in queues for a long time and ultimately miss out on their desired bus and the next choice bus arrives at a few streets away from their current location. If passengers had an easy way to see which bus is near to their location and approximate time it would take to reach the stop, in real-time, they could make a more accurate, informed decision of whether or not to wait at the stop. The GPS and GSM based Real Time Bus Monitoring system will provide pedestrians Convenience. Not only would the GPS and GSM based Real Time Bus Monitoring system be a new product for Best Transportation, it would also be an improvement to the transportation service already addressing the dissatisfaction with current wait times of the buses. If we have a mobile device that can provide bus arrival information with bus tracking based on the users current location, and suggest alternative bus route to the same destination, it will definitely help the user to manage their time properly. Users can decide if they have to keep waiting at their bus stop or go across a few streets to wait for another bus instead. In case there is only one bus going from users current location to their desired destination, then this application will show the approximate time the bus will take to reach the users place. In this way the user does not have to unnecessarily stand at the bus stop. In addition, user can determine whether they have to run or walk to the bus stops when they are near to the potential bus stop.

II.LITERATURE SURVEY:

The considerable development of passengers' traffic in public transportation has made it indispensable to set up specific methods of organization and management for a proper loading . Most of the bus operators companies are very much concerned with counting passengers, which allows improved diagnosis of fraud, optimization of line management, traffic control and forecast, budgetary distribution between the different lines, and improvements in the quality of service . In South Africa a number of automatic passengers counting systems have been used and they overall provide accuracy of ninety nine percent (99%), according to the key technology used for counting, systems are grouped as Infrared (IR) beams, Infrared optic sensors, Low ultrasonic frequency sensors, Treadle mats. (Load cells) and Video camera In this research designing of a system is concerning with capturing input signal by camera that used to catch images of passenger within the bus after that images are analyzed for determining whether the number of bordered passengers found are in compliance with the seating capacity. After analysis the system is then able to make decisions, made decisions are sending messages to both bus owner and overloading control authorities, display total number of passengers for drivers and passengers to see and in extreme case turn off fuel injection and prevent the bus from starting .Apart from solving the overloading problem, the research also overcome problem of other existing systems counting passengers.At the bus's door, Counting passengers at the bus's door ignore those illegal doors, example the system Is able to take care of passengers who have used windows or driver's door when getting in/out of the bus.

Many researchers have reported image-processing based methods for counting people passing through a door or gate to have occlusion, over lapping, merge-split, and shadow effects .To accurately count

passengers getting in and out of a bus, the major difficulty is how to cope with both problems of camera shaking and variation of illumination that will seriously affect the frame-difference techniques for movingobject segmentation

III.   PROBLEM STATEMENT

In Tanzania passenger overloading has persevered being a serious problem in public transport, example a bus capable of carrying fifteen (15) passengers may be loaded up to thirty (30) passengers or more. The current practice of checking and controlling .Passengers' overloading which is done by stationed police officers and   SUMATRA is associated with many challenges and limitations, being labor intensive, not providing real time data, being reactive rather than proactive, not applicable in rainy and night time, encourage bribery and lacking control are some of the commonly identified problems and limitations. The outcome of this research was to Design and develop a sophisticated embed passengers' vehicles overloading system that Monitor and automatically controlling the overloading process,; both drivers and conductor are alerted about the number of Bordered passengers and when the alert is ignored the system sends both vehicle's location and contained number of passengers to birth control authorities and vehicle's owner. As the measure of Using every passenger is able to wear seat belts the system also prevent vehicle from starting when bordered passenger exceeds the seating capacity.

IV.   PROPOSED METHODOLOGY:

The proposed automatic speed control system using sensors can assist to reduce road accidents in an effective way. Different roads need different speed limits. Firstly, the starting point and the exit point of a speed-limited road are painted with different color strips. Each color carries a color code which is used to set a different speed limit When a vehicle enters the starting point of a speed-limited zone of a highway road then the color sensor located below the car bumper detects painted color on the starting point. The color detecting sensor when getting in/out the color code to the microcontroller unit (MCU) to activate the speed limiting system. MCU then sets a speed limit on the car depending on the color. The car cannot go above that speed limit. When the vehicle reaches to exit point then the color sensor detects the Development was possible through the use of ADCUM Camera, Diode 1N4007, Arduino UNO R3, GSM modem A6, SIM900 Liquid crystal display 16X4, DC motor, Relay 5v, Regulator 7805 and battery 4AH
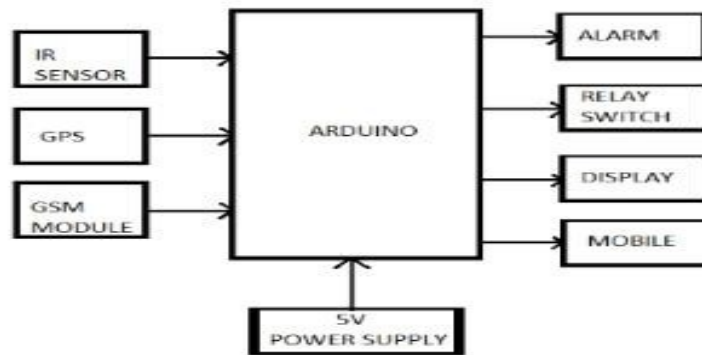

Figure 1: Block Diagram

Fig. shows the basic components of the system. In our proposed solution , we are using IR sensor for sensing the Overload in the foot step board more than 5 sec It will indicate the overload into driver with buzzer .When the object standing near the sensor more than 10 sec the ARDUINO will activate the Electromagnetic relay which is connected seriously with the spark plug of the engine and It will turn off the bus Automatically .When the object is not moving from the sensor even the bus turn off

It will inform the Location and detail of The Bus to the Transport office with the help of GSM and GPS . And the can arrange another Spare Bus for that particular time on the same route

5. Requirements:

Hardware Requirements:

- •   ARDUINO ESP 32
- •   GPS MODULE

- IR SENSOR
- RELAY
- BUZZER
- LCD DISPLAY

6. Composition for Impose Version:

A. Working of GPS Module:

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone with a GPS receiver. The GPS is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilian use. GPS works in any weather conditions, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to use GPS

Carving of ESP32:

Carving of ESP32 typically refers to the process of creating physical designs or models of the ESP32 microcontroller for manufacturing purposes. This process involves creating detailed specifications and designs that specify the dimensions, materials, and manufacturing processes required to produce the ESP32.
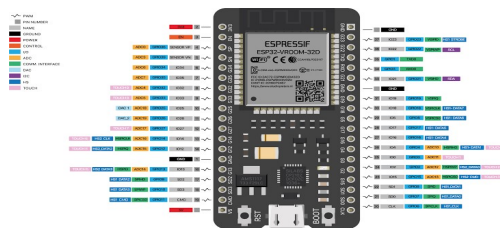

Figure 2: Pin Configuration of ESP32

ESP32 is created and developed by if Systems, a Chinese company based in Shanghai, and is manufactured by TSMC using their 40 nm process. is a successor to the ESP8266 microcontroller

B. IR Sensor :

Figure 3: IR Sensor

IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an photodiode. Photodiode is sensitive to IR light of the same wavelength which is emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received. There are five basic elements used in a typical infrared detection system: an infrared source, a transmission medium, optical component, infrared detectors or receivers and signal processing. Infrared lasers and Infrared LED of specific wavelength used as infrared sources.

C. Power Supply:

Power supply refers to a device or system that provides electrical energy to an output load or circuit. In the context of electronic devices and circuits, a power supply is essential for converting AC (alternating current) voltage

from a mains power source into DC (direct current) voltage suitable for powering electronic components: There are various types of power supplies, including linear power supplies, switched-mode power supplies (SMPS), and uninterruptible power supplies (UPS). Each type has its own advantages and applications .Power supplies often include voltage regulation circuitry to ensure that the output voltage remains stable even when the input voltage or load changes. This is important for the proper operation of electronic devices Some power supplies also include current limiting features to protect the circuit from excessive current that could damage components or cause overheating. The efficiency of a power supply refers to how well it converts input power into output power. Higher efficiency means less wasted energy, which is important for reducing power consumption and heat generation Power supplies are rated based on their output voltage and current capacity. It's important to select a power supply with the appropriate voltage and current ratings for your application.

D. Relays.

Relays are most commonly used switching devices used in electronics. It can be used to switch high current loads easily unlike transistors which are limited by the maximum current that can flow through them and also can't switch AC loads This 5V 1A Relay Module can switch both AC and DC loads. It is an Electromagnetic switch, when the coil inside is energized with a small current, it can switch ON or OFF the high current circuit. It has PCB screw terminals to directly come

F.Buzzer

Operating Voltage: The voltage required for the buzzer to operate effectively, usually ranging from 3V to 24V. Operating Current: The current consumed by the buzzer during operation, typically measured in milliamps (mA). Sound Output Level: The loudness or volume of the sound produced by the buzzer, often measured in decibels (dB).Frequency: The frequency of the sound produced by the buzzer, measured in Hertz (Hz).

7.Motor Driver:

The L298N consists of two H-bridges, each capable of driving a DC motor bidirectionally. This means that you can control the rotation direction (clockwise or counterclockwise) of the motor as well as its speed. The IC also includes built-in protection diodes for back EMF (electromotive force) suppression, which helps to protect the circuit from voltage spikes generated by the motor during deceleration.

V.RESULT AND DISCUSSION:

The L298N consists of two H-bridges, each capable of driving a DC motor bidirectionally. This means that you can control the rotation direction (clockwise or counterclockwise) of the motor as well as its speed. The IC also includes built-in protection diodes for back EMF (electromotive force) suppression, which helps to protect the circuit from voltage spikes generated by the motor during direction .measure the accurate speed of the car. An additional ultrasonic sensor is used in front of the car to measure the distance of the front cars. If any car comes to a distance that can cause accidents then the ultrasonic sensor senses the distance and sends a signal to the Microcontroller Unit (MCU) to control the speed of the car accordingly. A microcontroller located in the car receives information obtained by these sensors. After that, that information is processed and the decision is made with an efficient algorithm regarding the speed limit of the car or vehicle. The breaking system and throttle system of the car or vehicles will be adjusted depending on the decision

VI. CONCLUSION

The implementation of an overload monitoring and control system in public transport, utilizing proximity sensors and advanced technology, marks a significant step toward ensuring passenger safety and operational efficiency. The incorporation of proximity sensors in bus floors allows for real-time detection and immediate indication of overloads to the bus driver through visual and auditory signals. The integration of a time-based threshold ensures a timely response to overload situations, activating necessary alerts and initiating an automatic shutdown mechanism using relay control if the excess load persists. This not only prevents potential damage to the vehicle but also prioritizes the well-being of passengers. Furthermore, the inclusion of GPS technology enables the tracking of bus locations, providing invaluable data to transport authorities for effective management. This comprehensive approach not only addresses immediate safety concerns but also establishes a foundation for proactive measures in optimizing public transport services.

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