ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

IOT Based Dynamic Signaling and Detection of Ambulance

Mr. G. Rajasekharam [1]
P. Neelima Sowndarya Sai [2], T. A. N. Parimala [3], A. Gowtham [4], M.V. Saikanth [5],
1 Associate Professor, HOD Dept. of CSE, NS Raju Institute of Technology Visakhapatnam, Andhra Pradesh, India
2, 3, 4, 5 Student, Dept of CSE, NS Raju Institute of Technology Visakhapatnam, Andhra Pradesh, India
grajasekharam@gmail.com. neelimasowndaryasai@gmail.com, neelimatanuku@gmail.com, gowthamrohan10@gmail.com, saikanthmv@gmail.com.

Aim & Objective:
To provide dynamic signaling with the help of the traffic distance and clear a way in the traffic for the emergency vehicle like an ambulance.

Literature Survey:
Traffic signal management is one of the major problematic issues in the current situation. Such scenarios, every signal are getting 60 seconds of timing on the road at a regular interval, even when traffic on that particular road is dense. As per this proposed model in this article, which will be optimized the timing interval of the traffic signal purely depends on the number of vehicles on that particular roadside. Because of traffic issue people cannot walk on road itself, if any patient is in car and get fixed in traffic, and other signal having fifty seconds time, but no more vehicles going over there, in this case if we manage this time one patient will going early to doctor and more chances to recover early, Failure of signals, poor law enforcement and bad traffic management has lead to traffic congestion.

Methodology: We implemented the current application on **ARDUINO IDE** with **ARDUINO MEGA 250** as implementation platform. Here we used the **IR Sensors** to detect the vehicles distance and **BLYNK** application and **GOOGLE ASSISTANT** to detect the ambulance in emergency time and to clear the respective road.

1. Introduction

Today, Internet application development demand is very high. So IoT is a major technology by which we can produce various useful internet applications. Basically, IoT is a network in which all physical objects are connected to the internet through network devices or routers and exchange data. IoT allows objects to be controlled remotely across existing network infrastructure. IoT is a very good and intelligent technique which reduces human effort as well as easy access to physical devices. This technique also has autonomous control feature by which any device can control without any human interaction. The above figure shows the connectivity of various devices of different fields with Internet and exchange data between them.

Cite this article as: G.Rajasekharam, P.Neelima Sowndarya Sai, T.A.N.Parimala, A.Gowtham and M.V.Saikanth "IOT Based Dynamic Signaling and Detection of Ambulance", International Journal & Magazine of Engineering, Technology, Management and Research (IJMETMR), ISSN 2348-4845, Volume 7 Issue 4, 2020, Page 25-33

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

So above figure represent the connectivity of world through various existing technologies. "Things" in the IoT sense, is the mixture of hardware, software, data, and services. "Things" can refer to a wide variety of devices such as DNA analysis devices for environmental monitoring, electric clamps in coastal waters, Arduino chips in home automation and many other. These devices gather useful data with the help of various existing technologies and share that data between other devices. Examples include Home Automation System which uses Wi-Fi or Bluetooth for exchange data between various devices of home.

1.1 Future Scope of Iot

According to Gartner (an information technology research and advisory firm), consumer applications will drive the number of connected things, while Enterprise will account for most of the revenue. Gartner estimated that 2.9 billion connected things are in use in the consumer sector in 2015 and would increase to over 13 billion till 2020. The UK Government allocated £40,000,000 towards research into the Internet of Things in their 2015 budget. The British Chancellor of the Exchequer George Osborne posited that the Internet of Things is the next stage of the information revolution and referenced the inter- connectivity of everything from civil transport to healing devices to home appliances.

1.2 Building Blocks of IoT

Four things form basic building blocks of IoT system –sensors, processors, gateways, applications. Each of these nodes has to have their own characteristics in order to form an useful IoT system.

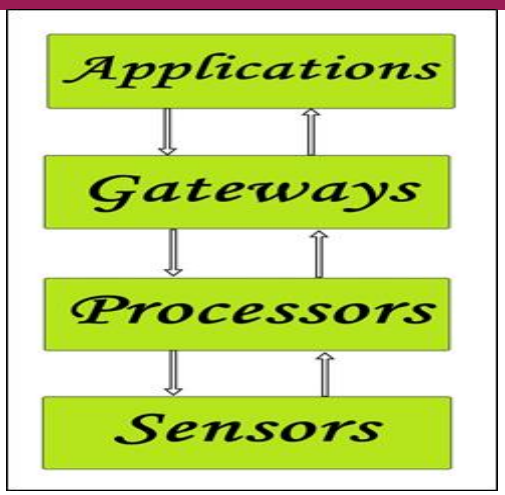

Figure 1: Simplified block diagram of the basic building blocks of the IoT

1.3 IoT Architecture Layers

There are four major layers. At the very bottom of IoT architecture, we start with the Sensors and Connectivity network which collects information. Then we have the Gateway and Network Layer. Above which we have the Management Service layer and then at the end we have the application layer where the data collected are processed according to the needs of various applications.

Let's discuss the features of each of these architectural layers separately.

Sensor, Connectivity and Network Layer

- This layer consists of RFID tags, sensors (which are essential part of an IoT system and are responsible for collecting raw data). These form the essential "things" of an IoT system.
- Sensors, RFID tags are wireless devices and form the Wireless Sensor Networks (WSN).

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

- Sensors are active in nature which means that real-time information is to be collected and processed.
- This layer also has the network connectivity (like WAN, PAN etc.) which is responsible for communicating the raw data to the next layer which is the Gateway and Network Layer.
- The devices which are comprised of WSN have finite storage capacity, restricted communication bandwidth and have small processing speed.
- We have different sensors for different applications – temperature sensor for collecting temperature data, water quality for examining water quality, moisture sensor for measuring moisture content of the atmosphere or soil etc.

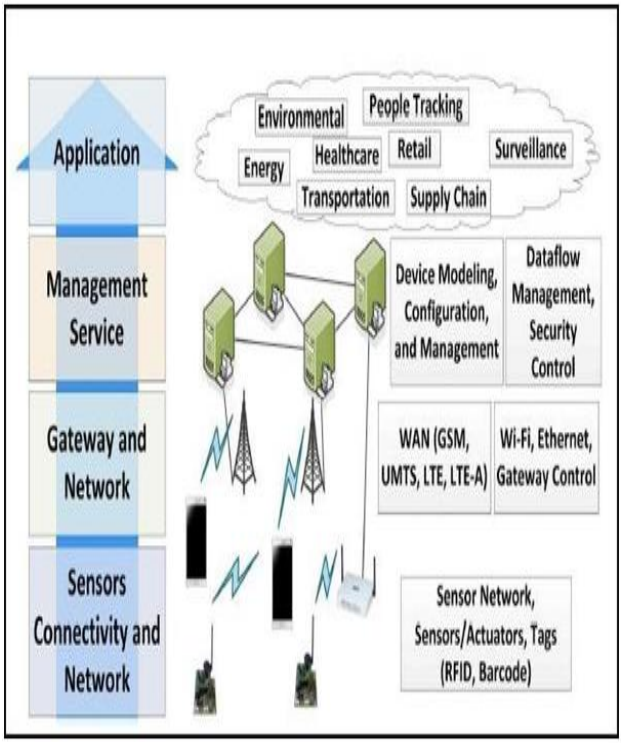

Figure 2: IoT architecture layers

2. Requirement Analysis

2.1 System Requirement Specification

Requirements and Specifications

Smart IoT services demand careful requirements capturing and specification development

A comprehensive description of an IoT service and/or its elements is needed to support the development and verification process. 7layers supports these processes with formal description techniques.

Requirements capturing and requirements specification

Requirements capturing is the first step in a requirements engineering process. The description of a capability or characteristic that provides value to a user or other stakeholder in an IoT Services process has been defined as a "requirement", whereas a set of specific requirements is called a "requirements specification". Requirements specifications are used as input into the design stage of an IoT process. Goal is to achieve a complete, valid and processable description of an IoT Service and/or its elements. To establish a complete requirements specification, 7layers performs the following activities:

- Initial requirements capturing and elicitation- For this purpose we interview IoT Services stakeholders and potential users about their demands, business cases, user stories etc. We also analyze conceptual papers, feasibility studies, already existing product or services descriptions from various sources.
- Requirements classification- Once the requirements have been captured, they are classified according to architectural / design

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

requirements, functional and non-functional requirements.

- Structuring of requirements- Requirements are structured according to characteristics such as hardware, software, communications, interfaces, security, electrical mechanical etc.
- Description and documentation of IoT process requirement- After classification and structuring, the requirements are described using formal description techniques. Especially for processes as complex as IoT Services set-ups, the requirements should be documented in a system that allows for continuous requirements management.

IoT Services specification

An appropriate subset of the established requirements will be used to define the basic IoT Service. In some cases additional aspects like environmental or legal requirements, or functional and design aspects may be included in the services specification. All specifications must be documented in a complete, consistent, correct, unambiguous and testable way.

2.2 Software Requirements

During the stage of research, we use many types of software to integrate our project, this software varies from programming software to designing, to software for circuits, etc, these software's names discussed before.

Arduino IDE, BLYNK LIBRARY, IFTTT SERVER LIBRARY, ARDUINO PROGRAM COMPILER

2.3 Hardware Requirements

The hardware requirements for the IOT Home Automation System consist of a computer controlled switching mechanism that will control the device to be automated.

Hardware Used In Iot Home Automation

- Nodemcu Iot Development Board
- Relays
- Power Supply
- Dht 11 Sensor
- Esp8266 01 Module
- Door Sensor
- Pir Sensor (Motion Sensor)
- Buzzer
- Loads

NODEMCU Development Board Description

Node MCU is an open-source firmware and development kit that helps you to prototype or build IoT product. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

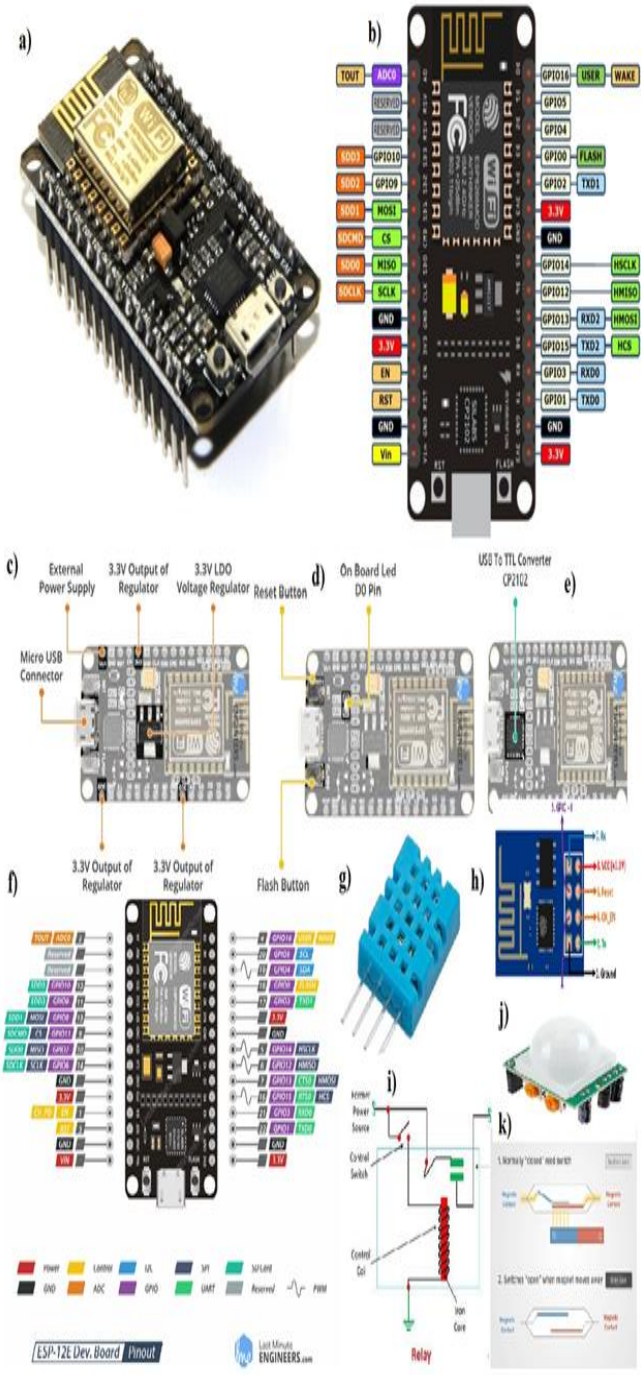

Fig 3: NodeMCU v1.0, Pin Out Diagram Of NodeMCU, ESP-12E Module, ESP8266 NodeMCU Pinout, DHT11 Sensor, Relays, PIR Sensor and Reed Switch Functionalities.

3. Design and Methodology

Fig- 4: Internet of Things, Basic Step of IoT

The concept of Home Automation aims to bring the control of operating your every day home electrical appliances to the tip of your finger, thus giving user affordable lighting solutions, better energy conservation with optimum use of energy. Apart from just lighting solutions, the concept also further extends to have a overall control over your home security as well as build a centralised home entertainment system and much more. The Internet of Things (or commonly referred to as IoT) based Home Automation system, as the name suggests aims to control all the devices of your smart home through internet protocols or cloud based computing.

.

3.1 Controller: The Brain of Your System

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

The main controller or the hub is the most essential part of your Home Automation system irrespective of whether you connect single or multiple sensors in your home. The main controller or the hub is also referred to as gateway and is connected to your home router through the Ethernet cable. Most of the smart home controllers available in the market from several manufacturers cater to all three widely used protocols of wireless communication for Home Automation: ZigBee, Z-Wave and Wi-Fi.

3.2 Smart Devices: The Sensory Organs of Your Home

The IoT based home automation consist of several smart devices for different applications of lighting, security, home entertainment etc. All these devices are integrated over a common network established by gateway and connected in a mesh network.

3.3 Wireless Connectivity: How the Internal Communication Occurs

Most of the IoT based Home Automation systems available today work on three widely used wireless communication protocols: Wi-Fi, ZigBee and Z-Wave. The ZigBee and the Z-Wave controllers are assigned a network ID which is distributed over other sensors in the network. The communication amongst devices take place in a mesh topology where there is no fixed path for the signals transmitted from the controller to the sensors and vice versa.

Connected with the Cloud: Access Everything on the Go

The Cloud-based-Networking system involves storage and maintenance of data over the Internet location. This gives users the flexibility to have access to the data from any location on the planet. As a result of this, in IoT based Home Automation systems users over the cloud network can send commands to the hub even from a distant or remote location. The hub will further send the signal for the intended sensors to trigger and perform the user-requested action. Once the action is performed, the hub will update the status of the action taken to the cloud network and in this way users can control and monitor every aspect of their smart homes.

Events and Notifications: Get Notified Instantly

Real-time monitoring and notifications is one of the key features of IoT based Home Automation systems. Since the hub is connected over the cloud network through the Internet, you can schedule various events as per your routine activities or daily schedules. The cloud network can receive and store all the user inputs and transfer them to the hub as per the scheduled events.

3.4 IFTTT Integration: Put Internet to Work for You

It is not practically possible to trigger every action one by one in your day long busy schedule. This is where you can put the Internet to work for you. The IF This Then That (IFTTT) Integration helps you in this condition. This enables you to create cascading effect of actions where the target action will trigger only when the IF condition is satisfied. Some of the examples of IFTTT

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

triggers are like "IF" day temperature above 25 degrees, turn the ACs on and roll-down the curtain blinds. IF Movie Mode is ON, then turn the lights to 10% brightness, IF soil moisture less then specific values, turn the water sprinklers in the garden ON.There are endless possibilities that you can create with IFTTT triggers and thus make the optimum use of your Home Automation system thereby making optimum use of energy and simultaneously enjoying a comfortable lifestyle.

3.5 Software Tools

ARDUINO IDE

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

INSTALLATION OF ARDUINO IDE SOFTWARE

After learning about the main parts of the Arduino UNO board, we are ready to learn how to set up the Arduino IDE. Once we learn this, we will be ready to upload our program on the Arduino board. In this section, we will learn in easy steps, how to set up the Arduino IDE on our computer and prepare the board to receive the program via USB cable. Step 1 − First you must have your Arduino board (you can choose your favorite board) and a USB cable. In case you use Arduino UNO, Arduino Duemilanove, Nano, Arduino Mega 2560, or Diecimila, you will need a standard USB cable (A plug to B plug), the kind you would connect to a USB printer as shown in the following image. Before explaining how we can upload our program to the board, we must demonstrate the function of each symbol appearing in the Arduino IDE toolbar.

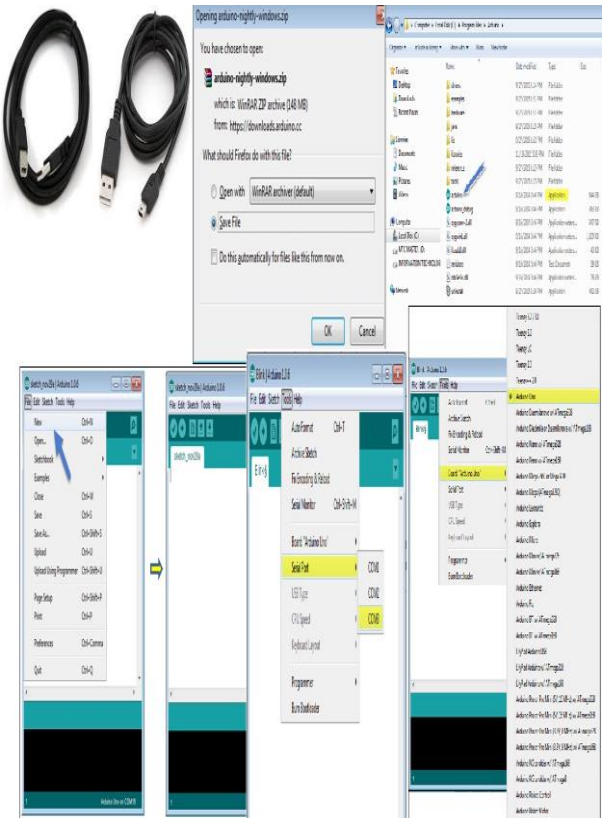

Fig- 5. In case you use Arduino Nano, you will need an A to Mini-B cable instead, Download Arduino IDE Software, Power up your board, Launch Arduino IDE, Open your first project, Select your Arduino board, Select your serial port and Upload the program to your board.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

4. TESTING OF EACH MODULE

Arduino – Digital and Analog Infrared Sensor

4.1 INTRODUCTION

This is a multipurpose infrared sensor which can be used for color detection.The sensor provides a digital as well as analog output. An on board LED is used to indicate the presence of an object. This digital output can be directly connected to an Arduino, Raspberry Pi or any other microcontroller to read the sensor output. IR sensors are highly susceptible to ambient light and the IR sensor on this sensor is suitably covered to reduce effect of ambient light on the sensor. The on board potentiometer should be used to calibrate the sensor.

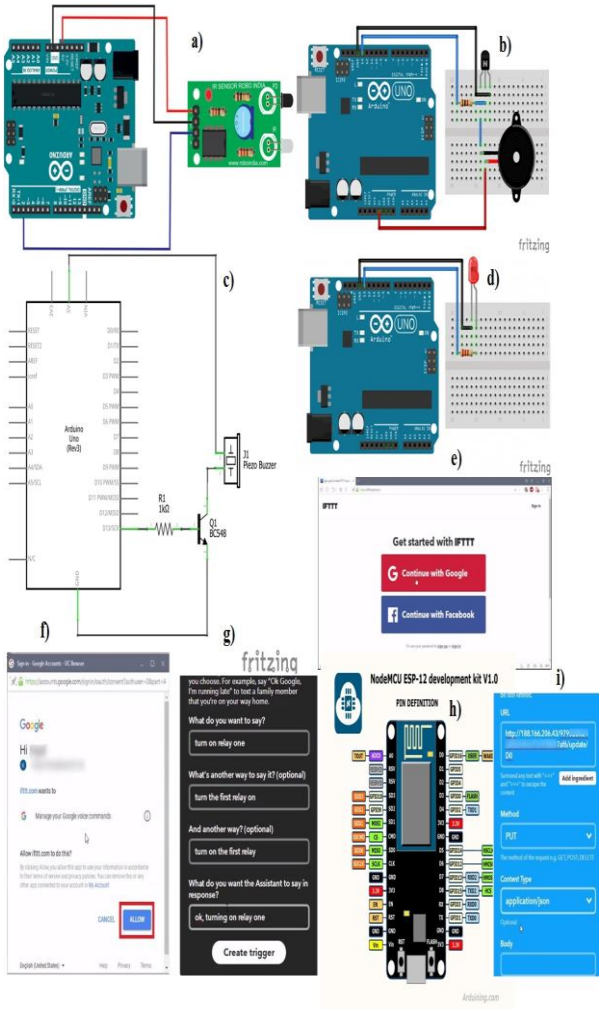

Fig- 6 a) IR Sensor Robo, b) Buzzer Arduino Connection, c) Buzzer Arduino Circuit, d) Arduino LED Connection, Node MCU, e) IFTTT, f) Google web, g) Okay, Turning on the T.V, h) Node MCU Esp-12 and i) Application/JSON.

5. RESULTS AND DISCUSSION

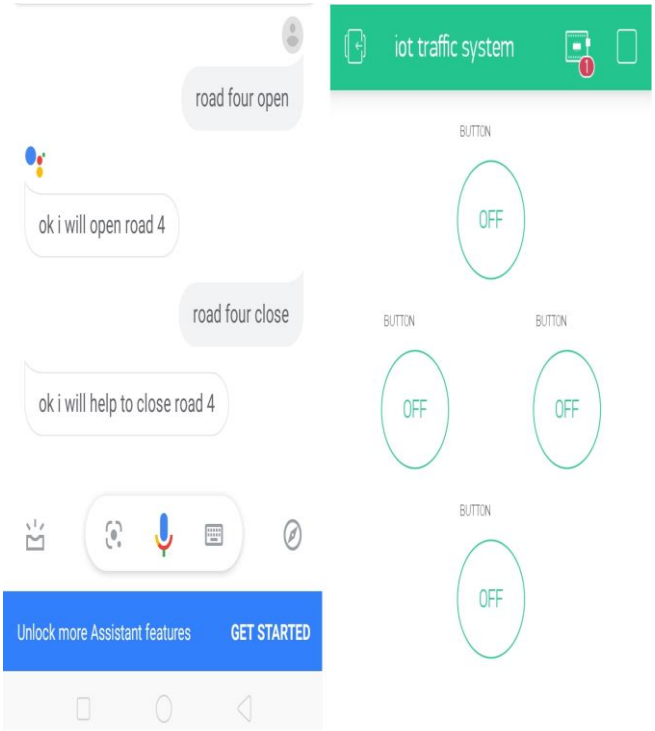

Fig 7: a) BLYNK application operation on ambulance module, b) Instructions to google assistant from ambulance

Dynamic signalling is done by detection of traffic with the help of IR sensor and NODE MCU, if the sensors get detected then the signal is allotted for 5seconds else for 3seconds.

With the help of Blyns app and google assistant it mekes a elmbulance to clear the traffic and automatically the signal returns to its specific road.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

6. CONCLUSION

TMS -Traffic Monitoring Signal timing has been developed by using multiple features of hardware components in IOT. Traffic optimization is achieved using IOT platform for efficient utilizing allocating varying time to all traffic signal according to available vehicles count in road path. TMS will helpful to client user to know timing arability and traffic flow count in any area of their nearby locality of any regions.

6.1 FUTURE SCOPE

In the future advancements of this TMS, a model ambulance can able to communicate with all base station to get an easy free lane to rush up reaching the hospital on time for needy people. So such scenarios signal automatically is cleared with its arrival schedule.

7. REFERENCES:

1. D. Choi, S. Seo, Y. Oh, and Y. Kang, “Two-Factor Fuzzy Commit-ment for Unmanned IoT Devices Security,” IEEE Internet of Things Journal, vol. 6, no. 1, pp. 335–348, Feb 2019.
2. N. Sriskanthan and T. Karand, “IOT based traffic management sys-tem,” Journal of Microprocessors and Microsystems, vol. 26, pp. 281–289, 2002.
3. R. Petrolo, V. Loscri, and N. Mitton, “Towards a smart city based on cloud of things, a survey on the smart city vision and paradigms,” Trans. Emerg. Telecommun. Technol., vol. 28, no. 1, pp. 1–12, 2015.