

# IoT based Traffic Management System for Pilgrims using Arduino

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## ABSTRACT

Traffic congestion is becoming a grave problem in many big cities of the country. Unpredictable failure of traffic signals, poor law enforcement, and bad traffic management have led to this grave problem of traffic congestion. The road traffic management strategy determines the objectives, roles, responsibilities, and operational principles of the Regional Transport Office (RTO). The main aim of this project is to provide a smart way to monitor and control traffic congestion on roads and emergency service vehicles. The appropriate places for placing radio frequency readers are selected so that the radio frequency tags on the ambulance and fire-extinguisher truck can be read easily by the reader. This project will improve the current traffic system. Some corrective measures are taken that are implemented in our system to control traffic. In the proposed system, there will be barricades placed before zebra crossing lines so that vehicles will stop behind them systematically and nobody will be able to break the signal and go, thus, reducing the number of accidents. This will ensure the safety of all the pedestrians and all drivers. In this system, the emergency services like ambulance vehicles and fire-extinguisher trucks are also given priority to reach their destination in time, thus reducing delay. The proposed system is used to accept information about any emergency cases such as the passing of ambulance, or fire extinguisher vehicles using radio frequency identification technology. For implementation, we are using one Arduino-UNO and one Arduino-MEGA board and RFID technology. The system can open a complete lane for such emergency cases. As a result, the system will guarantee the fluency of traffic for the main vital streets and paths that require fluent traffic during peak hours of the day and the traffic jam.

**Keywords:** Traffic control, Arduino UNO, RFID tags, Traffic Signals, Traffic congestion accidents, LED.

## I. INTRODUCTION:

Safety begins right from ourselves, so it is most important to follow traffic rules and regulations. The focus of this method is to improve the current traffic system and reduce this grave issue of traffic congestion to some extent. To control traffic some corrective measures are taken that are implemented in our system. Also, there will be a radio frequency reader on the roadside to read the radio frequency tag on an ambulance or fire-extinguisher truck and immediately open the barricade irrespective of what the signal is for that road [4]. Red LED indicates CLOSED and green LED indicates OPEN. Arduino board and radiofrequency reader placed on the roadside will be used for this purpose. This reader will read and scan the radio frequency tag that detects the pilgrims by their allowed tags or cards and signal the Arduino board to halt its normal operation and open the right lane barricade so that the intended emergency vehicle can pass the road junction. This will also reduce the number of accidents occurring due to violation of traffic rules bypassing the road junction during the stop signal. This will also ensure the safety of pedestrians while crossing the roads at road junctions. For implementation, we are using an Arduino-Uno board and RFID technology. The system can open a complete lane for such emergency cases. As a result, the system will guarantee the fluency of traffic for the main vital streets and paths that require fluent traffic during peak hours of the day and the traffic density. This system is smart because it can run automatically. Without human intervention using timer circuits designed using an Arduino board or can be turned to allow human intervention under certain

circumstances using the remote control. Arduino board is one type of microprocessor and microcontroller and the boards consist of a set of digital and analog input and output pins that may be interfaced to various expansion boards and other circuits.

## II. LITERATURE REVIEW:

**Internet of things:** In this modern technology, the internet has become the most unavoidable thing. The internet of things was invented first time by Kevin Ashton in 1999. In his presentation, he presented a link between the applications and machines as well as people and animals in the network. So that the sharing of data will happen. [1]. IoT is an emerging research paradigm and apparently, the discovery of its body of knowledge is still in the infancy stage. So, the exact definition, architecture, scope, and standard are still not concretely defined [2].

**RFID Readers:** The proposed system is based on the simple principle of RFID tracking of vehicles, can operate in real-time, which improves traffic flow and safety, and is fully automated saving costly constant human involvement [3]. RFID technology can do a revolutionary movement in traffic management control; when it is impeccably implemented and the neural network operates perfectly. One of the best advantages is that data is transferred to a central unit via wireless. Also implementing this system is simpler and quicker in any kind of weather condition unlike the system using binoculars and the equipment used is less in amount. The dynamic system management operation is instant (Real-Time) and it is equal to police judgship [4].

**RFID Tags:** RFID tags are wireless devices that make use of radiofrequency electromagnetic fields to transfer data, which is used for identifying and tracking objects. RFID tags are of two types: Active and Passive [7]. Active RFID has a battery installed, which the passive RFID doesn't have. Passive RFID has to depend on an external source for work. Tags information can be stored in non-volatile memory. A tag consists of a Radio Frequency transmitter and receiver. Each tag can be assigned a unique serial number [8].

**Arduino:** In this proposed system we used one Arduino UNO board where the RFID reader is

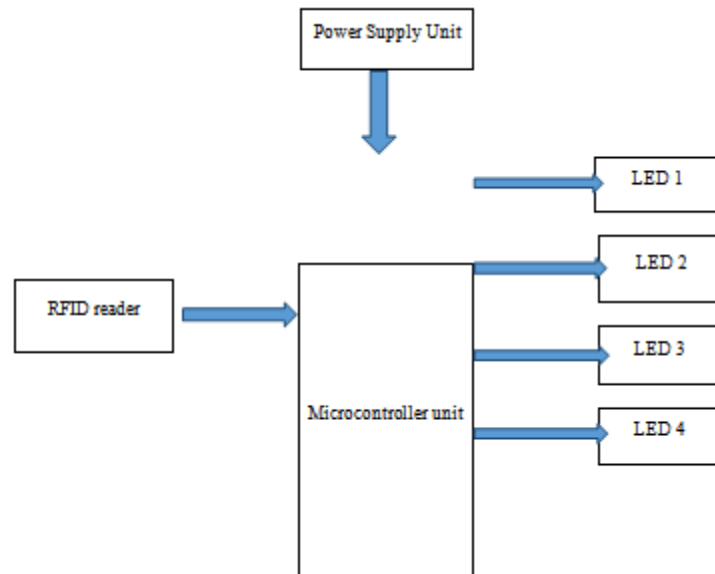
connected to it. RFID detects emergency vehicles and in the city like Pandharpur, it will detect pilgrims also at the time of Wari [4]. Arduino board designs use a variety of microprocessors and controllers. The whole is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits [5].

**Traffic Management:** The traffic management system is one of the major quantities of a smart city. With the rapid growth of population and rapid increase of vehicles across the whole country which further leads to the traffic Congestion which is usually seen on roads. To tackle various issues of traffic on roads and to help authorities in proper planning, a smart and advanced traffic management system using the Internet of things (IoT) should be there [9].

## III. METHODOLOGY:

At the signal junction, there are four signals. Green and red led are the indicators present over there. At that time when pilgrims are entered, one of the four junctions will start and the other three signals will be turned off. We provide one tag or card to the pilgrims only for that one road from which the pilgrims are entering. When the card is in the range of the RFID reader, the reader will send the signal to the control room [3] and the other three road signals will be red and then we allocate the time to the signal for example one minute and after completing time, all the signals automatically start. They work on a priority basis. For example, the first signal for 25 sec then the second signal for 25 sec. This system consists of a circuit that is combined in each vehicle. The users can interact with the system either through their smartphone's wired or wireless connection with a mounted board. This system used Radio Frequency Identification (RFID) which plays a vital role in the research paradigm of the internet of things (IoT) [6]. The basic functions of the proposed system include 1. An automatic traffic management system that works dynamically based on the concentration of vehicles in a separate area. The advantage of this proposed system is used in local workstations. Which receives data from every vehicle from a specific distance.

**Block Diagram of Proposed System:**



**Working Principle:**The working of this project is, first of all, the components required for the project are Arduino UNO, RFID reader, RFID tags, and LED. These are the most important components of the project. All the lights are connected to the Arduino UNO. And also RFID readers are connected to the Arduino.

RFID reader detects the valid cards allowed to the pilgrims who are included in Wari who have access to that registered card.

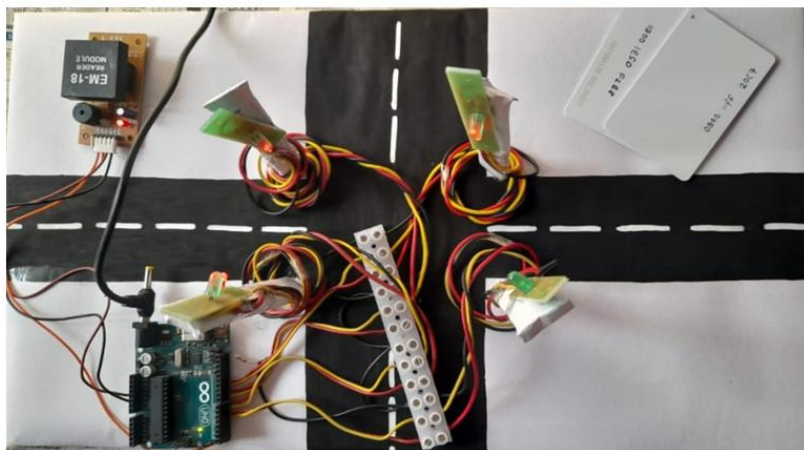
We are using two cards, one is a right card and another one is a wrong card. Right card means it's a valid card that is registered and which has the

access. And the wrong card means it's an invalid card that is not registered and which does not have access.

The RFID reader detects only that person who has a valid card. It also detects emergency vehicles like ambulances and fire brigades.

When we show the RFID card to the RFID reader, the RFID reader will send the signal to the Arduino UNO and the traffic lights will work according to the signal. We have given a delay of 10 sec, after each 10 sec the traffic signal changes and they will work according to their priority basis.

**IV. RESULT:**



## V. CONCLUSION:

By using this system we can detect the pilgrims and those are detected using RFID readers and sent to the microcontroller or the signal junction because of that we can avoid the accidents that happened with pilgrims.

Hence, here we conclude that by using this system, there will be fewer chances of disobeying traffic rules and several accidents. Also, the time delay for vehicles of emergency services to reach their destination will be less. Due to this, victims will reach the hospitals in time through the ambulance, and also fire-extinguisher trucks will reach in time to their destination.

Social awareness of citizens will be increased about obeying the traffic rules. This will make the traffic system more systematic.

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