IoT Based Passenger Count System in Public Transport

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Abstract- Internet is a distinct existence, continually changing and developing. New ideas applications and many real time applications are created continuously. By these changes in the technology the lifestyle also changes it is becomes easier and simpler. This leads to a new paradigm: the Internet of Things. IoT is the connection of physical device and combined with internet to provide a smart system to the society. As there is increase growth in population need for transportation is also high. IoT plays a major role in transportation systems by making the system automated and smart. Many real time applications are developed to maintain traffic congestion, to provide travelers safety, by tracking the vehicles, avoid fleet management and so on. In this project, it is considered with the passengers in public buses, it is been a major consideration to keep the count of each passengers presence in the bus manually. Instead we develop a smart system to keep track of passengers automatically by the use of sensors
Keywords – Internet of Things, Wireless Sensor Network, IR Proximity sensor.

I. INTRODUCTION

The objects in the surrounding are connected through wireless or wired networks without any intervention from users is what defines the "Internet of Things". Exchange of information, communication between the objects provides an intelligent service to users, in the field of IoT. The purpose of IoT is to provide an IT-infrastructure facilitating the exchange of "things" in a secure and reliable manner, i.e. its function is to overcome the gap between objects in the physical world and their representation in information systems. Scope of extending the initial application, the IoT might also serve as backbone for ubiquitous computing, recognizing and identifying objects by enabling smart environments, and retrieve information from the Internet to facilitate their adaptive functionality.

Internet of Things is categorized into many applications basically falling into Industry, Environment, Society monitoring domains. Each field has its own specification and behavior related to each other in one or the other way. In our economy, transportation is an essential and widely used system in day to day lifestyle where it is responsible for serving the citizens with full range activities needed by the customer and facilitating their needs.

Passenger's safety is major concern in the transport department, hence enhancing with road safety to passengers and driver is essential, we can optimize the time in responding during emergency, fleet management helps in tracking the vehicle during theft, many such applications can be monitored by the use IoT technology. The Internet of Things is enormously changing how we get to data and the diverse arrangements it can be connected. In earlier years, numerous new applications and ITS answers are using these advancements. Selection is presently, yet as new research and advances proceed to create and extend quickly, the effects and openings will be more prominent. This will essentially change numerous industries including transportation.

II. LITERATURE SURVEY

Zhu Yongjun, Zhu Xueli and their follow mates has analyzed and studied on Intelligent Transportation System Based on Internet of Things, their work explains all the components that can be used and the functionality of each is been analyzed and discussed on how traffic in urban area being controlled and maintained by monitoring vehicles.[1]

Juan Zambada, Ricardo Quintero and team presents "IoT based scholar bus monitoring system" to monitor school bus, which let the parents, school administration, keep track of the bus, this helps parents to know the safety of their kids and have control of the school bus[2].

Soumya Kanti Datta, Christian Bonnet discuss on "Integrating Connected Vehicles in Internet of Things Ecosystems: Challenges and Solutions". Internet of Things has wide range of implementation for vehicles which provides an intelligent and efficient transportation system. The authors discussion on this has formulated many challenges faced with connected vehicles and discussed oh how IoT can be used resolve the challenges. [4].

Cristina Alcaraz, Pablo Najera has proposed paper on "Wireless Sensor Networks and the Internet of Things: Do We Need a Complete Integration?" All the data about the physical device can be retrieved by accessing computational system through wireless sensor networks. In this paper the authors have discussed the security concerns with respect to WSN and challenges faced by integration process [8].

"Internet of Things (IoT): A vision, architectural elements, and future directions" by Jayavardhana Gubbia, Slaven Marusic Department of Electrical and Electronic Engineering, The University of Melbourne, Australia discuss on the vision of IoT, adaptation to recent wireless technology and key features and applications research for future scope in this technology . [9]

"Process and device for measuring the occupancy in passenger transportation means" proposed by Wilhelm Sonderegger , Georg Kuhne discuss about the occupancy of the passenger in the transportation system by using personal detectors and passenger cards. [10]

III. PROPOSED SYSTEM

In the proposed system, the occupancy of passenger in the us is detected using sensors which communicates and sends data to the driver who maintains a dashboard consisting the count of passenger present in the bus in each stage, by this technology it is easy to keep track of passenger when they are board and alight from the bus.

IV. OBJECTIVES:

Privacy of the passengers is maintained. Since the sensor does the work of a man so there is no need to keep a check on the passengers personally which keep gives the passenger his/her own personal space and comfort.

The entry of each passenger is read through sensors and displayed on dashboard hence there is no need of manpower. Its human tendency to forget and get confused during the count, so the accuracy on the count is maintained. Delay in the process does not occur since every count is maintained and displayed in time hence time management is maintained better through this process.

Software and hardware requirements
Software Requirements:
IDE   : Arduino IDE & EditPlus
Programming Languages : Embedded C, HTML & CSS, php
Operating system   : Windows
Database   : mySQL

Hardware components used
Sensor   : IR Proximity Sensor
Microcontroller : Aurdino Board
Wifi Module   : nodeMCU
LCD Monitor
System Design

System architecture and the proposed solution of the process are addressed in this chapter. Process specification, data flow diagram gives the view of the project in brief.

V. SYSTEM ARCHITECTURE

Fig 1 explains the system architecture of the process, power is supplied to the arduino board through power supply unit, once the power is given proximity sensors are activated and detects if any objects pass by and the data read is displayed on LCD(liquid crystal display).
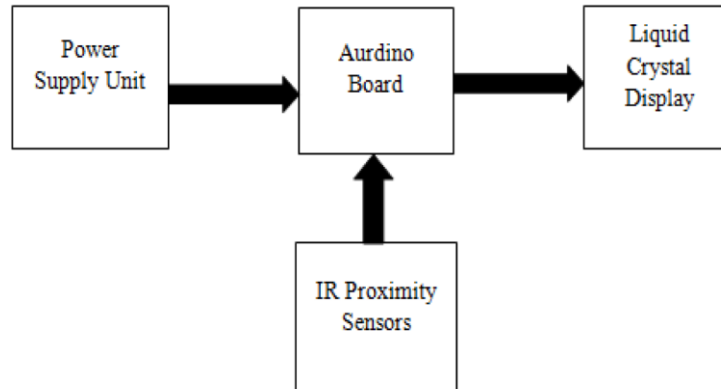
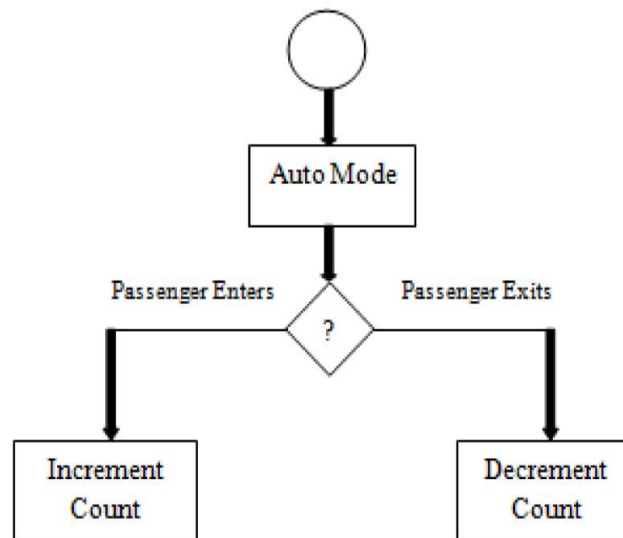Figure 1 System Architecture

Process Specification

Figure 2 Process Specification of Passenger Counting System

The above Fig 5.2 explains the process specification , the process is in auto mode which hold two condition , one when the passenger enters and second when passenger exit. If the first condition i.e. when passenger enters is true then there is an increment in the count and if the second condition i.e. when passenger exits is true then there is decrement in the count.

VI. IMPLEMENTATION

In this section we discuss the coding functionality and how the process is implemented. How the environmental setup is build in order to develop the process.

Real time applications based on embedded system should choose a programming language so it supports the system for implementation and interaction. Embedded C is used for embedded project. Embedded system are resource constrained, so using C would avoid any overhead since it is light – weight process. Runtime and the executables generated in C are small. So you do not require loading all the data for the execution.

C and C++ languages are simplified to make up an Arduino language has it is easier to code in arduino language using C. Few functions and commands are called to communicate with device when connected to the board. Each program is called "sketch" in arduino, once the complete code is ready the code should be dumped to arduino board, this can be done connecting it by USB and clicking on upload button on the tool . The results will be displayed on

the serial monitor. Two default functions present on each sketch is Void setup() in which commands are initialized, void loop() in which operations are mentioned to make the device work.

First we initialize two proximity IR sensors namely IR sensor 1 and IR sensor 2. When the IR sensor 1 is ON and when the IR sensor 2 is in OFF state it indicates that the passenger is entering the bus (ENTER). When the IR sensor 2 is in ON and IR sensor 1 is in OFF state this indicates that the passenger is leaving out of the bus (EXIT).When the passenger enters the bus count is incremented for each person, when the passenger exit from the bus count is decremented. The total count is displayed on LCD which maintained by the driver. when the connection is established Wi-Fi connection status is shown and data is transferred successfully and if connection fails no data is transferred. When the data is sent to server, admin uses his/her credentials to login. Once login is successful it redirects to dashboard where the passenger count and stage value is displayed.

VII. RESULTS AND DISCUSSIONS

Overview of the expected experimental results and discussion in described. It includes the display of total passenger count and the count of passenger in each stage form source to destination. The number of passengers in the bus in each stage is displayed on the LCD. Count varies in each stage as passenger enters the bus or exit from the bus until they reach the destination stage. The output is displayed on the dashboard as well which is maintained by admin.

VIII.CONCLUSION AND FUTURE WORK

All passengers who travel are concerned with their travel experience, in this proposed system each issue that is seen in the present system is resolved and given better way of approach to means of transport industry and automobile industry. To maintain privacy of the passenger during their journey is a high concern to the travel industry so by automating the system privacy of the passenger is also maintained and this would eliminate the need of manpower as we see in the present scenario. Other important task is to maintain the accuracy of the number of travelers in the bus by automating the system we can have the accurate count of the passenger travelling with any confusion. All these data is shown as a status on a web page which is maintained by admin in order to keep a confirmation and safety of the passengers. Hence by this process it eliminates extra manpower, privacy of each traveler is maintained, and accuracy in the total count is maintained.

Future implementation for proposed system is, we can make use of image processing to develop a system when the passenger enters the bus the image is captured and recorded so by this process we can keep track of each person in the bus and maintain their safety when they go missing. Even this process gives the passenger a better travel experience.

IX. REFERENCE

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