Innovative Journal for Opportunities and Development in Science & Technology
Volume 1,Issue 10, June 2021
Paper Id: – IJ2021V1I10 -27 A-C,
ISSN 2582-6026

TRAFFIC MANAGEMENT BY RFID BASED SIGNAL PRIORITY CONTROL FOR EMERGENCY VEHICLES

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ABSTRACT :- Vehicular traffic can hardly escape the list of critical problems in the world that demand to be resolved at the most punctual. Endeavoring to destroy the variables that prompted this threat is an interaction excessively long for the current basic circumstance to sit tight for and stay unattended. Considering the genuine outcomes that follow because of gridlocks, some arrangement that can bring a speedy cure needs to be found in order to handle the current situation. And this paper is aimed at proposing one such solution which can considerably ameliorate the degree of the mayhem that is prevailing, using Radio Frequency Identification (RFID) technology.

Keywords- Data reliability, Controlling, Arduino, Vehicle Detection, Traffic management, Intelligent traffic system

I. INTRODUCTION

The transportation framework is significant in everybody's life. Traffic jam is a significant issue in our everyday life. There are a few explanations behind the abrupt flood in the rush hour gridlock, in various regions. The major clarification can be described as, to increase in the general population which subsequently has caused a rising in the amount of vehicles making the rounds. Moreover, there are a couple of various issues for gridlock like lacking establishment, insufficient organization of cutoff (for instance vulnerable traffic timing), work zone, extraordinary events, emergencies, unconstraint demands, etc In the past couple of years, progression in distant correspondence advancements and the improvement of vehicular association standards tiled the way for the execution of ITS. ITS is described as the usage of state of the art sensors, PC, equipment and telecom advancements and the board methods in a planned way to work on the security and effectiveness of the transportation framework system [1]. The major goal of ITS is to evaluate, develop, analyze and integrate the sensors, information communications technologies, and concept to make efficient traffic flow to improve environmental quality, save energy, conserve time such that enhance the comfort of drivers, pedestrian, and other traffic groups[2]. We can say that the purpose of ITS is to take advantage of the appropriate technologies to create “more intelligent” roads,

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vehicles and users. An ITS application must detect, control and reduce congestion based on online data that describes traffic patterns such as, density, speed, travel time, the geographic position of vehicles and the current time. To accomplish this goal, however, the main challenge is how to forecast congestion and re-route vehicles appropriately by considering the time impact on future traffic in an area of interest [4]. Inadequate capacity or density and unrestrained demand are interconnected but signal delays are hard coded and do not depend on the amount of traffic density. Therefore there is a need to optimize the traffic control system and make it more dynamic so as to accommodate the varying traffic density.

II. INTELLIGENT TRAFFIC SYSTEM

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-PC collaboration. [5] Traditional fields of inserted frameworks, remote sensor organizations, control frameworks, computerization (counting home and building robotization), and others all add to empowering the Internet of Things.

Smart Transportation Systems is a worldwide pattern, drawing in overall interest from transportation experts, auto industry, and political chiefs. ITS is identified with cutting edge correspondence, data, and hardware innovation to tackle transportation issues, for example, gridlock, security, transport productivity and ecological preservation, described as:

- Automated Data Collection: It needs extensive and precise strategic planning through hardware and competent software. Automatic vehicle identification, GPS based vehicle locator; cameras, sensors etc. are the some of the hardware used for data collection. With this large amount of data the analysis can be done like traffic count, surveillance, travel speed, time, location, delay etc.[6]
- Data Transmission: It is a key aspect of rapid and real-time information communication in ITS implementation. Information can be communicated by a traffic-related announcement to the traveler through SMS, internet, on-board units of vehicles etc. [7]
- Data Analysis: It contains adaptive logical analysis, error rectification, data cleaning, and data syntheses. The processed data analyzed further to forecast traffic scenario. Real-time information like travel time, delay, accidents on roads, change in route, work zone, diversions etc. is the gain after data analysis [8].

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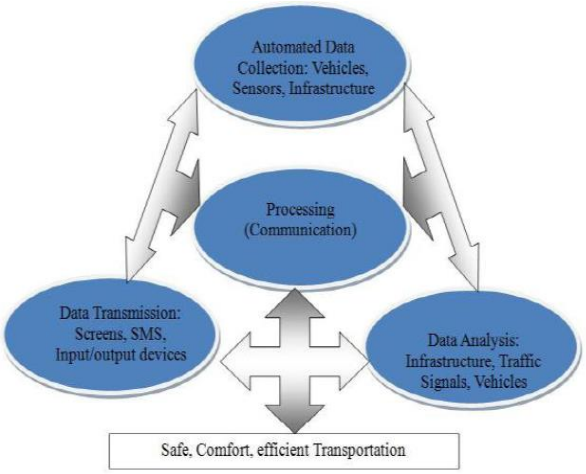

Fig 1 – Intelligent Traffic control

- Advanced Traveler Information System (ATIS): It implements a broad range of technologies, such as internet, telephones, cellular phones, television, radio, etc. to help travelers and drivers in making informed decisions regarding trip departures, optimum routes, and available modes of travel.
- Advanced Traffic Management System (ATMS): It is used by traffic police department and traffic regulation authorities as a tool to manage and control traffic by monitoring the flow of traffic and making appropriate decisions in a timely manner. Traffic management systems optimize the movement of vehicles, by using real-time information to interfere with and adjust controls such as traffic signals to improve traffic flow.
- Advanced Public Transportation System (APTS): It is concerned with increasing operational efficiency of all public transportation modes and increasing condition by making the transportation system more reliable. With the help of APTS the way public transportation systems functioning is transformed and the nature of the transportation services that can be offered by public transportation systems are changed.
- Emergency Management System (EMS): It is the newest research field in the intelligent transportation system. EMS is mainly concerned with the application of different intelligent transportation system technologies to develop a transport system which can provide help in the emergency conditions [5].

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III. SYSTEM ARCHITECTURE

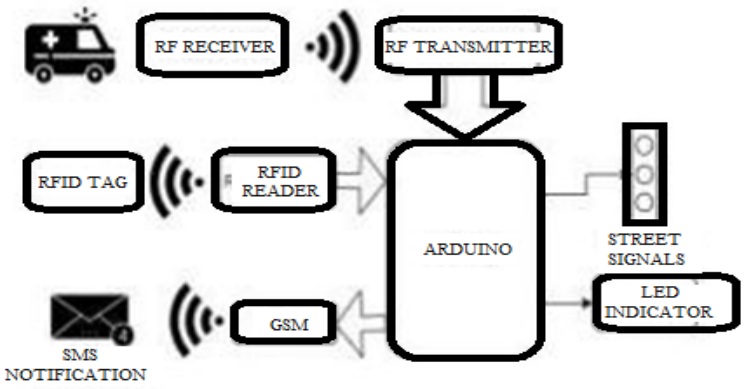

Fig 2: System Architecture Diagram

Implementation of RFID based intelligent traffic control needs a very strategic placement of RFID readers. The ITCS is included a bunch of two RFID perusers, isolated by some distance, toward every path of a street crossing and have a focal PC framework (CCS) to control them all. As a vehicle passes by a peruser, it tracks the vehicle through the RFID tag appended to the vehicle and recovers its electronic item code (EPC) information. The EPC essentially comprises of vehicular ID number (VIN). The VIN is an industry standard and each vehicle has an interesting VIN. Through a table look-into methodology the VIN might be coordinated against person vehicle record and all details like type, weight, length, registration, pollution control status, and the owner's identification can be retrieved. The data obtained is then sent immediately to the CCS by wireless or wired channels, as found convenient at that location. The CCS contains a central database processing system (CDPS) for processing vehicular data and a decision making section (DMS) for controlling the traffic signals. The CDPS consists of two parts:

- A dynamic database where the records of vehicles currently passing the crossing are temporarily stored
- A permanent database which stores the records of all vehicles that have passed the crossing

The dynamic database is divided into a number of parts. It arranges the EPC data of vehicles according to their path and direction of travel. Whenever a vehicle moves towards or away from the crossing, the two readers in its path detect it and convey the obtained data to the CCS with some time gap in between. The order of response of the two readers determines the direction of travel of the vehicle (whether it is moving towards or away from the crossing). The vehicular data is then sent to any one part of the database corresponding to its path and direction of travel. At each instant, the CDPS checks the data in various parts of the dynamic database and computes the volume of traffic for all the roads converging at the crossing. It then sends the computed information to the DMS of the CCS which operates the traffic signals

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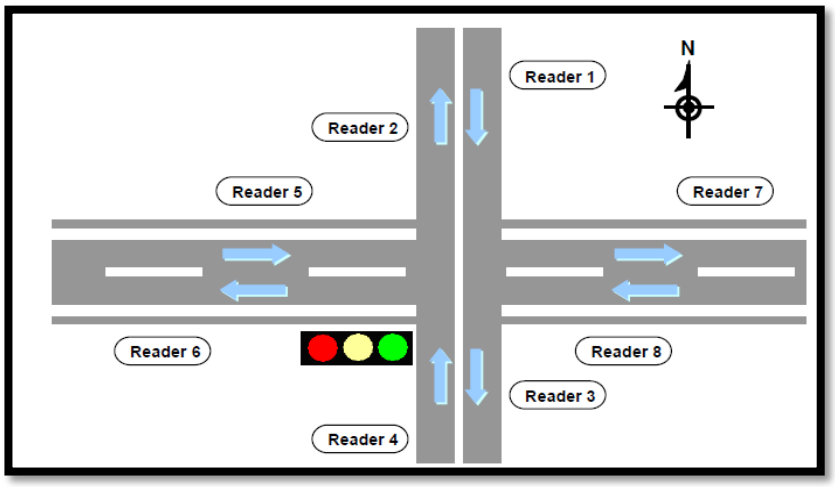

Fig 3 – Placement of RFID readers at strategic locations across signal

The volume of traffic is not calculated simply by the number of vehicles but by a complex set of equations which take into account pre-defined factors:

- Type of vehicle - Whether it is a smaller vehicle like a scooter or a car, or a larger vehicle like a bus or a truck. Emergency vehicles can be given unrestricted passage.
- Priority assigned to the vehicle - Each type of vehicle is assigned a specific priority based on its size, frequency of that vehicle at the crossing, time of the day etc.
- Priority assigned to the path of travel - This factor becomes essential when both the roads intersecting at the crossing are not of the same importance. Eg. Intersection of a national highway with an ordinary road.
- Time - The time of the day, and day of the week

So, the volume of traffic takes into account the priority assigned to each vehicle at the present time of the day and also the priority assigned to the two roads intersecting at the crossing. Some statistical parameters like inter-arrival time or, inter-departure time may also be calculated based on the available data which helps in prospective research.

Advantages

1. Low power consumption.
2. Easy to use
3. Microcontroller control
4. Notification via RFID

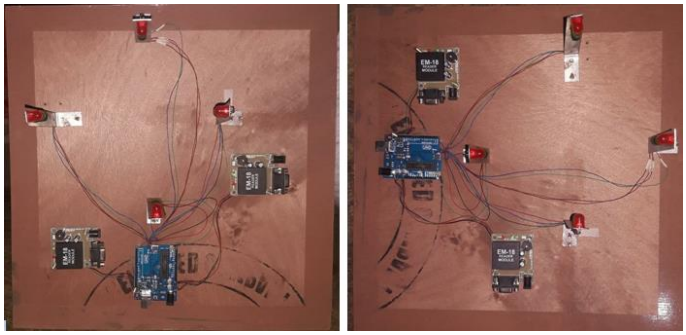

Fig 4 – Hardware implementation of system (demo purpose)

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IV. CONCLUSION

With automatic traffic light control supported the traffic density within the route, the manual effort on a part of the traffic policeman is saved. Because the entire system is automated, it requires very less human mediation. The vehicle data is put away inside the data set so it's not difficult to follow the taken vehicle. Additionally SMS will be sent all together that they will plan to get the taken vehicle at resulting potential intersections. Crisis vehicles like emergency vehicle, fire engines, had the chance to arrive at their objections at the soonest. On the off chance that they invest huge loads of your energy in gridlocks, valuable existences of the many individuals could likewise be in danger. With crisis vehicle leeway, the traffic signal goes to green as long on the grounds that the crisis vehicle is holding up inside the traffic unction. The traffic signal turns to red, only after the emergency vehicle passes through traffic signal. also as if any vehicle violate the red light is fined automatically. Further enhancements are often done to the prototype by testing it with longer range RFID readers. e purposes, and so forth.

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