An Iot Based Prominent Transportation System

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ABSTRACT:

The Internet of Things (IoT) is the network of physical objects like devices, vehicles, buildings and other items embedded with electronics, software, sensors and network connectivity that enables these object to collect and exchange data. By waiting long time for getting bus can be avoided by Prominent Transportation System. This paper is to analyse the user is provided with the information about the current location of nearest buses approaching the stop. Also the system will definitely control the accident which is caused by driver who drinks alcohol. If any accident occurs the information is passed to the nearby police station and hospital.

INTRODUCTION:

Internet of Things (IoT) links the objects of the real world to the virtual world. Large amount of data is generated as large number of is connected to the internet. So this large amount of data has to be controlled and converted to useful information in order to develop efficient systems. In this project we construct a prominent transportation system using the Internet of Things (IoT) platform. The system has three modules:

1. Detector module
2. Surveilling module
3. Exhibit/Unveil module

The Detector module is consisting of Global position system, alcohol sensor, vibration sensor, Seat switch and Automobile key which are connected with the Internet via GSM network to track the location, straphanger and ambience inside the bus. The Surveilling module is used to withdraw the sore data from the detector database, convert it into a meaningful backdrop, activate some events within the bus and provide information to the tibo. The Exhibit/Unveil module is used to show the backdrop data (Bus and Travel related information) to all straphangers in the bus stop.

LITERATURE SURVEY:

Rose Mary John, Finky Francis, Joe Neelankavil, Alwyn Antony, Ancy Devassy and Jinesh K J [1] proposed a Smart Public Transport System where all required bus information will be gathered, processed, and presented to them. This system also introduces a section inside the bus on indicating next stop and bus route. In addition, there will be a section that will alert the driver when the bus over speeds and also records the bus details, location, date and time. These recordings will help authorities to take action against the culprits. Also the system aids the public from the long waiting hours at the bus stop.

Janani.N and Saranya.N [2] proposed an approach for effectively designing user-friendly driver vigilance application especially target at preventing accidents. This paper aims to design an advanced driver safety awareness and assistance system that will monitor the driver and command the vehicle to take vital safety measures in order to overcome the serious problems.

Manini Kumbhar, Meghana Survase, Pratibha Mastud and Avdhut Salunke [3] proposed our system reduces the waiting time of remote users for bus. The system tracks the bus at any location at any time. All the current information is stored to the server and it is retrieved to remote users via web based application. This system is more user friendly for users to get information visually shown on Google Map. User can freely get this web based application for real time tracking of bus which provide interactive interface environment. So by using this application remote user can just wait or they may reschedule their journey according to the availability of bus.

J.Vijay,B.Saritha,B.Priyadharshini, S.Deepeka and R.Laxmi [4] their project is used to checks the wearing of helmet and drunken driving efficiently. By implementing this system a safe two wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accident rate due to drunken driving. This system also indicates No parking area which would reduce the crowd of the vehicle in those areas. No entry area is mainly allocated during the construction or repairing of the road, if the rider enters in such area this system would immediately intimate as no entry area and vehicle will stop automatically. In case of any accident it would send the messages to the friends continuously about the location of the accident happened till the first aid reaches the rider. Our system helps to know the location of the vehicle for rescuing in the case of theft incidents.

Dr D Durga Bhavani and S Ravi Kiran [5] proposed system reduces the waiting time of

remote users for bus. With the mobile application we can track the location of bus at any point of time. All the current information is stored to the cloud and it is retrieved to remote users via mobile application. This system is more user friendly for users to get information visually shown on Google Map. User can freely get this mobile application for real time tracking of bus which provide interactive interface environment. So by using this application remote user can just wait or they may reschedule their journey according to the availability of bus.

Mrs.Swati Chandurkar, Sneha Mugade, Sanjana Sinha, Megharani Misal and Pooja Borekar [6] proposed a RTPIS tracks the current location of all the buses and estimates their arrival time at different stops in their respective routes. Estimates are updated every time the bus sends an update. It distributes this information to passengers using display terminals at bus stops, web based GUI and smart phone application which is android based. This research serves the needs of passengers, vehicle drivers and administrators of the transport system. With the advent of GPS and the ubiquitous cellular network, real time vehicle tracking for better transport management has become possible.

DiravathChander and M.Venkata Sireesha [7] proposed a producing voice based announcement for the user i.e. the user gets the voice which pronounces his bus details as and reaches the destination. Here instead of the alerting sound the user can directly hear the location recorded by the user itself. This provides information that would be needed in an emergency situation to direct emergency officials, or to phone for help when lost assists in familiarizing with a new environment. To remove the chances of errors in finding exact location this uses RFID technology, active tags at each and every bus stops.

Ye Sun and Xiong (Bill) Yu [8] proposed a high sensitivity in the measurement of bio potentials on human body and requires no physical contact with skin. This method causes less mental or physical loads to the drivers and is advantageous for long-term driver monitoring purpose. The system can measure physiological signals such as eye blinking activity, EEG and ECG signals in the real time, which are widely accepted vital signals for health monitoring and drowsiness measures. The eye activity, EEG and ECG features were recorded on the alert and drowsy drivers using the nonintrusive system.

Pengfei Zhou, Yuanqing Zheng and Mo Li [9] proposed system provides cost-efficient solutions to the problem. We comprehensively evaluate the system through an Android prototype system. Predict the bus arrival time being independent of any support from transit agencies and location services, the proposed scheme provides a flexible framework for participatory contribution of the community. For a particular city, the only requirement of our system implementation is that there exist a backend server and an IC card based bus system.

SeokJu Lee, Girma Tewolde and Jaerock Kwon [10] proposed a in-vehicle device is composed of a microcontroller and GPS/GSM/GPRS module to acquire the vehicle's location information and transmit it to a server through GSM/GPRS network the web interface written in PHP is implemented to directly connect to a database. A vehicle's geographic coordinates and a vehicle's unique ID obtained from an in-vehicle device are recorded in a database table and a Smartphone application has been created to display a vehicle location on Google maps. The system was able to experimentally demonstrate its effective performance to track a vehicle's location anytime from anywhere.

BLOCK DIAGRAM:

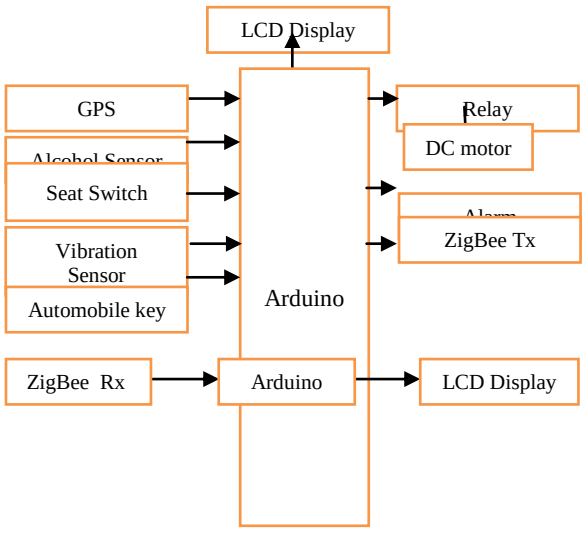

Fig1.1: Block diagram of prominent transportation system

DETECTOR MODULE:

In this block diagram we are using the alcohol sensor, vibration sensor, GPS and seat switch.

Alcohol sensor:

We usually come across drink and driving cases where drunken drives crash their buses under the influence of alcohol causing damage to property and life. So here we propose an innovative system to eliminate such cases. Our system would be constantly monitoring the driver breath by placing it on the driver steer. So if a driver is drunk and tries to drive the system detect the alcohol presence of in her breath and locks the engine so that the bus will stop. In other case driver is not drunk while he starts the bus and the engine is started. The system needs to be a push button to start to engine. If the alcohol is detected at the time of starting the engine the engine does not start at

all. If alcohol is detected after engine starting, the system locks the engine at the time.

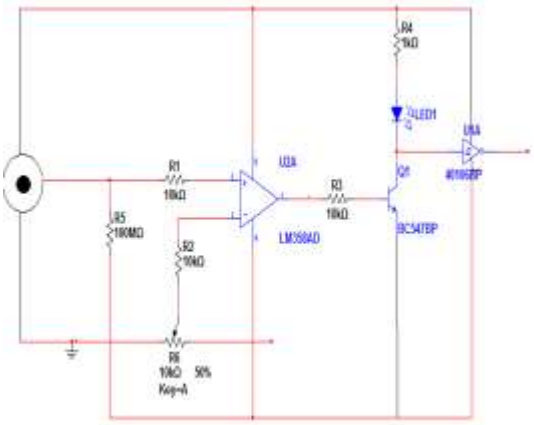

Fig 1.2: Block Diagram of Alcohol Sensor

Ideal sensor for use to detect the presence of a dangerous Alcohol in your car or in a service station, storage tank environment. This unit can be easily incorporated into an alarm unit, to sound an alarm or give a visual indication of the Alcohol concentration. The sensor has excellent sensitivity combined with a quick response time. The sensor can also sense iso-butane, propane, LNG and cigarette smoke.

Features:

- High Sensitivity
- Detection Range: 100 - 10,000 ppm iso-butane propane
- Fast Response Time: <10s
- Heater Voltage: 5.0V
- Dimensions: 18mm Diameter, 17mm
- High excluding pins: Pins - 6mm High

Circuit Description:

The alcohol sensor is the special sensor which designed for sense the Alcohol Detection. In the Alcohol sensor the supply voltage is given to input terminal. The Alcohol sensor output terminals are connected to non inverting input terminal of the comparator.

Here the comparator is constructed with operational amplifier LM 358. The reference voltage is given to inverting input terminal. The reference voltage is depends on the desired Alcohol intensity. When there is no Detection the non inverting input is grater then inverting input so the output of the comparator is positive voltage which is given to the base of the switching transistor BC 547. Hence the transistor is conducting. Here the transistor is act as switch so the collector and emitter will be closed. The output is taken from collector terminal. Now the output is zero which is given to hex inverter 40106.

When there is Alcohol Detection the inverting input voltage is greater than non inverting input. Now the comparator output is -12V so the transistor is cut off region. The 5v is given to hex inverter 40106 IC. Then the final output data is directly given to microcontroller to determine the Alcohol Detection.

Vibration sensor:

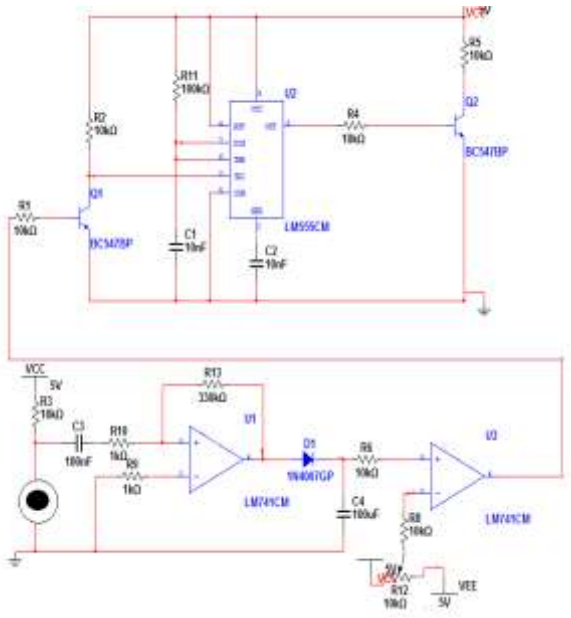

Fig 1.3: Block Diagram of Vibration Sensor

Vibration sensor detects accident and turn sends the signals to arduino. A vibration sensor is a device that uses the piezoelectric effect to measure pressure, acceleration, strain or force by converting them to an electrical signal.

Piezo Electric Effect:

Piezoelectricity is the ability of crystals and certain ceramic materials to generate a voltage in response to applied mechanical stress. Piezoelectricity was discovered by Pierre Curie and the word is derived from the Greek piezein, which means to squeeze or press.

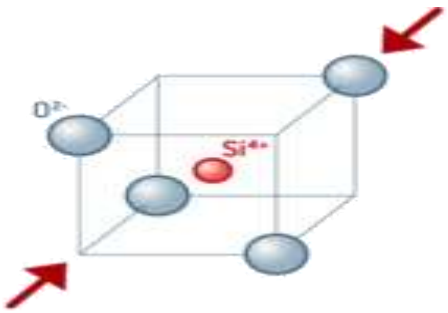

Fig 1.4: Diagram of Piezo electric effect

The piezoelectric effect is reversible in that piezoelectric crystals, when subjected to an externally applied voltage, can change shape by a small amount. (For instance, the deformation is about 0.1% of the original dimension in PZT.) The effect finds useful applications such as the production and detection of sound, generation of high voltages, electronic frequency generation,

microbalance, and ultra fine focusing of optical assemblies.

Circuit Description:

Vibration circuit is used to sense the mechanical vibration. This circuit is constructed with

- Piezo electric plate.
- Operational amplifier
- 555 IC timer

Piezo electric plate is the special type of sensor which is used to sense the mechanical vibration. Piezo electric plate converts the mechanical vibration to electrical signal. The converted electrical signal is in the range of small milli voltage signal.

Then the electrical signal voltage is given to amplifier unit through 0.1uf capacitor in order to filter the noise signal. The amplifier circuit is constructed with operational amplifier LM 741. The amplified output is in the form of AC signal the diode is used to rectify the negative signal.

The rectified signal is given to comparator. The comparator circuit is constructed with LM 741 operational amplifier in which the signal is given to inverting input terminal. The reference voltage is given to non inverting input terminal. It converts the input signal to +12V to -12V square pulse.

The square pulse is given to base of BC 547 transistors whenever the positive side of square pulse is come the transistor conducts emitter and collector side is short circuited because the transistor is act as switch. The collector side is connected to trigger terminal of the 555 IC. When the transistor is conducted negative signal is given to trigger terminal because the emitter is connected to ground side.

Now the 555 IC conducts and generates the square pulse. The frequency of the square pulse is depends upon the resistor and capacitor connected in between 7^{th} (discharge) and 6th (threshold) terminal.

The square pulse is given to base of the Q2 transistor. The transistor is turn ON and turn OFF depends upon the square pulse. The Q2 transistor output is 0 to 5V pulse.

Whenever the Piezo electric plate sense the vibration the Q2 transistor outputs the 0 to 5V pulse. This pulse is given to microcontroller or other related circuit to inform that vibration has been occurred.

Global position system:

Fig 1.5: Diagram of GPS

For those who are unfamiliar with the term, GPS stands for Global Positioning System, and is the way of locating a receiver in three dimensional space anywhere on the Earth, and even in orbit about it.GPS is arguably one of the most important inventions of our time, and has so many different applications that many technologies and ways of working are continually being improved in order to make the most of it. To understand exactly why it is so useful and important, we should first look at how GPS works. More importantly, looking at what technological achievements have driven the development of this fascinating positioning system.

Seat switch:

A switch is a mechanical device used to connect and disconnect an electric circuit at will. Switches cover a wide range of types, from sub miniature up to industrial plant switching megawatts of power on high voltage supply and distribution lines. In applications where multiple switching options are required (e.g., a telephone service), mechanical switches have long been replaced by electronic switching devices which can be automated and intelligently controlled.

Fig 1.6: Diagram for Seat Switch

A toggle switch in the "on" position. In the simplest case, a switch has two pieces of metal called *contacts* that touch to make a circuit, and separate to break the circuit. The contact

material is chosen for its resistance to corrosion, because most metals form insulating oxides that would prevent the switch from working. Contact materials are also chosen on the basis of electrical conductivity, hardness (resistance to abrasive wear), and mechanical strength, low cost and low toxicity.

Sometimes the contacts are plated with noble metals. They may be designed to wipe against each other to clean off any contamination. Nonmetallic conductors, such as conductive plastic, are sometimes used.

A push to make switch allows electricity to flow between its two contacts when held in. When the button is pressed, electricity can flow, but when the button is released, the circuit is broken.

SURVEILLING MODULE:

In this block diagram the surveilling module is consist of the Arduino and ZigBee.

Arduino:

The arduino Nano is small, complete, and breadboard-friendly based on the ATmega328P (Arduino Nano 3.X). It has more or less the same functionality of the arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

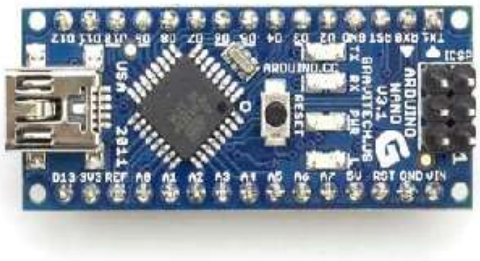

Fig 1.7: Pin diagram of Arduino Nano

The Arduino Nano has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An FTDI FT232RL on the board channels this serial communication over USB and the FTDI drivers (included with the Arduino software) provide a virtual com port to software on the computer. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the FTDI chip and USB connection to the computer.

The ATmega328 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed. The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

Specifications:

- Microcontroller Atmel ATmega168 or ATmega328
- Operating Voltage (logic level) 5 V
- Input Voltage (recommended) 7-12 V
- Input Voltage (limits) 6-20 V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- Analog Input Pins 8
- DC Current per I/O Pin 40 mA
- Flash Memory 16 KB (ATmega168) or 32 KB (ATmega328) of which 2 KB used by bootloader
- SRAM 1 KB (ATmega168) or 2 KB (ATmega328)
- EEPROM 512 bytes (ATmega168) or 1 KB (ATmega328)
- Clock Speed 16 MHz
- Dimensions 0.73" x 1.70"

ZigBee:

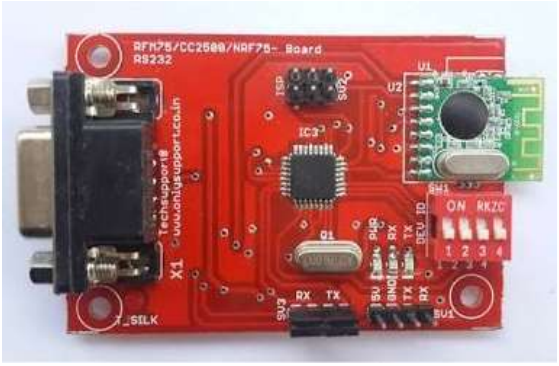

Fig 1.8: Diagram of ZigBee CC2500

ZigBee is a low-cost, low-power, wireless mesh network standard. The low cost allows the technology to be widely deployed in wireless control and monitoring applications. Low power usage allows longer life with smaller batteries. Mesh networking provides high reliability

and more extensive range. ZigBee chip vendors typically sell integrated radios and microcontrollers with between 60 KB and 256 KB flash memory. ZigBee operates in the industrial, scientific and medical (ISM) radio bands: 868 MHz in Europe, 915 MHz in the USA and Australia and 2.4 GHz in most jurisdictions worldwide. Data transmission rates vary from 20 kilobits/second in the 868 MHz frequency band to 250 kilobits/second in the 2.4 GHz frequency band.

The ZigBee network layer natively supports both star and tree typical networks, and generic mesh networks. Every network must have one coordinator device, tasked with its creation, the control of its parameters and basic maintenance. Within star networks, the coordinator must be the central node. Both trees and meshes allow the use of ZigBee routers to extend communication at the network level.

ZigBee builds upon the physical layer and media access control defined in IEEE standard 802.15.4 (2003 version) for low-rate WPANs. The specification goes on to complete the standard by adding four main components: network layer, application layer, ZigBee device objects (ZDOs) and manufacturer-defined application objects which allow for customization and favour total integration. Besides adding two high-level network layers to the underlying structure, the most significant improvement is the introduction of ZDOs. These are responsible for a number of tasks, which include keeping of device roles, management of requests to join a network, device discovery and security.

ZigBee is not intended to support power line networking but to interface with it at least for smart metering and smart appliance purposes. Because ZigBee nodes can go from sleep to active mode in 30 ms or less, the latency can be low and devices can be responsive, particularly compared to Bluetooth wake-up delays, which are typically around three seconds. Because ZigBee nodes can sleep most of the time, average power consumption can be low, resulting in long battery life.

EXHIBIT/UNVEIL MODULE:

LCD display:

The module, interfaced to the system, can be treated as RAM input/output, expanded or parallel I/O. Since there is no conventional chip select signal, developing a strobe signal for the enable signal (E) and applying appropriate signals to the register select (RS) and read/write (R/W) signals are important. The module is selected by gating a decoded module – address with the host – processor's read/write strobe. The resultant signal, applied to the LCDs enable (E) input, clocks in the data.

The 'E' signal must be a positive going digital strobe, which is active while data and control information are stable and true. The falling edge of the enable signal enables the data / instruction register of the controller. All module timings are referenced to specific edges of the 'E' signal. The 'E' signal is applied only when a specific module transaction is desired. The read and write strobes of the host, which provides the 'E' signals, should not be linked to the module's R/W line. An address bit which sets up earlier in the host's machine cycle can be used as R/W.

When the host processor is so fast that the strobes are too narrow to serve as the 'E' pulse

a. Prolong these pulses by using the hosts 'Ready' input
b. Prolong the host by adding wait states
c. Decrease the Hosts Crystal frequency.

In spite of doing the above mentioned, if the problem continues, latch both the data and control information and then activate the 'E' signal

When the controller is performing an internal operation he busy flag (BF) will set and will not accept any instruction. The user should check the busy flag or should provide a delay of approximately 2ms after each instruction. The module presents no difficulties while interfacing slower MPUs. The liquid crystal display module can be interfaced, either to 4-bit or 8-bit MPUs. For 4-bit data interface, the bus lines DB4 to DB7 are used for data transfer, while DB0 to DB3 lines are disabled. The data transfer is complete when the 4-bit data has been transferred twice.

The busy flag must be checked after the 4-bit data has been transferred twice. Two more 4-bit operations then transfer the busy flag and address counter data. For 8-bit data interface, all eight-bus lines (DB0 to DB7) are used.

RESULT:

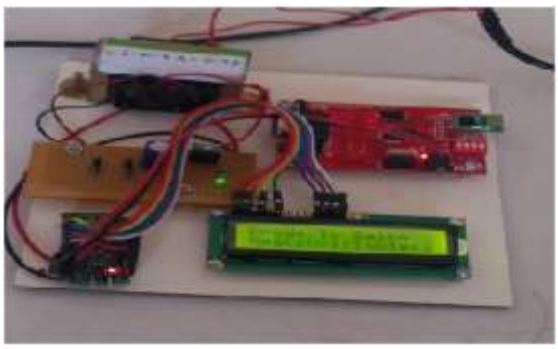

Fig 1.9: Output of next stop indication

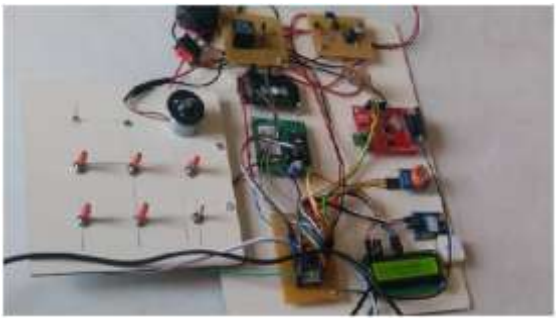

Fig 1.10: Output of Accident indication

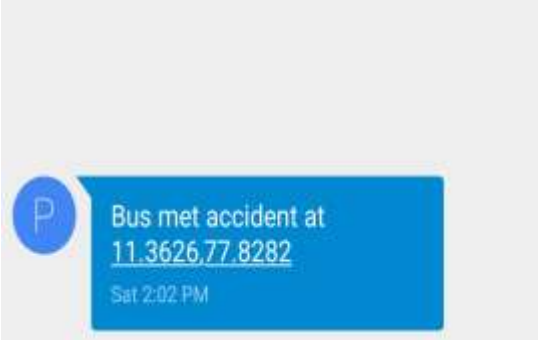

Fig 1.11: Output of bus accident information to Hospital

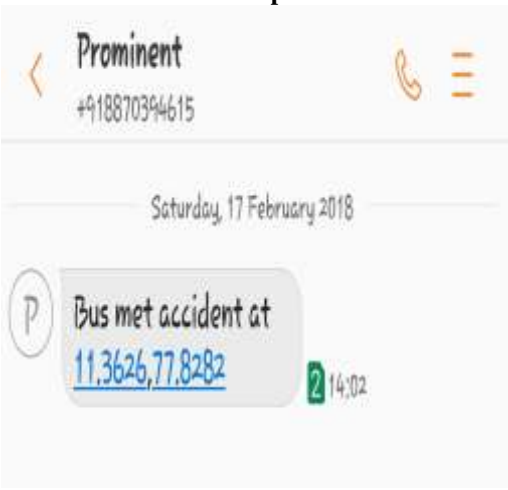

Fig 1.12: Output of the bus accident information to Police station

Fig 1.13: Output of the Drunk and Drive information passed to Tibo

FUTURE SCOPE:

This project is having a wide scope. Use of women safety to this system would take this system to the next level in the field of security. It will help to monitor the crimes that happen now a day's which is witnessed by common people every day. Also, with use of weight sensors the total weight of the bus can be calculated.

CONCLUSION:

We have implemented an on-line and offline tracking system by using GPS/GSM system. In addition to that we have also implemented alcohol detection system to avoid drunk and drive accidents. Accident detection is also included to acknowledge the accident location through GSM system, to provide immediate assistance for victims. The Vibration sensor detects if any accident in the bus the information is passed through the near hospital and police station. The system also has seat switch that helps to get pre acknowledgement of number of persons available in the bus. The results taken are from prototype-level implementation for buses. The results taken are at real time and help to improve a safe and smart system in the field of automation.

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