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Efficient Public Bus Transportation for Smart City with Amazon Web Service Interface

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Abstract
The way in which commuters plan to travel becomes more decisive currently based on multiple attributes like Time, Comfort, Cost and Environment, which may lead to choosing public bus transportation as most efficient. However, this requirement leads to having public bus transportation with Smart seating management. Having this helps the public to be comfortably available for work, classes and other activities which supports availability over network during the Commute as well. This explores to use different technologies. The Solution to the above problem can be achieved by designing the system which can be embedded inside the bus. The System Consists of distributed IoT methodology design, Microcontroller, GPS (which provides location of the bus) and IR Sensors (Number of commuters inside the bus) information available over GSM/GPRS Network. To overcome the drawbacks of currently available assistive device, this system proposes RFID READER which reads the bus information and TAG which is embedded back of the bus Seat that helps to identify whether seat is vacant or filled. The above-mentioned information is available, dynamically fetchable in real time when a User interfaces in Amazon Web Page with registered credentials.

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1. Introduction

With Billions of people that populate the world, a large number of people struggle travelling in public transports due to unavailability of seats. Public Bus transportation plays a predominant mode of urban transit. Concepts get evolved and customized based on providing information on the current sitting capacity of a public bus with its current location through Amazon Web Page app in real-time.

This concept uses Embedded system and IOT in providing advance information through display board using RFID switches[10] and embedded system. Thereby enables commuters to shift from using their own vehicles to taking public bus transport resulting in decreased pollution. Due to recent development of Smart-city on Digital-India project, we are urged to contribute a part of our generic cause to the country. Bus transport systems have evolved from single route to operations to large urban agglomerations.

Bus transport must provide comfortable travelling, by improving seating capacity utilizations efficiently. Thereby, reducing socially stagnant atmosphere. Current system in buses provides information only on bus route and bus number. With rapid population growth, there is congested social-discomfort strain on public and transportation facilities.

In order to overcome these challenges, Proposing an IOT based technology with Amazon Web Page. Mainly here the RFID READER [11] reads the TAG information of the bus forthe controller to Process.

GSM Technology ensures information of the bus is updated by Controller and accessed through Amazon Web Page application. When a person wants to board a bus, information is available in the Amazon Web Page application about the seating Capacity and Vacant Seats.

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2. Literature Review

A. Smart Bus Transportation System

This Paper uses FPGA Controller Spartan-3E family Design which mainly helps in versatile look up tables, IOBs management for the flow of knowledge between I/O pins, Double Data Registers for square measures, Digital Clock Manager for Self-Calibration for distribution, delay, divide, multiply and phase shift clock signals and additionally uses IR Sensors, LCD Displays, GPS and GSM Module to give cheaper and less time consuming solution, helping to interconnect passengers with real-world public bus[1]

B. Smart Public Transportwith Android Application using IoT

This Paper identifies Arrival Time estimated using Euclidean Distance formula which will be displayed on an Android Application and ensures buses are routed to different locations using Architecture of Client and Server based on dynamic update of maps and routes. The Technology used here will save 20% of the time and cost compared to Existing General Packet radio service device [2].

C. Internet of Things in Intelligent Transportation System

This paper updates location of the bus to the users dynamically based on IP Trunk Manager. Smart Phone users can receive this information on demand. For frequent and regular users, it is an economical and an efficient method to travel in public bus. This Technology gives better Prediction of arrival time of buses and manage the crowd inside each bus dealing with an embedded system. Finally, Manual ticketing system is replaced by a cost-effective automation system [3].

D. IOT Based Smart Public Transport System

In this Paper, processing control is achieved by Arm7 Processor, faster and easier tracking [6] of bus achieved by developing Android application for users of Smart phone. It is more Secure, smart and advanced because of accident detection added in the system including to help the physically challenged and also detection of Alcohol consumption. Ease of use and better controller processing is an advantage, however capital outlay and longer technology learning curve is vice versa [4].

E. Public bus Tracking using GPS and Monitoring by Accelerometer

In this Paper, Routing in battery operated wireless networks with improved algorithm for estimating gravity component of accelerometer measurements aimed at improving indoor localization. Wi-Fi fingerprint accuracy helpes to sense emergency services and social networking. Additionally, there is improvement in Latency of vehicle tracking using GPS [5].

3. Proposed work

The framework proposed allows the public to use Amazon's application which are capable of seat booking for the commuters. The commands will be sent to a Renesas Micro Controller (RL78) local web server. The Renesas Microcontroller pins can be managed by the assistance of CubeSuite+ C Code by obtaining the commands. Users can log into Amazon Web User Interface with Source and destination location, and get connected to the interface to check location of the bus and seat availability over GPS and GSM/GPRS network which interacts Microcontroller, RFID, TAGS system installed in the Public bus and monitor their smart home seating Management in Public Bus Transport.

Block Diagram:

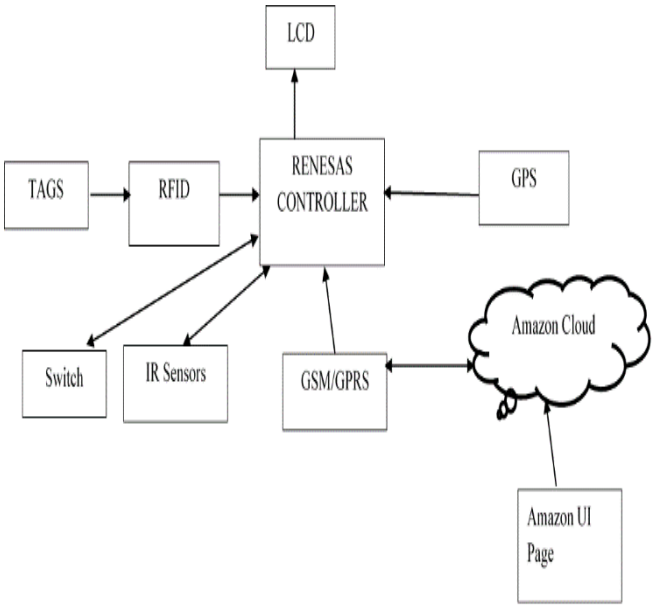

Figure 1: Components of Proposed Smart Seating System

The components of Smart seating arrangement in Public Transport System are listed below:

- Microcontroller RL78/G13
- IR Sensors, TAGS, RFID
- LCD
- GPS
- GSM/GPRS Module
- Amazon Web Service Console
- Activated Sim-Card
- CubeSuite+ IDE

The objective of this paper is to allow the users to make use of locating the bus to their preferred destination, to ensure seats are booked in advance before they board into the Public bus which results in efficient use of time, cost (due to no usage of their vehicle) and more importantly ensuring the city has a better environment with the resulting decrease in pollution.

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4. Proposed system

This paper uses RFID to identify the bus, TAG to identify the vacant seat and GPS to identify the exact location co-ordinates of the bus in a rapid and effective way to ensure Efficient Public Bus Transportation for Smart City.

The Amazon Website contains information about BMTC (Airport Pick up/Drop, Vajra and Non-Vajra) buses travelling across the city. The thought behind using RFID [10], TAG in bus to identify location of bus and vacant seats information and viaGPS exact location of the bus in real time is to save waiting time as well as ensures you have a Vacant and booked seat for the commuter. The Microcontroller placed in a bus will have four IR sensors, two at each door which contains number of passengers boarding the bus and exiting at their preferred destination from the bus. Data is sent to Microcontroller from Sensors through Bluetooth.

Public bus commuters use the information available in the Controller like Vacant seats, location of the bus and estimated arrival time of bus using Amazon web page. This Application shall provide other options for fetching information of the bus details including halts, route with the real-time through which bus is travelling, to help the users plan their travel in most time efficient way.

5. Design and Implementation of Proposed system

A. Specification of Renesas Microcontroller RL78

The main component of system is that Microcontroller board RL78-G13 is True Low Power Platform with various built in features used for General Purpose Applications with IC Name: R5F100LE (supporting Renesas Semiconductor product operating at 5V, Flash memory, Data flash provider, PIN counter Execution Capacity. Microcontroller consists of three Sections. Power, Controller and Communication. Power Section ensures voltage regulation, it will convert from 12V to constant (+5V). Controller is the heart of the board consists of 16-bit microcontroller, 64 pins, 14 ports, 10bit ADC and Communication protocol consists of 3 Universal Asynchronous Receiver & Transmitter System (UARTS) to communicate between System to Hardware.

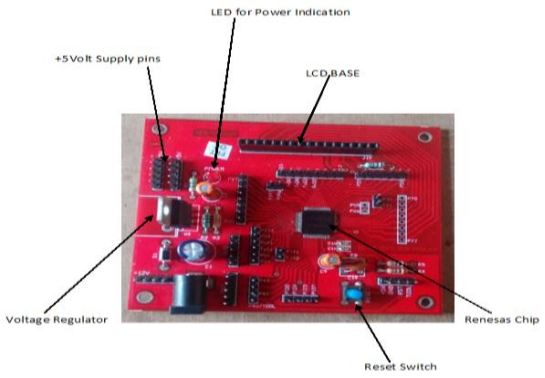

Figure of 64 pin Renesas Microcontroller Board

Figure 2: Renesas Microcontroller RL78 Board

B. Configuring the CubeSuite+ IDE

Embedded Code is written and compiled in this environment helps developers in Design, implementation and debugging software into unique platform.

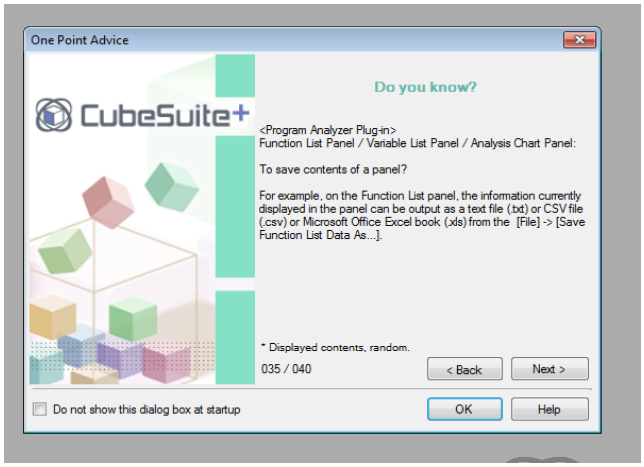

Figure 3: Developer Environment Interface

Following are the steps to setup Cubesuite+ IDE:

1. After Downloading and Installing CubeSuite+ Application, Click OK on above screen.
2. Click "GO" Option of "Create New Project"
3. Select the controller and give the name of project and then Click "Create"
4. Select "Code Generator" and Click "Fix Settings"
5. Select "Watchdog timer" and make it as "Unused"
6. Select Required Peripherals and Click on "Generate Code"
7. File generated with Main file and build the project

Following are the steps to Flash newly developed Program using Renesas flash programmer.

1. On connecting to DB9 cable from USB port of Controller to the Desktop//laptop of USB port with console or hyper-terminal
2. Select "Basic Mode" and Click Next
3. Select "Device" and Click Next
4. Select Emulator, Click Next
5. Select Interface Speed as 1,000, 000bps and Click Next
6. Select Supply Voltage as 5V and Click Next
7. In the console Browse for *.hex file, select *.hex file and Click Start, console window shall show "PASS" ensures binary is loaded to Controller Successfully.

C. GSM/GPRS Module

GSM is Global System for Mobile Communication telecommunication Protocol integrates with User subscription information and other applications of mobile through Subscriber Identify Module (SIM). SIM also gives added advantage of switching user information seamlessly with other handsets, additionally same SIM

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users can seamlessly move to different operators while retaining handset.

SIM300 GSM Module supports Triband 900Mhz, 1800Mhz and 1900Mhz and supports features like GPRS Multi-slot Class-10/Class-8 with 4 different coding schemes CS-1, CS-2, CS-3 and CS-4.

60pins board to board connector provides, physical interface between SIM300 & mobile application and hardware interface from module to customer board excluding RF Antenna interface.

Communication with network and mobile is activated by SIM card and users get packet data over GPRS and circuit switching for voice over GSM. This communication is achieved through wireless modem of GSM/GPRS module.

Figure 4: GSM/GPRS Module and other interfaces

Interface verification with GSM Module:
1. Open Hyper terminal application from the Desktop console (or laptop console) and apply these settings (Connect using (COM1), Bits per second (9600), Data bits (8), Parity (None), Stop bits (1) and Flow Control (None).
2. And Enter <AT> Commands to verify the interface, Manufacture Identification and bands supported.

D. End to End Network Level View

Below Diagram depicts how all components of the Paper (Bus, IR Sensors, GPS, GS/GPRS Modules, Cloud and Amazon Web Console can be seen at Network Level.

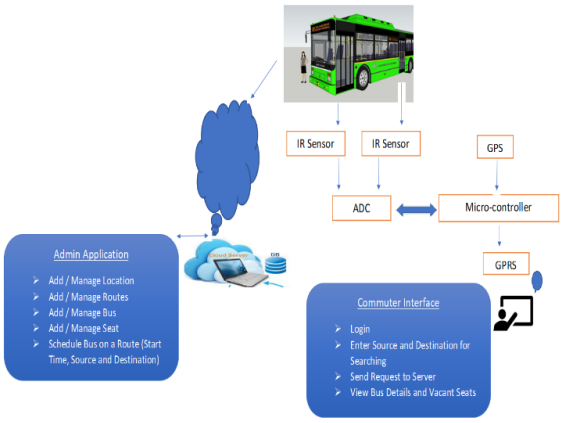

Figure 5: End to End System View

6. Result

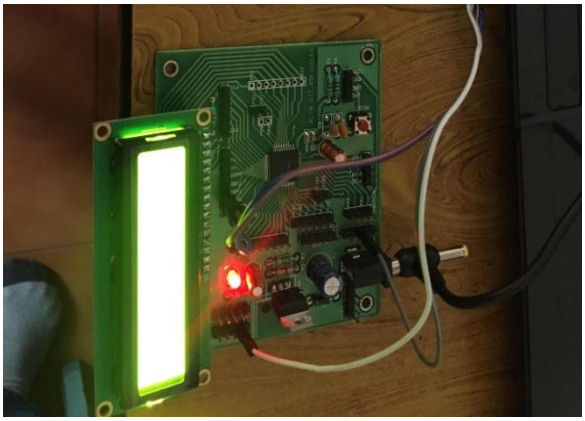

Figure 6: Result of the fully connected system

This Paper is implemented using RL78 Microcontroller which is heart of the system interfacing with different components. GPS provides most accurate & dynamic location information of the bus with maps & routes, while availability of seats retrieved by IR sensors & TAGS and RFID provides identification of bus using GSM/GPRS data packets based on client-server technology. To the public bus commuters, Amazon web service console interface provides information with user friendly options of easily boarding buses when the user provides source and destination location. The commuters will get seat availability, current location of the bus at a given time and estimated arrival time of the bus at source and this information is highly available all time to the user from the Amazon Web Service console via Amazon Database.

In this paper, reserving seats before travel is implemented for Public bus transport of the Vajra/Volvo (BMTC) buses as these buses are commuted by Office going users and this can also be implemented for Airport commuters using Public bus. However it will be bigger challenge or difficult to implement for Non Vajra/Volvo Public bus transports based on number of buses available to the ratio of commuters travelling in this segment of the bus, unless we increase number of Public bus in this segment by approximately 3 times compared to the current capacity.

Figure 7: LCD Screen Indicating Smart Seating

7. Conclusion

Commuters of Smart City gets public bus Smart seating information like Time, Date, GPS and Vacant Seat. Additionally, commuter also gets information about the bus booked for travel had any mishap (Accident/break

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down/repair etc.) in real time. In this way, user of the bus gets satisfied for the effective travel time with cheaper price compare to the self-owned or rented transport. Henceforth, the pollution caused to the environment are reduced to a considerable level. The seated arrangement in the bus with less cost also helps the commuter to spend quality time on Personal and Professional front as well.

8. Future Work

- Planning to integrate further into "***MyBMTC***" App which currently gives – Arrival of Bus Time (based on inputs of Current Location and Destination) but there is no Smart Seating arrangement available based on Capacity
- To take this product level integrated and Deployed across different cities of India
- To implement in most cost effective manner when increase in Public bus commuters using this service
- To study and review using Raspberry Pi boards and availability of this application to Android phone users.
- Whether RL78 Microcontroller boards, GSM/GPRS module boards and interfaces can made available in one board based on technology and methodology on date.

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References

[1] Ms. Diksha N Dahake1, Ms. Pooja N Veddampuri2, Ms. Anuja A Achintalwar3, Department of ENTC Engineering, JSPM, ICOER, Pune, India.Smart Bus Transportation System: International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395-0056, p-ISSN: 2395-0072, Vol. 06, Issue 06, June 2019,

[2] Mr. A J Kadam1, Mr. Virendra Patil2, Mr. Kapish Kaith3, Ms. Dhanashree Patil4, Ms. Shambhavi Bendre5, Dept. Of Computer Engineering, AISSMS COE, University of Pune1-5Smart Bus for Smart City using IOT Technology: International Journal of Advanced Research in Computer and Communication Engineering, ISO 3297:2007 Certified, Vol. 7, Issue 1, January 2018

[3] 1P.Amellesh, 2M. Ganesan, 3S. Dhatchana moorthy, 4K.Santosh kumar, 5N. Danapa quiame, Dept of Computer Science and Engg, SMVEC, INTERNET OF THINGS IN INTELLIGENT TRANSPORT SYSTEM, International Journal of Pure and Applied MathematicsVolume 118 No. 14 2018, 493-498

[4] Parag Gawade *, Prof.Meenakshi A **, IOT Based Smart Public Transport System, International Journal of Scientific and Research Publications, Volume 7, Issue 7, 390 ISSN 2250-3153, July 2017

[5] Pravinkumar, V. Anuragh, NLP Raju, "Accelerometer Based Vehicle Monitoring And Tracking System Using GPS", International Journal of Science, Engineering and Advance Technology, IJSEAT, Volume 2, Issue 11, ISSN 2321-6905 November-2016

[6] Prashant A. Shinde, Prof.Mr.Y.B.Mane Advanced Vehicle Monitoring and Tracking System based on Raspberry Pi, IEEE Sponsored 9th International Conference on Intelligent Systems and Control (ISCO), 2015

[7] Cemil SUNGUR, Ismail BABAOGLU, Smart Bus Station-Passenger Information System, 2nd International Conference on Information Science and Control Engineering, 2015.

[8] Monisha J Prasad, Arundathi S, Nayana Anil, Kariyappa B. S., "Automobile Black Box System For Accident Analysis", International Conference Of Advances In Electronics, Computers and Communications (ICAECC) 2014

[9] Elisabeth ILIE-ZUDOR "The RFID Technology and Its Current Applications", MITIP 2014

[10] Rubananth, T.Kavitha, "GSM based RFID approach to Automatic Street Lighting system", journal of theoretical and applied information technology 30th April 2012. Vol. 38 no.2, ISSN: 1992-8645

[11] Swati R.Zope, Prof. Maruti Limkar, "RFID based Bill Generation and Payment through Mobile", International Journal of Computer Science and Network (IJCSN) Volume 1, Issue 3, June 2012 www.ijcsn.org ISSN 2277-5420