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A Survey on GPS enabled City Bus Tracking System and Smart Ticketing

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ABSTRACT: The ability to track vehicle is useful in many applications including security of vehicle, public transportation systems, fleet management and others. Furthermore, the number of vehicles on the road globally is also expected to increase rapidly. Here, the development of City Bus tracking system using the Global Positioning System (GPS) is undertaken with the aim of enabling users to locate their City Bus with ease and in a convenient manner. The system will provide users with the capability to track City Bus remotely through the mobile network. This project presents the development of the City Bus tracking system's hardware prototype. Specifically, the system will utilize GPS to obtain a City Bus's coordinate and transmit it using GSM modem to the user's phone through the mobile network. The main hardware components of the system are. The developed City Bus tracking system demonstrates the feasibility of near real-time tracking of City Bus and improved customizability, global operability and cost when compared to existing solutions. We can also take the ticketing to whole new level by using RFID tags and scan that to buy a ticket after entering the bus.

KEYWORDS: IOT, GSM, GPS, City Bus Tracking, Smart Ticketing.

I. INTRODUCTION

City Bus Tracking System is the technology used to determine the location of a Bus using different methods like GPS and other radio navigation systems operating through satellites and ground based stations. By following triangulation or trilateration methods the tracking system enables to calculate easy and accurate location of the City Bus. City Bus information like location details, speed, distance travelled etc. can be viewed on a digital mapping with the help of a software via Internet. Even data can be stored and downloaded to a computer from the GPS unit at a base station and that can later be used for analysis. This system is an important tool for tracking each City Bus at a given period of time and now it is becoming increasingly popular for people having expensive cars and hence as a theft prevention and retrieval device.

i. The system consists of modern hardware and software components enabling one to track their City Bus online or offline. Any City Bus tracking system consists of mainly three parts mobile City Bus unit, fixed based station and, database and software system.
ii. City Bus Unit: It is the hardware component attached to the City Bus having either a GPS/GSM modem. The unit is configured around a primary modem that functions with the tracking software by receiving signals from GPS satellites or radio station points with the help of antenna. The controller modem converts the data and sends the City Bus location data to the server.
iii. Fixed Based Station: Consists of a wireless network to receive and forward the data to the data centre. Base stations are equipped with tracking software and geographic map useful for determining the City Bus location. Maps of every city and landmarks are available in the based station that has an in-built Web Server.
iv. Database and Software: The position information or the coordinates of each visiting points are stored in a database, which later can be viewed in a display screen using digital maps. However, the users have to connect themselves to the web server with the respective City Bus ID stored in the database and only then s/he can view the location of City Bus travelled.

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How it works on Google map?

In a nutshell, this is how the GPS Tracker works. The GPS chip outputs the positioning information which is transferred over a GPRS link to the mobile operator's GGSN (Gateway GPRS Support Node) and then to a remote server over a TCP connection. The TCP server stores the incoming positional data in a MySQL database. When a user clicks on the tracking page, Zope, which is an open source web application server, serves up an HTML page with an embedded JavaScript code.

The JavaScript would run in the user's browser and has instructions to retrieve the positional information from the MySQL database every second. It then integrates this information into Google Maps through Google Maps API which displays the position on a map. Since the positional information is retrieved every second and the maps updated at the same frequency, a real time GPS tracking effect is achieved.

What Is IoT?

Internet of Things represents a general concept for the ability of network devices to sense and collect data from the world around us, and then share that data across the Internet where it can be processed and utilized for various interesting purposes.
Some also use the term *industrial Internet* interchangeably with IoT. This refers primarily to commercial applications of IoT technology in the world of manufacturing. The Internet of Things is not limited to industrial applications, however.

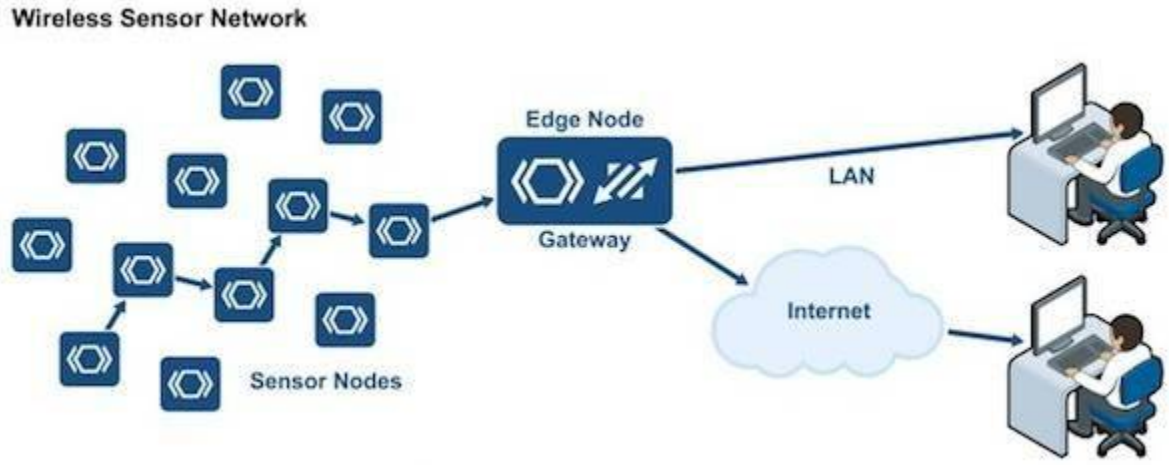

Fig.1. Basic architecture of IOT

II. LITERATURE REVIEW

A container terminal represents a complex system with highly dynamic interactions between the various handling, transportation, and storage units and incomplete logistics planning and incomplete knowledge about future events (Günther and Kim 2006). Given the randomness and complexity of the terminal, simulation technology is considered an effective research tool for researchers.

Many recent studies used simulation technology to study the container terminal, especially the scheduling, routing, and dispatching problem of the container handling equipment and yard stock problem. For the quay side, Legato, Mazza, and Trunfio (2008) presented two OR models to study the GC scheduling problem and to minimize the ship overall completion time.

Clausen and Kaffka (2012) developed a GC handling task-sequencing strategy.

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For the yard operation, Guo et al. (2008) used mathematical modelling and simulation to study the yard crane-dispatching problem. Sgouridis and Angelides (2002), and Van Asperen, Borgman, and Dekker (2010) evaluated the different container stacking rules by performing simulation models.

City Buss are used to transfer the containers among the yard and the quay/yard/yard and the outside. Automated guided City Buss (AGV) or trailers/trucks are commonly used as terminal City Buss. Yang, Choi, and Ha (2004) presented a simulation model and a procedure governing the transport City Buss of automated container terminals. Lee et al. (2007) studied the influence of different designs of City Bus lanes on the yard crane efficiency. Because shortening the ship dwelling time at the berth is the most important goal of the terminal operation, the problem of dispatching City Buss that served GCs has been studied by several researchers.

Bish et al. (2005) demonstrated that the greedy algorithm (give the job to the first available City Bus) is the near-optimal method for a single crane model; for a single ship with multiple cranes, the greedy algorithm does not perform optimally, although the performance is reasonably effective. Cheng et al. (2005) proposed a network flow model to solve the AGV dispatching problem, specifically, to minimize the total AGV waiting time. Briskorn, Drexl, and Hartmann (2006) present aniventory-based consideration to assign the AGV to the GC that has a relatively small number of AGVs currently assigned. However, in this study, the flexible City Bus dispatching method using current resources under the different GC workload is analysed by performing the simulation model.

Liu and Takakuwa (2011) proposed a simulation approach for collecting the required data from real-time tracking data to model an entire operations process at a container terminal. Additionally, GPS has been used to collect real-time tracking data for the simulation of an open pit copper mine to determine the optimized number of trucks and to estimate the maximum mining capacity (Tan et al. 2012). Shahandashti et al. (2010) have used GPS and RFID technology captured data to assess the productivity in construction.

Hsu-Yung Cheng [1], In this paper, the video based systems are important as compared to traditional system it can capture a large variety of information. City Bus tracking system is to deal with day time and night time traffic surveillance system, City Buss are treated at different conditions. Headlights are important features for tracking City Bus it need to be located and initialize City Buss. An algorithm based computation is developed to pair the headlights and initialize City Buss. The main purpose of this paper to apply a specialized system state transition model of Kalman filter for the traffic surveillance cameras. City Buss are detected through background modelling using Gaussian Mixture Model. It is difficult to segment out the City Buss at night, foreground image that can be detected the use of headlights, auxiliary lights and reflections of lights of City Buss. The experimental result shows that the proposed method is more efficient and reliable with the specialized state transition model, the prediction can be made error free and more accurately for track City Buss in both daytime and night time surveillance videos.

Amirali Jazayeri [2], The study of this paper the detection and tracking City Buss at real-time in car video analysis for safety, auto driving and target tracing. This paper locates target City Buss in video under different environment conditions. The extracted geometry features from the video are continuously track City Buss. The hidden Markov model (HMM) is used to separate target City Buss from the background and track them, this paper has investigated videos of day and night on different types of road, the problem is to identify City Buss in changing environment, illumination and the variations of City Buss such as colour, type and shape and also on cloudy day and occlusions between City Buss, it can be made real time feature extraction in video frame by using corner detection and line segment detection for reliable City Bus detection, corner points, horizontal line segments and intensity during the motion of City Buss and background scenes. The experimental result shows the effectiveness for the implementation and computation in real time which is easy for real City Bus-borne video.

Lei Xie [3], During the study of this paper the City Bus tracking is an important in video based intelligent transportation systems (ITS). THE proposed algorithm includes object region extraction and City Bus tracking by using City Bus segmentation method in real-time method. This paper propose a three step predict method based on Kalman filter to track each City Bus. So the experimental results show that a new algorithm is robust and real-time and the correct rate of City Bus tracking is higher than 85% , independent of environmental conditions. It is more effective in real world videos.

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R.Ramani [4], In this paper the locking system installed in the City Bus for City Bus tracking to track the City Bus's place and locking engine motor. The proposed technology identified the place of City Bus using Global positioning system (GPS) and Global system mobile (GSM). These systems work on any occlusions, theft is happening on the parking and driving insecurity places, These technologies constantly watch the moving City Bus and report the status. The responsible person send SMS to the microcontroller when the theft identified, Microcontroller issues the control signal to stop the engine motor, After that all the doors locked. It needs to open the doors the authorized person send password to controller to restart the City Bus and open the door. The GPS/GSM based systems are one of the most important technologies designed for users in transport business, It provides real-time information such as speed, location and expected arrival time of the user in moving City Bus. The wide usage of GPS/GSM system on the many applications by millions of people throughout the world. The experimental result shows that these system used in car, ambulance, police City Buss and fleets so the existing technology support tracking the City Bus place and status. This is more reliable, secured, low cost, burglary and theft prevention and also useful for communication process.

Raad Ahmed Hadi [5], This paper presents City Bus detection and tracking applications are important area in military and civilian such as in urban traffic planning, management and highway traffic surveillance control. The City Bus detection method used for City Bus tracking on road for counts, average speed of each City Bus, City Bus categorizing element and traffic analysis. this paper aims a concise overview of image processing methods, analysis and implemented under various environment changes. For developing traffic surveillance systems the processing methods classified under three categories to solve the occlusions. The proposed technology focuses in City Bus detection, City Bus tracking and classification with shadow and partial occlusion in traffic video. Transportation planning and traffic application extract the useful information for traffic analysis and traffic flow control such as City Bus's: velocity, count, speed, flow, classification, objectives and traffic density, traffic lane changes etc. Several City Bus tracking methods have been proposed by different researchers for different problem such as region based tracking method, contour tracking methods, 3D Model-based tracking methods, colour and pattern-based methods. In video image City Buss locate the position, estimate the motion of blobs and follow the movements between two consecutive frames. The experimental result presents that the proposed line-based method uses line group for remove all undesirable shades accurately in minimal error.

Smart Ticketing

• Akahane et al (1996) studied benefits of reservation models which takes care of traffic needs on holidays users which is based on state preference survey.

• DeFeijter et al (2004) suggested advance booking will enhance capabilities of services for better availability and effective utilization of resources this will be of major advantage.

• Granados et al (2006) studied on transparent electronic market in the case of travel industries using information system for e-business management.

• Malone et al (1987) found out management cost for usage can be reduced by favouring transport of materials across different firms eliminating hierarchies with in a single firm .

• Williamson. O.E (1975) suggest that cost associated with transaction will finally sling with governing configuration rather than technology.

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III. SYSTEM BLOCK DIAGRAM

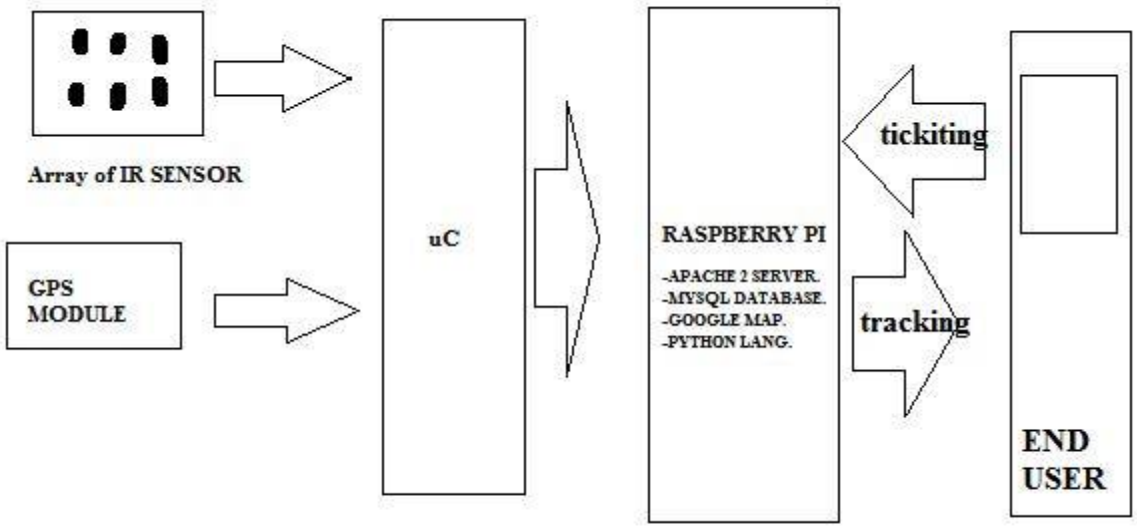

Fig 02 System Architecture

IV. SYSTEM FLOW

In this project IR sensor are connected directly to microcontroller (port pin). The GPS is connected via serial cable and data is sent to server by means of wireless communication.

The data is received at server side which is operating on Linux based system. Which will support the MYSQL based data base which will contain details as :-

- Location.
- Vacant seat.

The server runs on it. To full fill all the above requirement we have used the raspberry pi.
Which can easily run all commands on server and support all sever function. The data form server can made available to end user using mobile application or web page. This things can be controled dynamically from both side i.e user command can be answered from server side which make it complete IOT based system.

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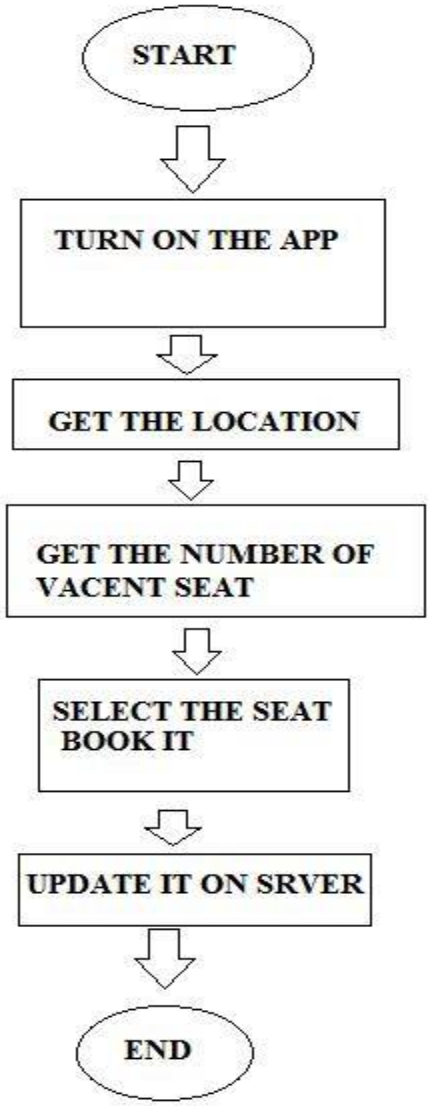

Fig 03 System Flow

STEPS:-

- **After starting the application we will update current location from server.**
- **Track your bus.**
- **Check for vacant seat.**
- **Select your seat**
- **Book it**
- **Wait till get update on server.**

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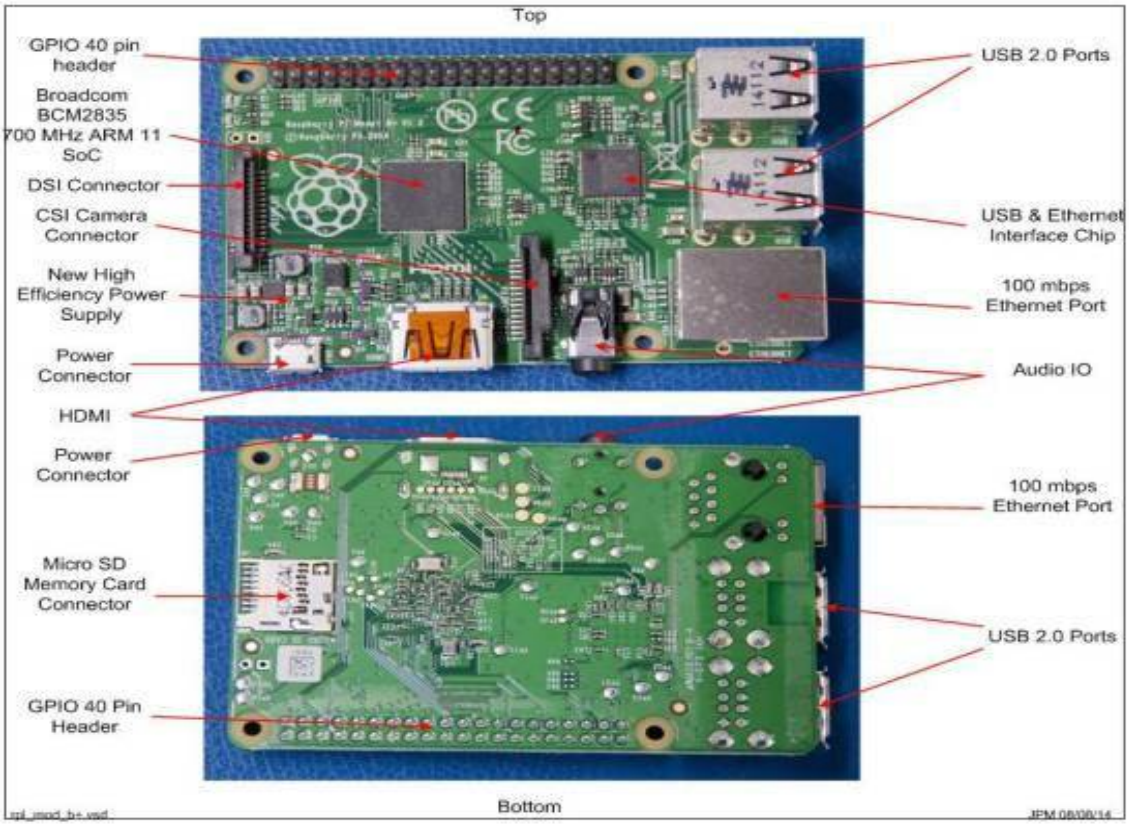
COMPONENTS EXPLANATION :-

RASPBERRY PI

The Raspberry Pi board used in the proposed system which having following features:

- 5V@1A maximum power from an adaptor.
- 700 MHz ARM1176JZF-S core (ARM11 family, ARMv6 instruction set).
- 1GHz operating speed.
- 4 USB ports for Key board mouse or accessing external memory.
- 40 GPIO pins.
- Ethernet port for internet connectivity.
- VGA connector and HDMI connector.
- 3.5mm stereo jack for audio out to amplifier.
- MicroSD card interface slot to carry the OS.
- 512MB of SDRAM.



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