



## AN IOT APPROACH TO THE ISSUE OF BUS COMMUTERS

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### ABSTRACT

As we have projected our nation as a developing country in transition to developed nation status. The development of smart cities is in full swing and several hundred crores of INR is being spent on the development of smart cities. Efficient transportation could be an important issue to be considered in public transport system. To make city digitalised this is the small contribution. As we know buses are most widely used for transportation in many cities today. Passengers face a major problem due to the lack of proper bus management by authorities. Various sectors in economy have seen immense involvement of technology. The introduction of Internet of Things (IoT) in the blooming silicon market provided us with an opportunity to enhance customer experience of bus commuters (especially daily commuters). With the integration of various sensors and Arduino modules, we have designed a solution for various problems (such as overcrowding) faced by the bus commuters on a daily basis. It will

help immensely in the development of smart cities which will eventually lead to the nation's overall development.

**KEYWORDS:** The main objective of this project is to provide with some IoT based approaches that can help to solve the problems faced by daily commuters. To reduce the overcrowding.

### 1. INTRODUCTION

Public transport has always been the first priority for daily commute on every commoner's mind. The reason why public transports are preferred is that, public transports are relatively cheaper than private travel. Private vehicles require servicing, insurance and repairs on a timely basis. Public transport on the other hand, offers concessions for elderly citizens and also students. Also, public transports are a boon to the environment. Big cities have public transport networks that reach out all around the city, thereby making it very convenient for people. Public transport comes as a boon to all those people who can't drive



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and are dependent on their friends or relatives to do the driving. Public transportation can convey many more people in much less space than individual auto mobiles, which helps to keep traffic congestion lower, and helps riders avoid the stress that comes from daily driving in highly congested areas.

This paper attempts to provide solutions to the problems stated above, we want to provide solutions with the help of this paper. For instance, a weight check can be installed on all the buses which will ensure that the buses do not run overloaded. Also, real time data can be provided to the passengers on their mobile devices, regarding the arrival and status of the buses. The status can be shown indicating whether the bus is filled or not. If a person finds his bus already filled, he need not wait until the bus arrives. He can make alternate arrangements. Also, real time information regarding any bus break downs on any route can be indicated on the mobile application. The paper is organised as mentioned further. Section II talks about Methods Used in which, we have briefly explained the methods we have used as solutions to the aforementioned problems. Section III discusses Implementation Details, an in-depth view of how the proposed methods are implemented. Section IV and Section V contain and the Future enhancements of this presentation.

## **LITERATURE REVIEW**

### **[1]. Automatic Passenger counting System using Image Processing based on Skin colour Detection Approach.**

Paper published on 2018. This paper presented a model of automatic passenger counting using Image processing. The number of people entering and leaving the bus is an important parameter to allocate the correct number of buses for each public transport service connection line. As far as the safety and comfort of the passengers is considered, the bus through which they are travelling should not be overloaded. Moreover, the distribution of existing buses on different routes is the basis for obtaining overall transport network optimization, and to reduce costs. In general, most of the available passenger counting system consists of sensor and counter to count the number of passengers on the public transport. However, the problem faced by this system is inaccurate counting due to fault in the transmission of data from sensor to counter. Therefore, this paper proposes an automatic passenger counting system for fleet management by using image processing based on skin colour detection approach. This study aims to increase the efficiency and reliability of bus management system in Universiti Malaysia Perlis (UniMAP).

In order to obtain the number of passenger in the bus, the passenger images have been processed with several image processing techniques which consist of a few steps; (1) colour conversion of RGB to HSV colour image, (2) image segmentation using thresholding technique, (3) removal of noise or unwanted object, (4) image smoothing and (5) passenger counting process.

For the skin colour detection, this approach is based on utilizing the colour content of the hue



and saturation colour components. In order to test the capability of the proposed APC system, the numbers of passengers and the conditions of lighting have been considered. Based on the qualitative findings provided in the previous section, it can be seen that the thresholding technique has successfully segment the area of interest based on skin colour detection by using the proposed threshold values.

### **[2].An Internet of things based on intelligent Transportation System.**

Paper published on 2014. In this paper they demonstrate the idea to build an Intelligent Transportation System (ITS) using the Internet of Things (IoT) platform. The system has three components; the sensor system, monitoring system and the display system. The sensor system has Global Positioning System (GPS), Near Field Communication (NFC), Temperature and Humidity sensors, which are always connected with the internet via a GSM network to track the location, commuter and ambience inside the bus. The monitoring system is used to extract the raw data from the sensors database, convert it in to a meaningful context, triggers some events with in the bus and provide information to the bus driver. The display system is used to show the context data (bus and travel related information) to all the commuters in the bus stop. They described their prototype and show how this can be used as a fundamental component to build the ITS.

### **[3]. Pervasive Technology and Public transport: opportunities beyond telematics.**

Paper published on 2012. This article provides an overview of what IT-based services are currently offered in public transport and what is their assessed impact. They finalise by putting forward possible directions that future services might follow, and stress out the necessity to come up with frameworks that enable for the impact assessment on service quality and customer satisfaction.

This article has reviewed the IT-based services and applications that currently are offered to public transport passengers. The shift from ITS to more passenger-centric services seems to indicate that researchers and developers are starting to look at the introduction of services from the user experience perspective.

### **[4]. Intelligent transportation based on Internet of Things (IoT).**

Paper published on 2012. This paper is mainly about the integration of the technology of Internet of Things and the intelligent transportation, and it points out the tendency of the collection of the intelligent transportation signal and the control system as well, which are based on the structure of the Internet of Things, They also analyze the influence on the transportation industry and elaborate the relationship between the intelligent transportation and the Internet of Things, discuss the setup of the new generation intelligent transportation. At last they will expect the application prospects of the intelligent transportation based on the Internet of Things.

The applications of the Internet of Things technology in ITS will enhance management level and the level of information service of the intelligent traffic, from the field of physical control to the information space of virtual mirror control. And it will provide a powerful technology guarantee for the traffic information intelligence analysis and traffic management mode transformation and provide advanced technical support to reduce the energy consumption, improve environmental pollution and improve the image of city, creating the great social and economic benefit.

## 2. BLOCK DIAGRAM

The block diagram shows the connections of different modules. In this block diagram, Sensor (Pressure) is connected to Arduino module, when passengers are seated in the seat, the Pressure sensor is sensed the weight and send the data to Arduino module. Arduino module is connected to RF module as well as Internet module, the data from the Arduino is send in two ways, the first is it will send the data to the display through the RF module. Second is, it will send the data to the PC/MOBILE through the Internet module. Then passengers easily find seats are available or not in the bus through the Android application.

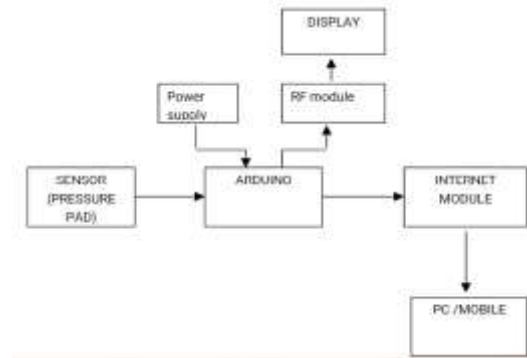


Fig 1. Block Diagram

## 3. HARDWARE DESIGN

In our proposed android system, any passengers who will board, it will be shown in the display monitor installed in front of the bus. No manual counting would be needed. If there is no passenger on seat, it will show a blank seat. But when a passenger will be seated on the bus, it will show occupied on the display screen. Display will change the colour for each seat occupied. The display database updates in every 30 sec. There will be some checkers for every stoppage. When the bus reaches any stoppage, checker will enter into the bus. He will access into the display database by giving his login credentials and send the updated data to server. So that, from every starting point to destination, the actual number of passengers will be automatic counted and it will reduce the window of corruption.

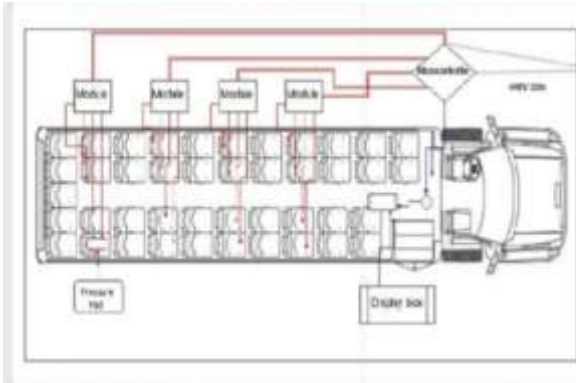


Fig2:Hardware Design

Node MCU is an open source IOT platform. It includes firmware which runs on the ESP8266 Wi-Fi SOC from Expressif Systems, and hardware which is based on the ESP-12 module. The term "Node MCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the Lau project, and built on the Espressif Non-OS SDK for ESP8266

#### 4. SYSTEM DESIGN AND IMPLEMENTATION

The Internet of Things (IOT) describes a network of physical objects that connect to each other through the internet. Objects or 'things' can transfer information wirelessly without requiring human interaction. A 'thing' can be any object that can be assigned an IP address and provided with the ability to transfer data over a network.



Fig3:NODE MCU (WI FI MODULE)

#### 5. SOFTWARE IMPLEMENTATION

SKETCH Embedded C software for programming of IOT module. Dip trace PCB designing software. BLYNK IOT app for mobile. Imagine a prototyping board on your smartphone where you drag and drop buttons, sliders, displays, graphs and other functional widgets. And in a matter of minutes these widgets can control Arduino and get data from it.

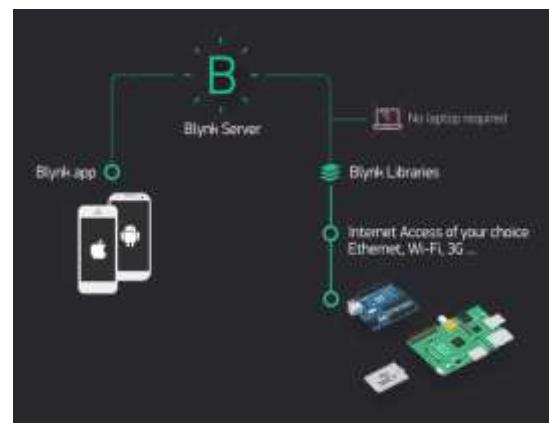


Fig 4:Software implementation

### RESULT



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Public transport is a very convenient means of commute for people. But, if people have to think twice before they wait at a stop every time, just to avoid an overcrowded bus, then public transport will not serve its purpose. Also a mobile application that informs passengers real time data related to buses in a route can help people save time, and plan their schedules and arrangements without getting disappointed waiting for buses that does not turn up or a bus that arrives filled up.

**FUTURE SCOPE**

This model can help to solve the problems faced by the public transports to avoid overcrowding. Because of overcrowding many accidents and waste of time by waiting in bus stand for buses can reduce. Another scope is that, alternate routes can be provided to users if a certain bus suffers a break down. This also helps to promote Make in India by working digitally. In future it may develop by adding more applications to it. The new development helps to reduce the problems which are faced by the commuters.

**CONCLUSION**

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