Smart Public Transport System

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Abstract-*In day to day life we generally face problem of public transport system. Its like somebody is waiting for some bus for an hour, but when bus arrives at his stop, it could be fully loaded and he will not even get a chance to enter into it. Sometimes driver would not bother to stop the bus. So that hour is wasted that he waited. If that person would know about where his bus is in advance, May be he could look for another option. It saves time and frustration. Here we are developing a system which will have android application. We can use our smart phone to track particular bus. This can work with offline also. It will send an SMS to track that bus. Bus unit will have GSM module which will read SMS and mobile number of sender. It will check for seat count by using obstacle sensors at entry door and exit door. It will send return SMS of seat count along with its GPS location to that sender.*

Keywords-RFID authentication for drivers, Person Availability, GPS tracking and GSM acknowledgement, Smart Application for user.

I. INTRODUCTION

A Smart Assistance for Public Transport System is to be designed. The Public transport selected is Public Bus. The issues related with public transport bus are discussed and taken into consideration. The issues such as bus arrival time prediction [2], no. of persons available in the bus [2], accident detection and safety, alcohol detection for driver [3], bus report to public through online/offline options are available [4].

The basic methodology used is GPS/GSM is used. The PIR sensors are to be used at front and rear door of the bus for person counting of in/out from the bus. Also, MQ3 alcohol detection sensor is used to detect alcohol level of the driver and if alcohol is detected then bus will not start and a message will be given to PMT through GSM system requesting for change of driver. Then an accelerometer is used to detect accidents and simultaneously message is sent to PMT, registered hospital and registered police station so that they can give proper assistance to the bus at the time of accident. When the switch is been pressed, a message will be sent to registered police station containing the data about bus and its location. The following fig. represents the basic idea for the system.

II.RELATED WORK

In previous works provided Design and Implementation of Vehicle Tracking System using GPS/GSM/GPRS Technology and Smartphone Application[1], they have implement bus vehicle tracking for UCSI university, kuala Lumpur, Malaysia. It is implemented for fixed route, providing students withstatus of bus after specified time interval using LED panel smart phone application. Technology used is Ardunio micro- controller Atmega328 based Ardunio UNOR3 microcontroller. Also, for GPS, GSM/GPRS module the same controller is used. Software program to control them is written in C programming language, complied and then saved in microcon-trollers flash memory. The testing results in this paper provide; testing in-vehicle device, testing web server and database, testing smart phone application.

In Predicting Bus Arrival Time with Mobile Phone Based Participator Sensing, June 2014[2], predicting bus arrival time with mobile phones is given. Technology used is participa- tory sensing of user. This prototype system with different types of Android based mobile phones and comprehensively experiment with the NTU campus shuttle buses as well as Singapore buses over a 7-week period, then followed by London in 4-weeks. The proposed system is solution is more generally available and is energy friendly. The evaluation results suggest that the proposed system achieves outstanding prediction accuracy compared with those operator initiated and GPS support solutions. The prototype system predicts bus arrival time with average error of 80 sec.

In Mobile Tracking System Using Open MTC Platform Based on Event Driven Method 2013 [3], mobile tracking system is used to monitor vehicles position and in special cases there are much useful information can be monitored such as speed, cabin temperature and no. of passenger. This monitoring process is done using GPS device, and sending the data to a server through GSM modem. It is proposed machine-to-machine (M2M) communication from which Open Machine Type Communication (Open MTC) as communication platform for aggregating and processing location data. The location is displayed on Google map. The Open MTC platform that is developed by Fraunhofer FOKUS based on ETSI M2M Rel.1 specification.

In Water-Cluster-Detecting Breath Sensor and Applications in Cars for Detecting Drunk or Drowsy Driving [4], safety measures to prevent drunk and drowsy drive is mentioned. A system is developed called Water-Cluster-Detecting (WCD) for this purpose. An expired gas contains water clusters that have a saturated vapor pressure of 47 mmHg and temperature of about 37C. This concept is used here for WCD, it detects breath by measuring electric currents of positively or negatively charged water clusters in breath that are separated by using an electric flied. WCD breadth-alcohol sensor is couples the WCD breadth sensor with an alcohol sensor and it simulates and detects electrical signals of both breadth and alcohol in the breadth. It is detects breadth from about 50 cm and can also test the level of alertness of a subject sitting in the drivers car. Its tested by using persons breadth, not by an artificial source. In GPS based Advanced Vehicle Tracking and Vehicle Con- trol System 2015[10], The vehicle tracking system presented in this paper can be used for positioning and navigating the vehicle with an accuracy of 10 m. The positioning is done in the form of latitude and longitude along with the exact location of the place, by making use of Google maps. The system tracks the location of a particular vehicle on the users request and responds to the user via SMS. The received SMS contains longitude and latitude that is used to locate the vehicle on the Google maps. The vehicle tracking system allows a user to: remotely switch ON the vehicles ignition system, remotely switch OFF the vehicles ignition system, remotely lock the doors of the vehicle, remotely unlock the doors of the vehicle, and remotely track a vehicles location. Some changes were made in which most notable change was alteration of the tracking methodology (i.e. Access to 32 channels of satellites instead of 3). The vehicle tracking system was built successfully. However, the vehicle tracking system could be made more robust by using more accurate GPS unit.

In Smart Onboard Public Information System using GPS and GSM Integration for Public Transport[11], This system thus decreases the vehicle idle time as its being monitored by authorities by central authorities. The optimally designed routes can also benefits in fuel usage. This system can also integrated with different technologies for additional features and due to use of popular and widely used technology at cost-effective price make it ideal for urban areas. In Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS Modem [12]. This paper presents vehicle accident detection and alert system with SMS to the user defined mobile numbers. The GPS tracking and GSM alert based algorithm is designed and implemented with LPC2148 MCU in embedded system domain. The proposed Vehicle accident detection system can track geographical information automatically and sends an alert SMS regarding accident. Experimental work has been carried out carefully. The result shows that higher sensitivity and accuracy is indeed achieved using this project. EEPROM is interfaced to store the mo- bile numbers permanently. This made the project more user- friendly and reliable. The proposed method is verified to be highly beneficial for the automotive industry.

In Automatic Detection and Remote Alarm Device 2014[14],This paper provides the design which has the ad- vantages of low cost, portability, small size and easy expansibility. The platform of the system is ARM along with MEMS, Vibration sensor; GPS and GSM, interfacing which shortens the alarm time to a large extent and locate the site of accident accurately. This system can overcome the problems of lack of automated system for accident location detection. Consequently, the time for searching the location is reduced and the person can be treated as soon as possible which will save many lives. This system will have broad application prospects as it integrates the positioning systems and the network of medical based services. The accident can be detected by both vibration sensor and MEMS sensor which will give the accurate information. The controller will process the data, as soon as input is received by the controller the alarm is ON and message is sent through the GSM module. The geographical coordinates and the time of the site of the accident is detected by the GPS module. An alternate condition is given by pressing a switch, in order to interrupt the flow of sending the message in case of no casualty; this will help to save time of medical rescue team and unnecessary alarming which creates havoc in such unusual conditions. The accident location automatic detection will help us to provide security to the vehicles and to the lives of the people. The high priority is given to the lives of the people. Hence, this paper provides a feasible solution to traffic hazards and it gives security to vehicle and reduces loss of valuable lives and property.

In A distributed PIR-based approach for estimating people count in office environments [17], By using a real-life test deployment in an office building, we obtained performance figures for our sensor prototypes. The results confirmed our approach to direction detection and thus the potential for people counting per office space. Subsequently we used empirically obtained PIR sensor characteristics to explore the performance of two people count estimation algorithms in an office floor simulation. Our simulations confirmed that the probabilistic distance-based algorithm can outperform a more simple direction-based counting. Our people counting approach could be applied in any (office) building including larger open office spaces, where subspaces

can be defined using virtual gateways. The estimated people count per building space is a key information to dynamically control building systems related to HVAC and lighting.

III. SYSTEM MODEL

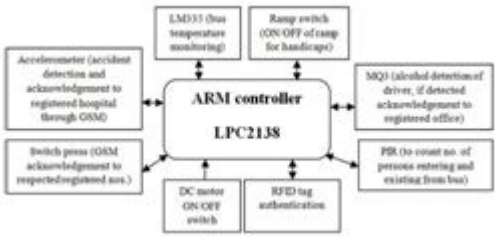


Fig. 1. Methodology for system execution.

- ARM (LPC2138):This block is heart of our system. It works as CPU unit. It processes all the data of the sensor and displays it on LCD and respected output device. It is basically used because of N no. of sensors connected to the controller. It is selected because it has ability to process parallel data and at the time it maintains the sync in the system. This controller has 3 satge pipeline which helps in fast process. As it has 40 GPIO pins, it makeeasy of availability to connect 240 sensors to it. Here, it takes input from various sensors (both analog and digital) and processes it to required output.

- 4-leg push-button: Five switches are used for various applications. Its a 4-leg push-button switch. Initially its released and when pressed it counts as a input. The various applications used for switch are Emergency switch, Rash driving switch, Ramp switch, Location tracking switch and System ON/OFF switch. Switch acts an interrupt to controller and then the controller servers the requirement of the switch. If its location tracking switch, it fetches the latitude and longitude of the location at that particular instant and displays on LCD and at the same time provides the location on smart app for tracking.

- PIR sensor unit: This unit acts as an input to the processor. Its connected to the ADC input pin of the controller. As the sensor is an analog sensor, it takes in analog input and passes it to the control unit. Then, the control unit converts analog signals into digital ones and helps it to display on LCD unit and at the same time also updates the person count on the smart app for person availability section.

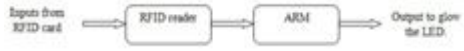
- Accelerometer (ADXL335):Thisunit is used for accident detection and acknowledgement system. The input the control unit is analog as its an analog sensor. It gets shocks/vibrations as input and passes it to the controller. It is programmed to detect accident at 700 at X-axis and Y-axis. The controller converts the analog input into digital and generates output at GSM port and LCD display respectively.

- Alcohol sensor (MQ3): Thissensor is connected to ADC pin of ARM. As the sensor is an analog sensor, also known as CO2/gas sensor. It detects the change the change of alcohol % in the air. It acts as input to controller and controller converts the detected level into digital value and displays as output on LCD and GSM system. The % level of detection of alcohol is set to 80mg.

- Temperature sensor (LM35): This sensor is generally used to detect the temperature of an environment. Its an analog sensor, so connected to ADC pin of the controller. Input to the sensor is analog temperature value and the sensor acts as input to the controller. Then, the controller converts the analogy temperature value into digital and continuously displays it on LCD.

- GSM/GPS unit (SIM900): These units are connected to the GPIO ports of the controller. The GSM unit is used to acknowledge the system via SMS to the registered nos. and the GPS system is used to collect the real-time co-ordinates for the system. These units are connected at the output of the system. The GSM/GPS unit drives output for accelerometer, alcohol sensor, rash driving switch, emergency switch, location tracking switch, and PIR sensor respectively. The GSM/GPS port is serially connected with the system.

- RFID reader (EM-18): This unit is used as authenticator for the system. The input to the reader is RFID card. The reader decodes the serial no. of the card and if the no. matches the code then it provides us authentication to operate the system, up to that the system will not start. To make the authentication visible, a LED is mounted to glow



A. Algorithm for hardware demonstration:

- Initialize the hardware.
- Grant access to the system using RFID unit.
- Initialize LCD and sensors.
- LCD displays: Initial value of Temperature sensor, Value of Accelerometer in X-axis, Value of Alcohol sensor and PIR sensor count.

- If system ON/OFF switch pressed, start the system moment.
- When the value of MQ3 sensor changes i.e. if the value of alcohol content changes, the GSM system sends a SMS acknowledgement to the registered no. that the driver is drunk and real-time co-ordinates of the location. The alcohol contents can be changed by spraying a perfume or by taking alcohol closer to the sensor manually.
- When an accelerometer is been vibrated or shocked, it detects accident when the X-axis and Y-axis changes above 300gravity and 700gravity respectively. Then, the GSM unit sends an acknowledgement SMS to the registered mobile no. containing the message of accident detection and real-time co-ordinates of the location.
- If location tracking switch is pressed, then it tracks real-time location for tracking the system. This location is displayed on map on smart app.
- While, at entry and exit gate of the system PIR sensor are mounted for person count. Increment of person count is at entry gate and decrement of person is at exit gate. Then, the sum of increment and decrement is display on smart app.
- When ramp switch is pressed, opening and closing of ramp is done.
- When emergency and rash driving switch is pressed, they acknowledge SMS through GSM unit with GPS co-ordinates to the registered.

B. Algorithm for software demonstration:

- Open the Eclipse Luna (Java IDE).
- Select the main page and run as java application. Then, select com port to which system is connected through USB port.
- Set all the properties i.e. baud rate, parity bits, start and stop bits accordingly.
- As soon as properties are set, it displays no. of persons available and when location tracking switch pressed, it gets the location as latitude and longitude values on the main page.
- • Then, run the main project on run on server and then finish by selecting Tomcat v8.0 Server at local host.
- Then, the application page on browser opens.
- At homepage, search options are provided for bus searching.
- When searched for bus, it displays the bus details and location to track the bus.
- If track pressed, then on Google map displays the current real-time location of the bus.

IV. EXPERIMENTAL RESULTS AND ITS DISCUSSION

A. HARDWARE RESULTS

Figure represents top view of the system. It represents the hardware prototype (robot) built to represent public transport system bus. Fig.3 shows prototype setup for the system. The setup includes hardware and PC.

Fig. 2. Prototype implementation of the system.

Fig.4 represents output for ramp for handicap people. The ramp is designed using CD drive. Fig (a) represents opening of ramp

Fig.5 represents output of RFID authentication for driver in the system. Fig (a) represents valid user authentication. The output on LCD is ACCESS GRANTED TO Mr.ABC and

Fig. 3. Setup for demonstration.

Simultaneously the LED also glows. Fig (b) represents invalid user. As a result, LCD displays ACCESS DENIED FOR RFID and LED doesnt glows.

Fig. 4. Result of RFID authentication.

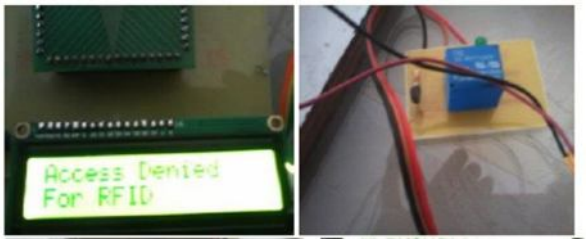


Fig. 5. Result of RFID authentication.

V. CONCLUSION

The system to be designed is fully secured and smart assisted public system. The implementation of the system is to be done for bus. ARM7 processor is used as controller to control the whole processing[4]. A system prototype is developed for testing of three sensors i.e. accelerometer, bus fail switch and PIR sensors. The PCB is developed on glassepexicresion material. PCB is single layer PCB. Designing and layout of PCB is done on Dip trace tool due to its ease of availability and use. Required testing programs are developed for testing of sensors. The coding is been done using Keil4 software version.The code burning is done by using Flash Magic tool with baud rate of 9600bps.The system overcomes basic mechanical, Volvo and BRT systems. Its more secure, smart and advanced.As emergency switch, bus fail switch and accident detection is added the system becomes secure.The system is smart and advanced as it has various features of alcohol detection, GPS tracking, GSM acknowledgement, ramp for handicaps, etc.

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