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Traffic Management System for Smart Cities

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Abstract:- The main objective of our paperInvention is to work on density-based traffic control and smart lane changesover for Ambulance. From past many years, we all observed that there is a hefty traffic happening on roads, which influences the progression of ambulances. Nowadays managing or controlling the traffic in smart cities isgetting complicated due to rapid enhancement of Automobiles. Tofigure out this challenge we came up with the invention of "Traffic Management System for Smart Cities".

Key components included in the work are PIC Microcontroller, DC motors and IR sensors. We will be using IR sensors in Four Intersection roads which detect the nature of the traffic. All these IR sensors are connected to the PIC Microcontroller.If the ambulance got struck because of the traffic, RF receiver present at the signal on receiving the RF signal sent from the emergency vehicle and sendsthe data to the control unit. After signal received from the RF transmitter, the road divider starts moving right side a bit far for free pathof ambulance. After that, the divider comes to the original path. If These rules were followed, this will be the exact solution for the ambulance free path. This paper will regulate the traffic signals and saves the crucial time needed for the ambulance andbehaves like a "life saver project".

Keywords:- *PIC Microcontroller, Traffic signals, IR sensors, Road Divider.*

I. INTRODUCTION

During the past years, no traffic police involved in their duty to control the traffic. And there is only one lane road which does not helps the people to reach their destination properly on time. After some years, two lane road is constructed. Even though it won't help in control the traffic blockage.

We know that many patients were lost their lives with these traffic blockages. Mainly with Heart issue patients are dying inthe ambulance itself and most important thing is road accidents. It also produces the pollution which hits hard on the people'shealth.

Increment of vehicles everyday keeps theambulance and patients at risk. If this is howit will be, it is very complicated thing to savethe patients. In future, it may even growhigher and can become adverse. In this movement recapturing things should be made right away. Thus, for our over populated climate there is a genuine requirement for this paper for the general public to make simpler everyday better transportations. These traffic signals are established for smooth flow vehicles withoutany confliction between the pedestrians. Traffic signals are invented by a policeman named Lester Wire in 1912. It is easy for ambulance to cross the junction with the helpof movable divider if these traffic signals are strictly followed their rules any confliction between the pedestrians. Traffic signals are invented by a policeman named Lester Wire in 1912. It is easy for ambulance to cross thejunction with the help of movable divider if these traffic signals are strictly followed theirrules ambulance to cross the junction with thehelp of movable divider if these traffic signals are strictly followed their rules any confliction between the pedestrians. Traffic signals are invented by a policeman named Lester Wire in 1912. It is easy for ambulanceto cross the junction with the help of movabledivider if these traffic signals are strictly followed their rules RF Transmitter which is located and installed in the ambulance will sends the information upon its arrival to the RF receiverwhich is introduced at the junction signal. IR sensors which is placed in the four roads are connected to the control unit. Components aremainly interconnected to the PIC Microcontroller.

Our paper is not exclusively only for ambulances we can use it for many other emergency vehicles like Fire Engines, VIP vehicles, Blood donation vehicles, Civil defence vehicles. This paper will decrease theobstacles between the vehicles in rush hour gridlock and assists with giving quick recuperation. Our proposed paper really very simple and friendly cost which made us towork on it smoothly. Our system helps manyemergency vehicles who is suffering with traffic congestion.

II. LITERATURE SURVEY

Nowadays technology has become an important role in human life. And accidents are part of our era, which were caused due touncertain negligence and uncertain levels. To avoid accidents, we human sources have discovered some essential rules. Traffic congestion and tide current (often dangerous) are the main reasons which cause delays to ambulances. There may be several reasons for traffic slowdown, like rapid growth of human population and temporary traffic flowdisruption.

These are the most unwelcomed that causethe roadway to be blocked, a construction zone causing unpredictable and change inroad patterns or inclement weather conditionsthat leads to all accidents. To get away from all kinds of accidents and to save the human race we implemented a scheme called [1,3] ITLS. The main theme behind this theory is to provide

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a smooth flow for emergency vehicles and other important vehicles to reach the hospitals in time which leads to minimizing the delay caused by the traffic congestions. The basic function of traffic lights requires more than sight function and coordination to make sure that traffic and living things move in a coordinate system, assmoothly as possible. The idea is to implement the ITLS which mechanically controls the traffic lights and which leads the path to ambulances. The ambulances here are controlled by the control unit [17] which leads a unique route to the ambulances and also controls the traffic signals according to ambulances location and makes it to the hospital. The sensor system [18] attached to the vehicle identifies the accident spot and passes the signal through the control unit to nearby hospitals. This theory is fully automated which finds the accident spots andcontrols the traffic lights, and also helps the ambulance to reach the hospital in a short period.

IR sensors [4] present in the four intersection roads detects the density of the vehicles on the road. Ambulances will send the RF signals to control unit (which acts as a Receiver) upon its arrival. The systems that are being implemented or proposed works onthe basis of IR sensors. In some innovations technology based on using RFID [3] has alsobeen present. Thus, where they lack having the alternate method to control flow. And it also can't be stated whether an emergency vehicle like ambulance, Fire engine. So, these are the times where our project becomes handy. In following cases the time limit mustnot be taken into account.

There are much more defined solutions using image processing [2] which lacks capturing of the images clearly. Capturing ofthe images depends on the climatic condition (sometimes during fog or rain which can't beclearly seen). This can be completely eliminated in our model where we use only RF signals to transmit to the control unit. Special modified algorithms, morphology cannot be used in Intelligent Traffic Control Systems (ICTS) [1].

The other proposed system based on android application [1], which works on installing an apk file in the phone and then confirms the registration by the server ofcloud and the coordinates of the local signal system is then stored in that of cloud computing server. And now the emergency vehicle can be able to track using the coordinates [8] at any time which will be intimated to the server by disclosing the location of the vehicle. Here, in this case a unique id to be created that is to be registered in the cloud [14]. The command will be selected in the server on which the colour of the traffic signal will be changed according with. But there are mere chances that the system might get hacked and the atmospheric conditions can get impact the flow of the process. The above mentioned can be purely avoided in the paper we proposed as it only uses RF signal to get transmitted.

As you can see in this [7] they have usedMega Arduino which plays an important role in the work of moving the divider in needs byusing RFID reader. It is used to control the actions needed for the paper. The cost of the Mega Arduino [8] is high as compared to PICMicrocontroller. The number of pins presented in PIC microcontroller is less than the Arduino. It is having more memoryspaces and with more input pins when it is. We can use make of moving the divider inneeds by using RFID [11] reader.

The number of pins will be less in PIC Microcontroller [13] to that of Arduino. compared to other microcontrollers which is available in the market. These IR sensors [1]are internally connected with Arduino to check the density of the traffic. Connections made between the components is a long setupin the Arduino. The main advantage of Arduino [8] is having more memory spaces than the PIC microcontrollers. Normally, it isused in big projects in order to maintain a standard inputs and outputs. It can also be used for software by connecting it to the computer. Choosing Arduino in this paper makes it more expensive for designing the project. So, we suggested PIC microcontroller for suitable cost.

III. PROPOSED SYSTEM DESIGN

The system proposed works using PIC Microcontroller, which works as the heart ofour proposed work. Commands or actions will be performed using this Microcontroller according to the code used. When the supplyof power is given to the Microcontroller and the IR sensors placed on the one side of the road detects the incoming of the objects or vehicles. It is not necessary to keep the sensors on either of the road, as if one side ofthe road is jammed then the other side will befree moving or it will be moderate. We can get the output through DC motors, Relays, LEDs and LCD.

When the supply of power is given to the Microcontroller and the IR sensors placed onthe one side of the road detects the incoming signals of the obstacles and will reflect back to the photodiode. It is not necessary to keepthe sensors on either of the road, as if one sideof the road is jammed then the other side willbe free moving or it will be moderate. We canget the output through DC motors, Relays, LEDs and LCD.

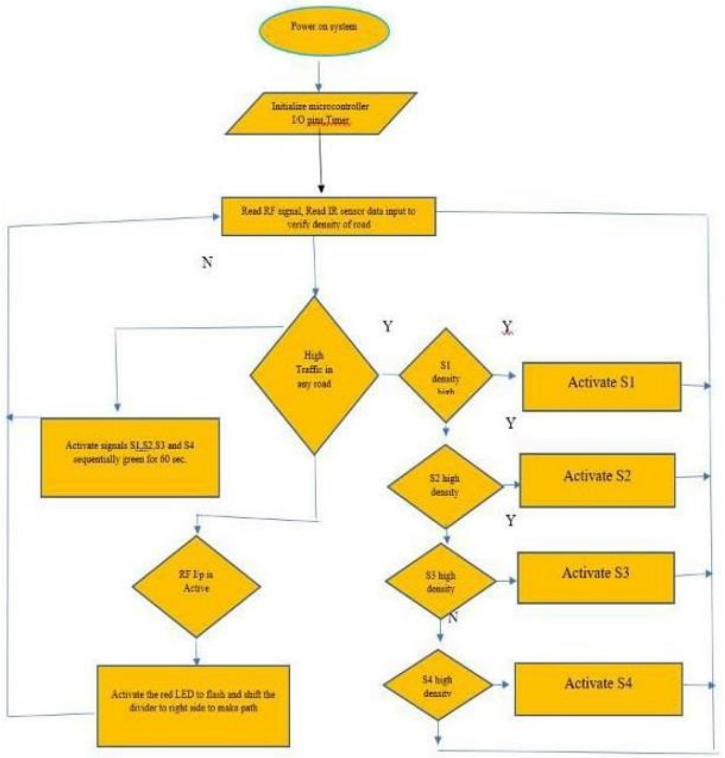

Fig 1:- Flowchart of the proposed system

There are two sensors placed on each side ofthe road where the distance between them canbe altered according to. When the sensors transmit, the objects can be detected replace the switch where the movement of the divider performed and the divider will come to its original position when the ambulance crosses the signal. The movement of the divider willbe very slow that the persons on the other sidecan be intimated by the help of LCDs displayand alerting LEDs.

The relays which can be defined as electrically operated automated switches will be used crosses the signal. The movement ofthe divider will be very slow that the persons.

IV. METHODOLOGY

➢ *Block Diagram*

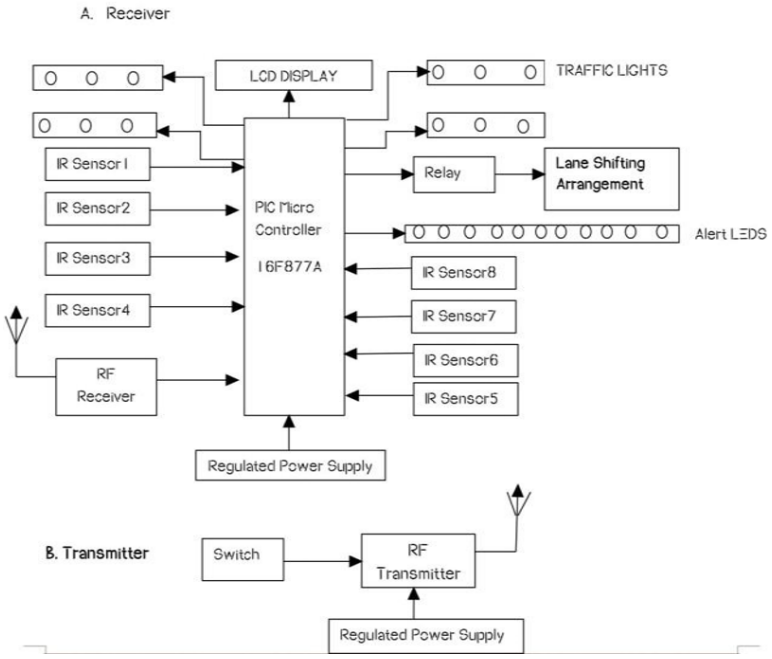

Fig 2:- Block Diagram of the work

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As soon as we connect power supply to the system Microcontroller, then the input/output pins, Time, LCD will get initialize. IR sensors, RF receiver, MOTOR, Relay drivers, Traffic LED's, Emergency laser lights are connected to the controller using IR sensors Traffic lights are controlled as per the bulk of the vehicles present in the road. Wherever the road is more density thatroad will becomes green first and here the IRsensors are used to track down the density inthe road. If two or more roads are become ofsame density then, the first density activated road becomes green and followed by next signal but at this stage time delay will reduceto 30 sec from 60 sec.

Whenever the ambulance, emergency or VIP vehicles needs to pass during traffic, thenRF signal from the transmitter which was kept in emergency vehicle needs to transmit to the control unit through the transmitter. Simultaneously, time lane shifting system will activate to give a path to emergency vehicles and red LED lights start flashing @ 500msec to indicate and alert the other vehicle on both sides of the road. The movement will be so slow that no damage canoccur. Once emergency vehicle passes out ofsignal then the system will come back to the normal position and the movement of the divider will be very slow in this case. The LCD will be used display the movement of divider. This can be used especially in four cross roads and heavily packed places. We can also delay the time of divider as not to come back to its original state by using the switch built in the transmitter part in ambulance and till it crosses that particular signal.

A. PIC Microcontroller

PIC 16F877A is one of the most famous Microcontroller. It arrives in a 40 pin and it has numerous inward peripherals and high performance. Without stressing more there are adequate pins to join other gadgets. The low usage of power and the voltage, it operates in wide range of (2V to 5.5V). It operates at a speed of 10MHz, having internal EEPROM with 8Kb Internal flash memory and including setup of RS232 with that of MAX232.

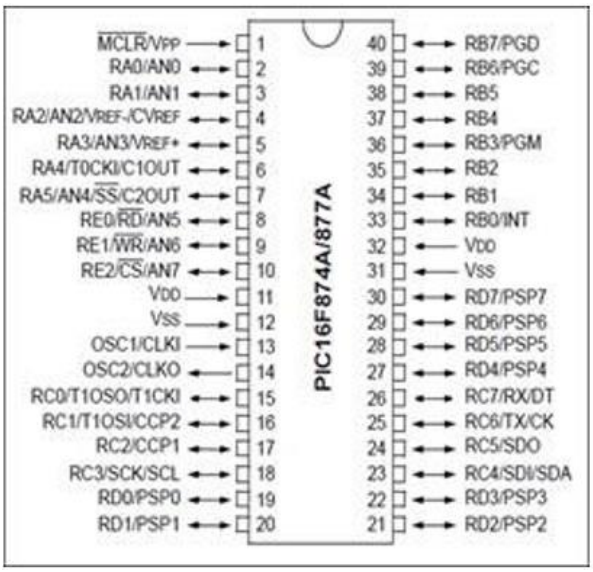

Fig 3 :-Pin Configuration of PIC 16F877A

B. 16X2 LCD:

LCD (Liquid Crystal Display) of two into sixteen parallel is a bit of eight or bit of four interfaced LCD. This unit allows the user to display text, numerical data and custom created characteristics which are 2 lines displayed on screen having 16 characters. The device can display ASCII characters, Japanese Kana characters. By the usage of extension driver, up to eighty characters can be displayed on this device. There are two very important registers in LCD namely Command Code register and Data Register.

C. IR Sensors and LEDs:

The heat of the objects and motion can bedetected using IR sensors. The radiations emitted from the infrared sensors are invisible for the naked eye. LED is an emitterwhereas IR photodiode works on the detectorpart. IR photodiode is so sensitive to the IR light which is emitted. The voltage of the output will be changed depending on the IR light magnitude (5v or 0v).

The IR light which was received is in proportion to the change in the output voltageand the resistance of photodiode. This is the principle of working of IR sensor. Some amount of the radiation is reflected back fromthe object after striking that is emitted from the IR transmitter.

Light-emitting diodes are utilized in applications as assorted as aeronautics lighting, auto lighting, promoting, generallighting, and traffic lights. In devices like TVs, DVD players we can use the Infrared Light-emitting diodes in that of controller units. LEDs are likewise utilized in seven-portion display.

D. Relay:

A relay is an automated switch which is operated electrically. Switch contacts will get changed as when the switch receives the magnetic field created when the current flowthrough the coil. There are two switch positions in coil current which are ON and OFF and they changeover the switches. Relaypermits 1st to 2nd circuit which is different from the former.

V. RESULTS

This work was done on moving the Divider to one side of the road for the purpose of emergency vehicles. The following resultsare obtained.

Fig 4:- The setup of the work done

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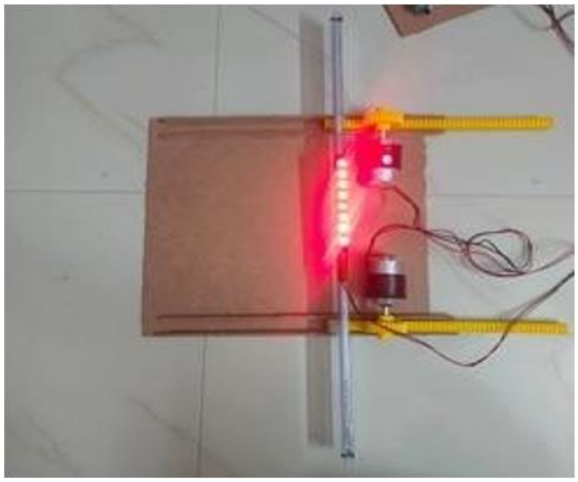

Fig 5:- Divider moving to one side ofroad

The divider which was at the center has moved towards the right side a bit as to makepassage for the ambulance and it will be keptthere until emergency crosses the signal and in the following it comes back to its original position.

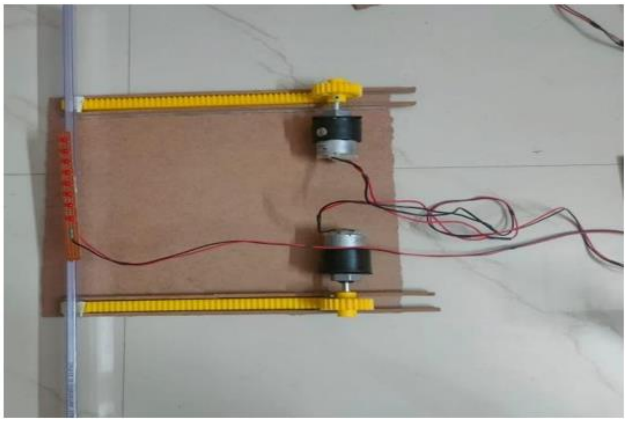

Fig 6:- Divider at the center

Fig 7:- Messages displayed on LCD'sscreen

The LCD display alerts, that themovement happens in some time and theposition of the moving divider.

VI. CONCLUSION

The system we proposed helps in reducingthe delay of treatment which is needed for thepatients, especially cardiac, met with accidents et.al. This provides a way for the clearance of the road for the free passage of emergency vehicles. Time constraint can alsobe reduced. Mostly used in places of cross-section, X-junctions and the zones of traffic. Our paper can be used in most places in Bangalore city. We can get more accuracy through RF than that of Camera's. So, the paper proposed can be helpful in improving the traffic lights implement. This model can be utilized for multiple purposes, which will more efficient.

The system proposed helps in calculatingthe amount of density of traffic using IR sensors which are placed on one side of the road. The density will be either low or moderate on the other side of the road wherethe movement of divide can be done with ease. PIC Microcontroller behaves as the heart of the proposed work. Without waitingfor the traffic signals to be get changed according to the time intervals set the new way bridges the need where we can save a life, an immense satisfaction we can get.

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