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# INTELLIGENT TRANSPORT SYSTEM USING IoT

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**Abstract -** *Today trustworthiness is of great significance in public transport. Around the same time, there is lack of real-time information for the people mainly use city buses. So, they always wait a long time in a bus stop for the bus. This paper proposes a framework which uses the Internet of Things (IoT) for that. This system is used to monitor the exact location, seating availability and bus arrival time in public transportation. In addition, as described above we created an Application (App) to show the data about the bus information. There is a lot of benefits for the people by using this process. An Intelligent Transport System (ITS) eliminates barriers to use of public transport for the bus journey.*

***Key Words***: Public transportation, Real-time information, IoT, App, Intelligent Transport System (ITS).

## 1. INTRODUCTION

Generally, public transport is a service available on sharing basis for the benefit of general public. Then the main reason why the people choose public transportation over other modes of transport or eco-friendly and easy accessibility .But there is a lack of information about the arrival time in public transportation. To overcome that, we propose a smart information system where all relevant information of the bus will be processed to the user.

The main thing in this method is Internet of things. Basically, IoT can assist in integration of communication, control and information processing across various transportation system. So, this method uses internet of things which is mainly used to provide an interaction between the passenger and bus. We use these devices regarding our daily life, monitoring personal status and tracking objects.

Public transport is extremely economically allowing a large population to access it. Using a bus is comparatively cheaper than other modes of transport. Then there are many discounts available for some individuals like students and senior citizens who use public transport as their transportation option to get to work or to school. Also, public transport can preserve the environment by reducing the amount of pollution.

## 2. LITERATURE SURVEY

Here, they present an alternative approach for fine-grained transportation mode detection using Kinetic Energy Harvester (KEH). They designed a transportation detection framework based on attention-based Long Short Term Memory (LSTM) [1]. In this paper, they proposes a system to track public bus using GPS , tells the count of number of passengers in bus and also the estimated arrival time to the user [2]. They implement a system for helping UiTM Students to pinpoint the location and estimate arrival time of bus [3]. In this method , they used Raspberry pi with GPS and other sensors for secure and predictive bus transportation in schools and collages [4]. They propose WiBus ,which is a system to estimate buses arrival time, based on information from opportunistic IEEE 802.11 contacts [5]. This paper presents an improved approach to predict the public bus arrival time and dwell time . It could provide timely vehicle arrival and/or departure information to en-route, wayside, and pre-trip passengers [6]. Here, they propose a smart information system is presented for a bus passengers that have the ability to interconnect passengers with real-world public bus [7]. They proposed the design, development and deployment of GPS (Global Positioning System)/GSM(Global System for Mobile Communication) based vehicle tracking and alert system which allows inter-city transport companies to track their vehicles in real time [8]. In this paper, they introduce and discuss a design space of how behavioural transport data can shape more user-centric transport information services in order to inform future research activities in this area [9]. Here they design a method which describe the current system, and then discuss current and planned research that builds on it to use increasingly-powerful smart mobile devices to provide location and context-aware tools for navigating transit system [10]. They present a IT-based services offered in public transportation focuses on the passengers perspective and need to develop frame work for assessing service quality and customer satisfaction [11].

## 3. PROPOSED SYSTEM

### 3.1. SYSTEM IMPLEMENTATION

In this paper we present Intelligent Transport System show in figure1 which will allows the passenger to take alternative choices depending upon their situations. It proposes the latest and advance technique for existing system.

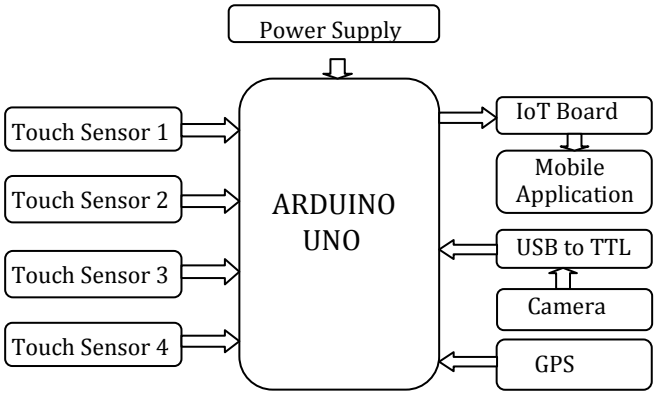


Figure 1.Block Diagram of the Intelligent Transport System

The input 230V supply is converted into 12V by using step down transformer, which is given to the voltage regulator to convert it as 5V supply. The proposed system presents setting availability by using touch sensor. This sensor is placed at the bottom of the each seats to take the exact count of occupied and unoccupied seats. When the passengers count is calculated using USB camera. This camera is used to capture each seat in bus depending upon the captured image we can predict the passenger count. GPS module is used to find the current location of the bus by showing the latitude and longitude. The information from the touch sensor and GPS module is send to ARDUINO Uno through serial communication. The ARDUINO Uno transmit these information to the IoT module it will display in Android App. This bus tracking system proposes where the passengers can get the information about the seating availability, exact location and bus arrival time by using the Android App. By using this system the passengers can get the real time information of the bus.

### 3.2. CIRCUIT DIAGRAM

In this circuit diagram, the GPS and Touch sensor output is displayed on the web page by using the software Arduino IDE and it is coded by using Embedded C programming. At the same time the cameras output is got through Anaconda Navigator which is coded by using Python programming. These data's are gathered in IoT serially and it is displayed in Android App on real-time basis.

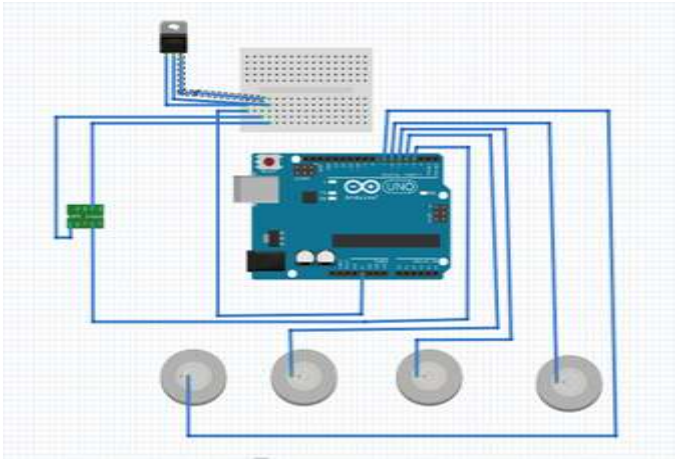

Figure 2.Circuit Diagram of the Intelligent Transport System

## 4. OPERATIONAL SPECIFICATION

### 4.1. HARDWARE IMPLEMENTATION

#### A. Arduino Uno

**ANALOG INPUT:** Arduino atmega-328 microcontroller board consist of 6 analog pins. These analog inputs can be named from A0 to A5. From these 6 analog inputs pins, we can do the process by using analog inputs. Analog inputs can be used in the operating range of 0 to 5V.

**DIGITAL INPUT:** Digital inputs can be defined as the non continuous time signal with discrete input pulses. It can be represented as 0's and 1's. These digital inputs can be either on state or in off state. Arduino atmega328 microcontroller also consists of 12 digital input pins. It can be stated as D0 to D11. Nearly 12 inputs can be used for digital input/output applications.

- ATmega328-AU microcontroller with UNO Bootloader Installed.
- USB Programming Facilitated by the CH340G.
- USB-B Connector and cable included.
- Input voltage - 7-15V.
- 0-5V outputs with 3.3V compatible inputs.
- 14 Digital I/O Pins (6 PWM outputs).
- 6 Analog Inputs.
- ISP Header.
- 32k Flash Memory
- 16MHz Clock Speed.

#### B. Global Positioning System (GPS)

GPS receiver module high sensitivity gps module:-165dBm low power consumption small size support walk model The Skylab SKG13 series is a complete gps receiver module that features super sensitivity, ultra low power and small form

factor. The GPS signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol.

GPS is based on the high performance features of the MediaTek 3329 single-chip architecture, Its -165dBm tracking sensitivity extends positioning coverage into place like urban canyons and dense foliage environment where the GPS was not possible before. The small form factor and low power consumption make the module easy to integrate into portable device like PNDs, mobile phones, cameras and vehicle navigation systems. Dual Power Source, Serial and TTL output Free GPS Active Antenna.

- Ultra high sensitivity: -165dBm
- 22 tracking/66 acquisition-channel receiver
- WAAS/EGNOS/MSAS/GAGAN support
- NMEA protocols (default speed: 9600bps)
- Internal back-up battery
- One serial port
- Embedded patch antenna 18.2 x 18.2 x 4.0 mm
- Operating temperature range: -40 to 85
- RoHS compliant (Lead-free)
- Tiny form factor 30mm x20mm x 8.5mm.

**C. Touch Sensor**

Touch Sensors are the electronic sensors that can detect touch. They operate as a switch when touched. These sensors are used in lamps, touch screens of the mobile, etc… Touch sensors offer an intuitive user interface.

Touch sensors are also known as Tactile sensors. These are simple to design, low cost and are produced in large scale. With the advance in technology, these sensors are rapidly replacing the mechanical switches. Based on their functions there are two types of touch sensors- Capacitive sensor and Resistive sensor

Capacitive sensors work by measuring capacitance and are seen in portable devices. These are durable, robust and attractive with low cost. Resistive sensors don't depend on any electrical properties for operation. These sensors work by measuring the pressure applied to their surface.

**D. Internet of Things (IoT)**

**Node MCU:** ESP8266 offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor.

When ESP8266 hosts the application, and when it is the only application processor in the device, it is able to boot up directly from an external flash.

It has integrated cache to improve the performance of the system in such applications, and to minimize the memory requirements.

Alternately, serving as a Wi-Fi adapter, wireless internet access can be added to any microcontroller-based design with simple connectivity through UART interface or the CPU AHB bridge interface.

- SDIO 2.0, SPI, UART
- 32-pin QFN package
- Integrated RF switch, balun, 24dBm PA, DCXO, and PMU
- Integrated RISC processor, on-chip memory and external memory interfaces
- Integrated MAC/baseband processors
- Quality of Service management
- I2S interface for high fidelity audio applications
- On-chip low-dropout linear regulators for all internal supplies
- Proprietary spurious-free clock generation architecture
- Integrated WEP, TKIP, AES, and WAPI engines.

**E. Camera**

The purpose of a webcam is, not surprisingly, to broadcast video on the Web. Webcams are typically small cameras that either attach to a user's monitor or sit on a desk.

Most webcams connect to the computer via USB, though some use a Firewire connection. Webcams typically come with software that allows the user to record video or stream the video on the Web. If the user has a website that supports streaming video, other users can watch the video stream from their Web browsers.

Webcams can also be used for video chat sessions with other people. Instead of broadcasting the video on the Web, users can set up a video chat session with one or more friends and have a conversation with live audio and video.

## 4.2. SOFTWARE IMPLEMENTATION

**A. Arduino IDE**

Arduino is an open-source platform used for building electronics projects.

Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason.

This flexibility combined with the fact that the Arduino software is free, the hardware boards are pretty cheap, and both the software and hardware are easy to learn has led to a large community of users who have contributed code and released instructions for a huge variety of Arduino-based projects.

There are many varieties of Arduino boards (explained on the next page) that can be used for different purposes. Some boards look a bit different from the one below, but most Arduinos have the majority of these components in common.

**B. Embedded C**

Embedded C is most popular programming language in software field for developing electronic gadgets. Each processor used in electronic system is associated with embedded software.

Embedded C programming plays a key role in performing specific function by the processor. In day-to-day life we used many electronic devices such as mobile phone, washing machine, digital camera, etc.

These all device working is based on microcontroller that are programmed by embedded C. The Embedded C code written in above block diagram is used for blinking the LED connected with Port0 of microcontroller.

In embedded system programming C code is preferred over other language. Due to the following reasons:

- Easy to understand
- High Reliability
- Portability
- Scalability
- Function is a collection of statements that is used for performing a specific task and a collection of one or more functions is called a programming language.

**C. Anaconda Navigator**

**Hardware Requirements:**

- CPU: 2 x 64-bit 2.8 GHz 8.00 GT/s CPUs
- RAM: 32 GB (or 16GB of 1600 MHz DDR3 Ram)
- Storage: 300 GB, Additional space recommended if the repository will be used to store packages built by customer. With an empty repository, a base install requires 2GB
- Internet access to download the files from Anaconda cloud or a USB drive containing all of the files you need with alternate instructions of air gapped installations

**Software & System Requirements:**

- Client environment may be Windows, macOs or Linux
- MangoDB 2.6 (provided)
- Anaconda Repository license file
- Linux system accounts
- Mangod (RHEL) or mongodb (Ubuntu)
- Anaconda-server

**D. Python**

- It is easy to learn and use. It is developer-friendly and high level programming language.
- Python language is more expressive means that it is more understandable and readable.
- It is an Interpreted language. This makes debugging easy and thus suitable for beginners.
- Python can run egually on different platforms such as windows, linus, unix and macintosh etc. So, we can say that python is a portable language.
- It is freely available at official web address. The source-code is also available. Therefore it is open source.
- This supports Object oriented language and concepts of classes and objects come into existence.
- Extensible
- Large standard library
- GUI programming support
- Integrated.

## 5. EXPECTED RESULT

This Intelligent Transport System provides the real-time information about the exact location, seating availability and bus arrival time. This helps the people who use public transport as their mode of transportation, where the people can check the vacancies status and searching for upcoming buses to make better decisions. It will reduce the crowed level inside the bus.


Figure 3.ITS Android App

Figure 4.Output of ITS App

## 6. CONCLUSION AND FUTURE WORK

In this paper, an Intelligent Transport System is presented for the bus passengers that has the ability to interconnect passengers with real-time information. This system has been implemented on Android platform. Also, different attributes like touch sensor, GPS, Arduino Uno and IoT has been added to the project to improve the advantageous to the system. It provides the Information about current and next location, passengers counts and seating availability. So, the passengers will be able to take better decision depending on their situation. This system will help in making the public transport most reliable and efficient.

Future work includes adding details regarding waiting time in signal and traffic jam to produce higher accuracy in time of arrival. To produce higher data service to the passengers map primarily based visualization regarding the situation of the bus may additionally be provided.

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