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Intelligent traffic light system for ambulance rescue and patient health monitoring system using IoT

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Abstract:-The road accident in the present situation is increased to greater level. The loss of human life due to accident should be avoided. Ambulance service is one of the major services which getting affected by traffic activity. Traffic congestion and tidal flow are major facts that cause delay to ambulance. The delay of emergency vehicle reaching the accident spot and the traffic in between accident spot and hospital has rising the chances of death of the affected people. In order to save human life from accidents we introduce a scheme called ITLS (Intelligent Traffic Light system).The main concept behind this scheme is to provide a smooth flow for the emergency vehicles like ambulance to reach the hospitals in time and thus minimizing the delay caused by traffic congestion and this project aims to monitor the patient health conditions like temperature, heart rate and sends this information to the server through the use of Internet of Things(IoT) and cloud data to know the current scenario of the ambulance.

Key words:-ITLS, PIC 16F877A, GPS, IoT, ZigBee, Heart rate sensor, Traffic light system.

1.INTRODUCTION

India is the second most populous Country in the World and is a fast growing economy. It is showing the terrible road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints due to this emergency occurs anywhere at any location, at any time, and in various ways will make one at risk. These situations require a speedy response. So it is very crucial and important to establish direct, fast and efficient technique without delay. With the rising number of population in the metropolitan cities already existing problem of

low traffic congestion has grown to an alarming event. This problem has to be properly observed and the appropriate measures have to be taken [5]. Often rural areas are devoid of the traffic congestion. The proper care is to be given to the urban areas mainly focusing on to the metropolitan cities. Even if each and every vehicle passing through the traffic has its own need, the prior importance is given to the Ambulance and other emergency vehicles which needs to wait longer time on the traffic thereby rising the probability of risk [14].Transportation of a patient to hospital in emergency seems quite simple but in actual it is very difficult during peak hours. Optimum usage of the time after an accident is actually the golden hours as a measure of effectiveness of an emergency rescue service provider system. Recovery action should be taken immediately. Congestion can be solved at that time. In addition to this, in the case of giving prior importance to the ambulance and other emergency vehicles, their chances of misusing the vehicles by some people for their own benefit is very high[10]. The ancient technology uses RF transmitter is mounted on atop of the ambulance and RF receivers are placed in every road leading to the signal at a suitable distance from the traffic signal. Initially the driver of the ambulance switches on the transmitter through a switch placed on the steering wheel. This makes the receiver output to go high and thereby interrupting the microcontroller placed in the traffic light unit [1][10].At the beginning of the interrupt sub routine, all the port pins are scanned to determine in which lane the ambulance is approaching and the corresponding lane is made green. In order to tackle

these problems, this paper has come up with a proposed system using the advanced IR sensors and ZigBee Technologies for faster data transmission and GPS is used for location finding purpose [2][5]. The ambulance is controlled by the control unit and also controls the traffic light according to the ambulance

2. OVERVIEW OF INTELLIGENT TRAFFIC LIGHT SYSTEM FOR AMBUANCE RESCUE AND PATIENT HEALTH MONITORING SYSTEM USING IoT

In order to save human life from accidents introduce a scheme called ITLS (Intelligent Traffic Light system).The main concept behind this scheme is to provide a smooth flow for the emergency vehicles like ambulance to reach the hospitals in time and thus reduce the delay caused by traffic congestion. The idea behind this scheme is to

location and thus reaching the hospital safely[1].The ambulance location and patient health conditions like temperature and heart rate are uploaded in the server using cloud data and the IoT.

implement ITLS which would control automatically the traffic lights in the path of the ambulance. With the help of this Intelligent Transportation System integrated with the GPS the current situation of traffic congestion can be solved to an greater level. This scheme is fully automated controls the traffic lights, helping to reach the hospital in time. Here we track the ambulance location using GPS units, and it sends the data to the traffic lights through Zigbee device.This system control the traffic lights and save the time in emergency periods. This system is mainly classified into two units. That are 1.Traffic Light Unit 2.AmbulanceUnit

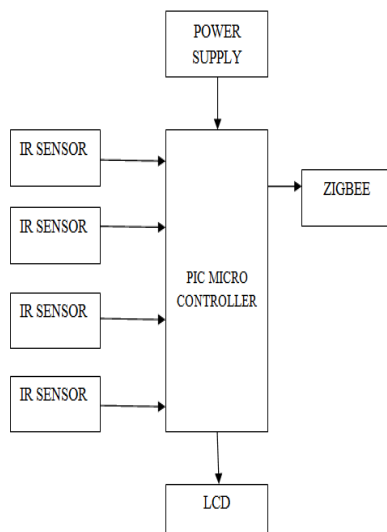


Fig 2.1 Traffic Light Unit (Block diagram)

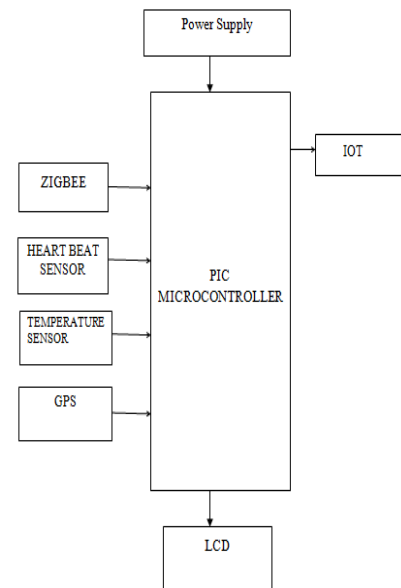


Fig 2. 2 Ambulance Unit (Block diagram)

2.1 PIC 16F877A

Various microcontrollers have different kinds of memories. EEPROM, EPROM, FLASH etc.

are some of the memories of which FLASH is the most recently developed. Technology that is used in pic16F877 is flash technology, so that data is retained

even when the power is switched off. Easy Programming and deleting are other features of PIC 16F877. The PIC start plus development system from microchip technology gives the product development engineer with a highly flexible low cost microcontroller design tool set for all microchip PIC micro devices. The PIC start plus development system contains PIC start plus development programmer. The PIC start plus programmer gives the product developer ability to give program user software in to any of the supported microcontrollers. The PIC start plus software running under lab gives the full interactive control over the programmer. CMOS FLASH-based 8-bit microcontroller packs Microchip's powerful PIC architecture into an 40 pin package.

PIN DIAGRAM OF PIC 16F877A

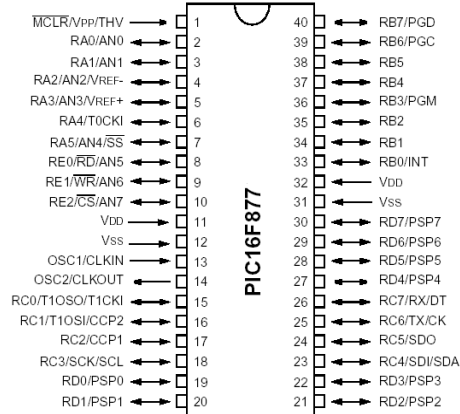


Fig 2.3 Pin Diagram of 16F877A

PIN DESCRIPTION

The most pins of PIC Microcontroller are multifunctional. This small trick is often used due to this it makes the microcontroller package more compact without affecting its operations. These various pin functions cannot be used simultaneously, but can be changed at any point during operation.

Port name	No. of I/O pins	Use of ports
Port A	6 Pins	A/D converter inputs
Port B	8 Pins	External interrupt source
Port C	8 Pins	Serial ports, Timer I/O
Port D	8 Pins	Parallel Slave Port
Port E	3 Pins	A/D converter inputs

2.2 IoT

The Internet of things is the of physical devices, allows objects to be sensed or controlled remotely across existing network structure. It creating opportunities for more direct integration of the physical real world into computer-based systems, and results in improved efficiency, accuracy and economic benefit in addition to reduced human intervention.

When IoT is interfaced with sensors and actuators, the technology becomes an instance of the more general class of which also one of the trending technologies. Each thing is uniquely identifiable through its embedded computing system but it is able to interoperate within the existing infrastructure. Experts estimate that the IoT will consist of almost 50 billion objects by 2020.

Typically, IoT is expected to have advanced connectivity of devices, systems, and services that goes beyond Machine to Machine communications and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices, is expected to used in automation in nearly all fields, while also enabling advanced applications like a smart grid, and expanding to areas such as smart city projects.

Things, in the IoT board, can refer to a wide variety of devices such as heart monitoring implants, transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring or field operation devices that assist firefighters in operations.

These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. IoT collects the data from the temperature sensor, heart rate sensor and data from the GPS and uploaded this data's in the web server using the cloud data and IoT.

2.3 GPS (Global Positioning System)



Fig 2.4.GPS

The Global Positioning System (GPS) is a U.S. space-based global navigation satellite system. It gives reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all conditions like weather, day and night, anywhere on or near the Earth. GPS is made up of three parts: between 24 and 32 satellites orbiting the Earth, four control and monitoring stations on Earth, and the GPS owned by users. GPS from space that are used by GPS receivers to provide three-dimensional location (latitude, longitude, and altitude) plus the time. So the use of GPS we can find out any place in the earth.

2.4 ZIGBEE

ZigBee is a specification for a suite of high-level communication protocols used to create personal area networks built from small, low-power digital radios. ZigBee is based on an IEEE 802.15.4 standard which is used in a wireless sensor network. Though its low power consumption limits the transmission distances to 10–100 meters line-of-sight communication, depending on power output and environmental characteristics.

ZigBee devices can transmit data over long distances by passing data through a mesh network of intermediate devices to reach more distant ones. ZigBee is typically used in low data rate applications that require long battery life and secure networking. ZigBee has a defined rate of 250 kb/s, best suited for intermittent data transmissions from a sensor or controller device. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other wireless personal area networks (WPANs), such as Bluetooth or Wi-Fi.

2.5 HEARTBEAT SENSOR

A person's heartbeat is the sound of the valves in his/her's heart contracting or expanding as they force blood from one region to another. The number of times the heart beats per minute (BPM), is the heart beat rate and the beat of the heart that can be felt in any artery that lies close to the skin is the pulse.

Heart beat sensor is designed to give digital output of heart beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at Each pulse.

2.6 TEMPERATURE SENSOR

The LM35 series are precision integrated circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin as the user is not required to subtract a large constant voltage from its output to obtain convert centigrade scaling.

The LM35 does not require any external calibration or trimming to provide typical accuracy's of $\pm 1/4$ °c at room temperature and $\pm 3/4$ °c over a full -55 to +150 °c temperature range. Trimming and calibration at the wafer level assure low cost. The LM35's low output

impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with pulse and minus supplies.

2.7 IR SENSOR



Fig 2.5 IR sensor

CONCLUSION AND FUTURE WORK

In this paper the proposed system of the automatic ambulance rescue system consist of GPS for find the location and control the traffic situation using ITLS and sensors for monitor the patient condition and the send the information to the web server through the use of IoT and cloud data. The data collected from the GPS information is also updated in the server. Thus ITLS if implemented in countries with large population like INDIA can produce better results. In future we are thinking to implement our idea to determine shortest location to the hospital and which is used to treat the victim people more comfortable and plan to control the traffic situation using cloud.

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