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IOT BASED CONFIGURABLE TRAFFIC LIGHTS CONTROLLING AND MONITORING SYSTEM

[1]Sakshi Mishra, [2]Shrushti Kolhe, [3]Pranjali Khangar, [4]Prof.AbhilashaBorkar

[1,2,3,4]*Cummins College of Engineering for Women, Nagpur*

Abstract: Here we provide IoT based automated traffic signal monitoring, traffic signaling system automation and automatic over-control of manual overrides on the Internet. The system uses a microcontroller-based circuit system to monitor traffic signals and transfer these data online to controllers on the Internet. The proposed system for online GUIs will be a web-based interface and software application for monitoring traffic light activity. In addition, system overlays give controllers the option to override the signal and override ambulances or critical vehicles when other signals are red. It has a traffic signal monitoring and controller system that can be operated remotely from anywhere on the internet with manual override capabilities. The system provides an option to control whether the various settings of the traffic light process can be configured remotely using a web application.

Introduction:

The Internet of Things (IoT), which incorporates everyday objects such as lamps, cameras, motion sensors, power switches and appliances, brings the next wave of Internet development. Cisco estimates that the IoT connection will reach 12.2 billion by 2020. It is common to represent almost all the connected devices, homes, activities with hundreds of smart IoT devices that can communicate with each other individually and remotely control / monitor.

IoT is the network that controls the physical device despite the Internet. This network provides accurate, quick and accurate results. The IoT system is designed to store all databases in a computer. This storage is mainly done through the Internet. Also this database is used according to their requirements and applications. The IoT system thus enables remote access to components that ultimately reduce human function or its interference. This makes it a more economical system. Thus, different protocols can be used depending on the relevant domain in IoT. The main communication form on the Internet is human-to-human, but everything will happen in the future, meaning the object has a unique identification number. The communication form will extend from human-to-human to human-object and object-to-object. This will enable it through various sensors connected to the Internet. Basically, IoT is connecting various application tools through the Internet. This is possible because of sensors which aid to transmit a wide variety of data, location.

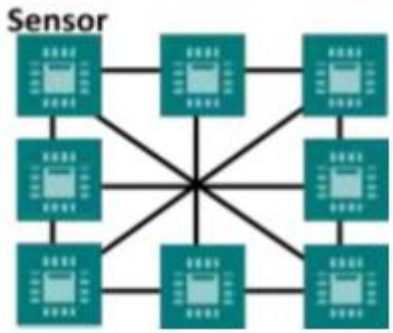
Here we propose to control IoT-based automated traffic signals, as well as manage the entire traffic signaling system and the individual tracking system. One of the important things in the Internet of Things in the Smart Cities is the Intelligent Transportation System (ITS). ITS improves vehicle-to-vehicle and vehicle-to-infrastructure infrastructure, rather than increasing road capacity or developing new roads. This is possible because it uses advanced information and communication, and this communication will be helpful in reducing traffic congestion and road accidents that are dangerous in urban areas.

Literature survey:

Methods of Traffic Management

Video data analysis: The video data analysis system consists of a video camera or sensor, a communications center, and a central observatory. Traffic is continuously monitored by the camera and the video is sent to the central monitoring station after compression. In some cases, real-time video transmissions can occur between the camera and the central monitoring station. This video analysis helps you calculate traffic statistics such as average speed, vehicle frequency and lane occupancy. Adaptive Traffic Control System (ATCS)**:** In such a system, traffic is often diverted from the main roads, where frequent lanes. It is followed in the United States, San Jose, and Portland. One of the main drawbacks of this approach is that it increases traffic on residential roads.

Wireless Sensor Network: The sensor is a fundamental component of the wireless sensor network. Sensors are components that report changes in the physical environment such as temperature, pressure, wind speed, etc. The sensor can then transmit recorded data to cellular mobile networks, such as Ethernet or gateway. Cellular mobile networks have the advantage of installing sensors despite the availability of cellular services. These sensors do not need to be within the wireless range of the network gateway due to their mesh connection. The node or sensor can transfer data to the nearest node and therefore the data can be transferred over the network gateway.



Fig,1-Sensor Mesh Network

Types of Sensors:

IR sensor: IR sensor or infrared sensor has two packages - transmitter and receiver. The transmitter emits transmitter waves passing through the transmitter. In the case of the existence of an object, the waves transmitted by the transmitter are reflected back and detected by the receiver. The receiver then sends commands to the electronic circuitry about the existence of an object in the area. Vehicles with IR sensors can notify the driver of vehicles in the vicinity and **avoid collisions.**

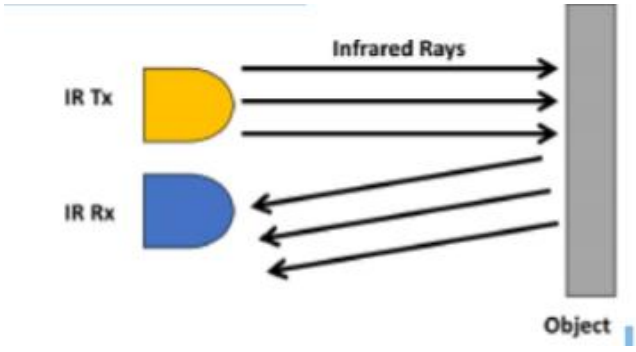


Fig 2-Working of IR Sensor

Radio Frequency Identification: This is called Radio Frequency Identification because it uses radio waves for object identification. This vision is not a line of technology. With this technique many objects can be found. The RFID system mainly consists of RFID readers and RFID tags. The RFID tag is attached to the object. RFID readers are constantly sending radio waves. Whenever the RFID tag comes around the radio waves it sends a feedback signal to the RFID reader. This feedback signal contains information from the RFID tag. There are two types of RFID tags - active and inactive. The active tag itself has a dedicated battery, while the idle tag does not have it. Idle tags receive their required power from radio waves sent by RFID readers. Non-volatile memory is used to store tag information. RFID can be used for traffic monitoring, parking management and toll collection.

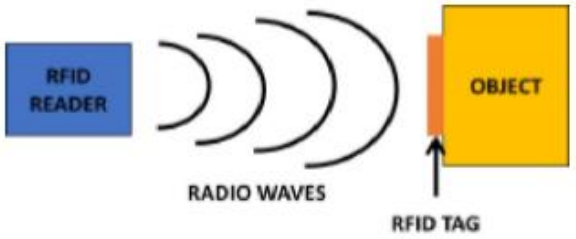


Fig 3-Radio Frequency Identifier

Applications of RFID:

1. Automatic collection of toll charges: Each country follows a different path to address toll charge collection. In case of RFID, RFID reader installed at the toll booth continuously send radio signals The data stored in the RFID tag is then sent to the RFID reader using radio waves. Information received from the RFID card reader is sent to the Central Monitoring Station for further analysis and operation. Information includes vehicle number, date of registration, amount in tag, etc. The toll charge is calculated accordingly and the new amount is updated after the tag is discovered.

2. Parking Guidance - RFID sensors can be applied to send parking space to a central monitoring station. Instead of traveling the entire parking lot in search of parking, the driver can request a dedicated parking space directly through his smart phone. This will tell the driver about the nearest empty parking lot.

3. Automatic vehicle speed detection - RFID readers continuously send radio waves. The time required by the radio wave to obtain information is used to determine the speed of the vehicle.

Proposed System:

All the traffic light is totally manually driven and wired system hence it always needs a human intervention at every square every day's multiple times a day. In case of emergency also there is no direct controlling power to authorities to control the traffic lights. Traffic control unit has a setting to control the start / stop timing for signal and daily on / off timing, but all those needs to done manually through physical access at every square. Proposed system is designed to have remote control over these activities and control it using IoT technologies.

The roadside unit consist of controlling and monitoring unit, cloud server unit, RF communication channel, IOT device and master controller. Signals controls by microcontroller follow by sensing data, which is processed and transfer through the cloud server. The entire system mounted at road side which used wireless sensor network.

Aim and Objective of the project:

The proposed system is primarily designed to control traffic light configuration and function. Below are the points of thought in the proposed system.

- Setting the traffic allow timing for every side of traffic flow.
- Configuring the daily signal start and stop timings.
- Control signal activities at every traffic signal.
- Monitor the signal activities over Google map.

Methodology:

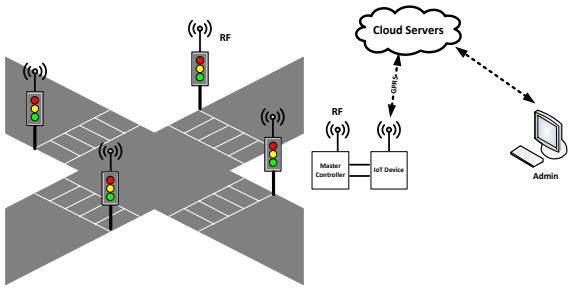


Fig. 1.0 System architecture

Figure no. 1.0 describes the architecture of the system where it displays all blocks, including hardware and software parts. It will have a master control unit that wirelessly controls the activation of the signal on each side using an RF communication channel and performs daily actions defined in the configuration. The master control IoT device will be connected to interact with the cloud server after a specified period of time to receive new settings. The cloud server will primarily have a web service for communicating with the IoT device and storing the settings in a DB containing a web application to gain user access to the system. The administrator will have a web-based GUI to administer the system. Control the all yellow light ON or OFF operation to allow all side traffic.

System Requirements:

- Hardware Requirements:
  a. Arduino Microcontroller Development Board
  b. IoT Communication Device
  c. RF Communication module
- Software Requirements:
  a. Microsoft ASP.Net
  b. MS SQL server Database

Conclusion:

Our country is ranked highest in the world for traffic related problems, thus there is the need to reduce traffic related issues such as long travelling time, fuel wastage, air pollution and transport related problems, this proposed system developed. Here developed system for real-time traffic monitoring using IoT platform which is reliable for users. This system also controls signal time, according to traffic levels at the lanes, gives priority to emergency vehicle. The proposed system is more reliable, easily operates by users and lost cost system and easily equipped at any place

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