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TECHINICAL ARTICLE OF SCIENCE TECHNOLOGY AND E&TC ENGINEERING

A technical article is an article for a magazine or an online service that is about a technical topic, and typically the article drills down into some low-level of detail. Could be computers, could be physics or chemistry or any other science.

When writing technical (scientific, medical, legal, etc.) articles, it is usually the case that a number of technical terms or terms of art ,specific to the subject matter will be presented. These should be defined or at least alternative language provided, so that a non-technical reader can both learn the terms and understand how they are used by scientists. Writing good technical articles is indeed a challenge, takes a lot of your personal time, and requires doing a lot of research. And you should have a passion for writing and reading as well.

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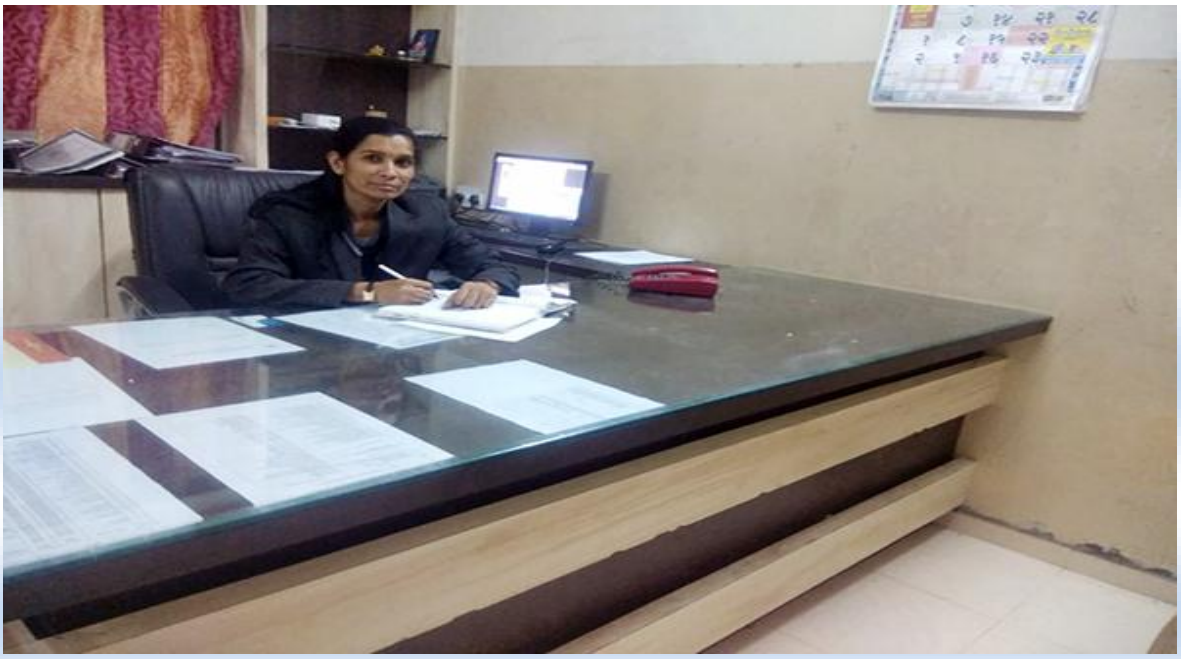
HOD DESK

DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING



It's immense pleasure to present this semi-annual Technical Article "SAGACITY". Electronics & Telecommunication engineering department is the dynamic and vibrant department with the blend of young and experienced Faculty. Department is actively involved in academic as well as research work in current areas of Electronics & Telecommunication Engineering and multi-disciplinary streams. The department has well equipped labs with the state of art software, hardware and machineries. The faculty members are constantly publishing technical papers in national and international journals and conferences. Also, they are involved in consultancy activities. The department is fortunate to have dedicated teachers, devoted students, and committed supporting and expert technical staff.

My best wishes to all Students for their bright carrier and successful life.

Mrs.Sonone V.W.

Head, Department of E&TC Engineering

VISION:

To develop Electronics and Telecommunication Engineers with sound technical knowledge focusing on social and industrial demands with professional ethics.

MISSION:

1. To create environment for imparting technical education through effective teaching learning process.

2. To develop Industry driven and entrepreneurial skills through co-curricular & extra co-curricular activities.

3. To provide value based education for Socio-economic enhancement of the nation.

PEO's:

PEO I: Provide socially responsible environment friendly solutions to Electronics & Telecommunication Engineering related broad based problems adapting professional ethics.

PEO II: Adapt state of the art Electronics & Telecommunication Engineering broad based technologies to work in multi-disciplinary work environments.

PEO III: Solve broad based problems individually and as a team member communicating effectively in the world of work.

CONTENT

MICROCONTROLLER BASED ADVANCE TRAFFIC LIGHT SYSTEM USING VOICE RECORDER

JADHAV AISHWARYA BHAGWAT 1, JADHAV PRASHANT CHANDRAKANT 2

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Abstract:

This paper proposes an intelligent way of reducing the problem of traffic congestion on the road network which has become very severe nowadays. In this contemporary scenario this work suggests new and alternative method for improving the efficiency of the existing road network. In today's world most of the traffic light systems are based on Microcontroller or Microprocessor with fixed time delays for green light and red light with no or less arrangement for contingency situation. At this situation this paper explores an alternative approach to manage this problem in best opposite way. This Microcontroller based project has co-opted the density of the traffic on the road network as a prime focal irrespective of the conventional traffic system in which time is assigned without calculation of the density on the road crossing. In this paper time duration has been assigned on the basis of the traffic rather than on fixed time basis with an extra arrangement for the contingency situation. To handle the emergency situation, voice recorder is used with microcontroller where the voice of ambulance vehicle is already recorded and if the record voice math with the vehicle present on the road network then it will halt all the outgoing instruction and will furnish highest priority to the ambulance vehicle. For gauging the traffic density IR sensors have been used here and programming of the Microcontroller has been done on the basis of traffic density measurement. In this considered module three LED of different colour-RED, GREEN, YELLOW- has been used. In pursuance of this information, micro-controller will make a decision and then assign the glowing time of green light, yellow light and red light. It means that the timing of the traffic light is set according to the density of the vehicles. This is going to be very helpful in the reduction of the traffic congestion and it has a scope for further expansion in future.

Introduction :-

With the growth of the urbanization, industrialization and population, there has been a huge growth in the traffic. With growth in traffic, there is occurrence of bundle of problems too; these problems include traffic jams, accidents and traffic rule violation at the heavy traffic signals. In this situation traffic lights based on the voice intensity of the vehicle play an important role in traffic management. Traffic lights are the IR based signalling devices that are placed on the intersection points and employed to control the flow of traffic on the road. The history of the traffic light control goes back to 1868 when the first traffic lights system was installed in London and today this system could be found in all major cities of the world [4]. Most of the traffic lights around the world follow a predetermined timing circuit. Sometime the vehicles on the red light side have to wait for green signal even though there is little or no traffic. It results in the loss of valuable [1].

Traffic control at intersections is a matter of concern for large cities as shown in figure 1. Several attempts have been made to make traffic light's sequence dynamic so that these traffic lights operate according to the current volume of the traffic. Most of them use the sensor to calculate current volume of traffic but this approach has the limitation that these techniques based on counting of the vehicles and treats a emergency vehicles as the ordinary vehicles means no priority to ambulance, fire brigade or V.I.P vehicles. As a result, emergency vehicles stuck in traffic signal and waste their valuable time. Another limitation of this approach is that sensor based system needs the line of sight path between the sensor & vehicles which results in low performance [2].

The problem of traffic light control can be solved microcontroller based voice recorder system. With this system, we can consider the priority of different type of vehicles by gauging the intensity of voice level of the vehicle present on the crossing and also consider the density of traffic on the roads by installing IR Transmitter sensor and IR receiver sensor on the road intersections. Voice intensity recorder technique has been drawn enormous attention and is used for identification of the vehicle based on their voice intensity [4].

This paper is extremely useful in the context India where with scarcity of road network and ever increasing population exacerbated the problem of traffic management.

In some cities the problem is so much so severe that the people have to wait for several hours. This given method of handling the problem of the traffic can be proved to be very beneficial for this country which is riding on the new initiative such as smart city mission, urbanization and migration settlement. Method employed here takes two dimension approaches for

handling the traffic i.e. both density present on the road and demand of the emergency vehicles such as fire arm, ambulance and VVIP caravan. After installation of this system we will not have to stop all vehicles on the road at the time of passing of the VVIP caravan which would have adverse implication over common citizen some time [7].

IR SENSORS

In this system we will use IR sensors to measure the traffic density. They are arranged on each side of the road and are interfaced to the microcontroller. Based on these sensors, controller detects the traffic and control the traffic system. IR sensors are connected to the microcontroller. If there is traffic on road then that particular sensor output becomes logic zero otherwise logic one. Based on logic 0 and logic 1 output, the microcontroller changes the glow time of the green LED of the corresponding junction to a higher value.

Thus as a number of vehicle increases, the green light glows for more time. An infrared sensor is an electronic instrument that is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. It is also capable of measuring heat of an object and detecting motion. Infrared waves are not visible to the human eye. In the electromagnetic spectrum, infrared radiation is the region having wavelengths longer than visible light wavelengths, but shorter than microwaves [6].

The infrared region is approximately demarcated from 0.75 to 1000µm. The wavelength region from

0.75 to 3µm is termed as near infrared, the region from 3 to 6µm is termed mid-infrared, and the region higher than 6µm is termed as far infrared.

LIGHT EMITTING DIODE

A light-emitting diode (LED) is a two-lead semiconductor light source as shown in figure 2. It is a p–n junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the colour of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.

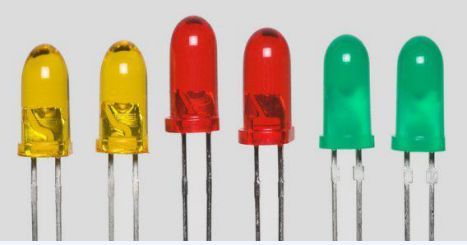


Fig.2 LED light

MICROCONTROLLER

Micro-controller unit is constructed with ATMEGA32 Microcontroller chip. The high-performance, low-power Atmel 8-bit AVR RISC-based microcontroller combines 32KB of programmable flash memory, 2KB SRAM, 1KB EEPROM, an 8-channel 10-bit

A/D converter, and a JTAG interface for on-chip debugging. The device supports throughput of 16 MIPS at 16 MHz and operates between 4.5-5.5 volts. By executing instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.Its key parameters are mentioned in Table 1.

S.N	PARAMETER	VALUES
1.	Flash (Kbytes)	32 Kbytes
2.	Pin count	44
3.	Max operating frequency	16 MHz
4.	CPU	8-bit AVR
5.	Touch channels	16
6.	Hardware acquisition	No
7.	Max i/o pins	32
8.	Exit interrupts	3
9.	USB speed	No
10.	USB interface	No

Methodolgy And Algorithm

In presently used traffic light system most of the traffic lights are controlled on a fixed time basis i.e, same time duration will be for both ON and OFF irrespective of the traffic intensity. In considered paper the traffic light is managed depending upon the traffic density on road. Here the traffic lights changes dynamically based on the traffic density by using Microcontroller based system accompanying with IR Sensor and LED devices to continuously gauge the density of traffic. The IR receiver output is given as the input of microcontroller in serial communication. The microcontroller will allocate the time slot according to the input of sensors, and then the CPU sends appropriate time

[5]. When the allocated time is completed then the process will be shift into the next road. The same procedure it follows on each road. This system is designed by using Microcontroller and three pairs of IR sensors on each lane. Here priority based operations by using the round robin algorithm is done. So that each road will be cleared simultaneously and this system is mainly used to reduce the waiting time, avoid fuel wastage, and also manage the traffic load at the intersection adaptively, so that the traffic can be avoided [5].

Algorithm used to implement this work is Robin Algorithm written below [4].

STEP 1- start

STEP 2- check sensors output

STEP 3- compare output of all other sensors STEP 4- if lane 1 high

Green it

STEP 5- compare other 3 If lane 2 high

Yellow it

STEP 6- red all others

STEP 7- if any emergency vehicle Go to STEP-9

Else

Again repeat above cycle

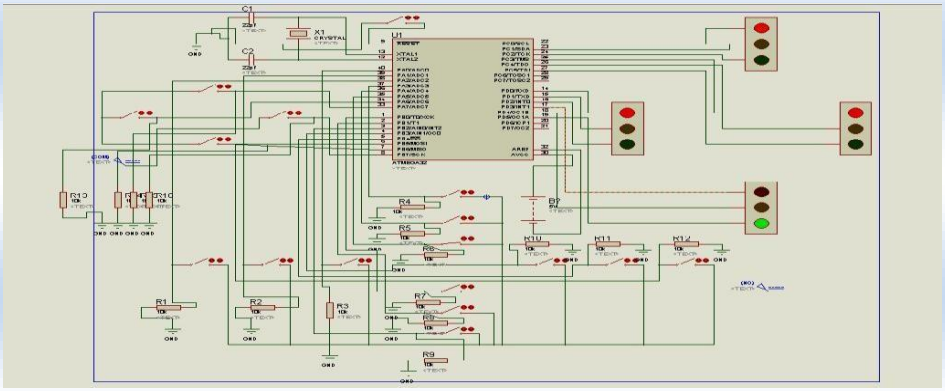
STEP 8- interrupt whole system Allow only interrupt

STEP 9- after interrupt execution STEP 10- again goes to main program. STEP 11- repeat process

STEP 12- stop

Software Implementation

On the basis of vehicle count, microcontroller decides the traffic light delays for each side. Traffic light



delays are classified as LOW, MEDIUM, HIGH range. Three ranges are predefined by varying vehicle count. The simulated circuit diagram of advance traffic light system, implemented for this work using Proteus software is shown in figure 3.

HARDWARE IMPLEMENTATION

The hardware implementation on Printed Circuit Board has been done in figure 4 where three pair of transmitter and receiver is used for checking the traffic density. In figure5 three different LED lights RED, YELLOW and GREEN are used in the circuit and according to the intensity of the vehicle on the road they will glow. These LEDs are later interfaced with Microcontroller. Preset circuit is seen in figure 6 which is used for the activation of the circuit and final PCB circuit are used in figure.7. These circuits are the basic building block of our hardware implementation.

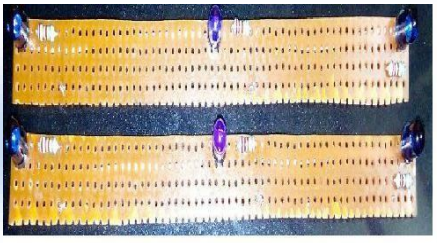


Fig.4 IR SENSOR

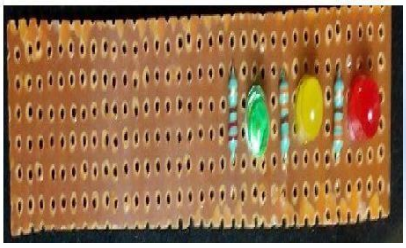


Fig.5 TRAFFIC LIGHT

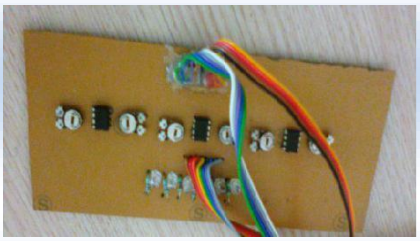


Fig.6 PRESET CIRCUIT

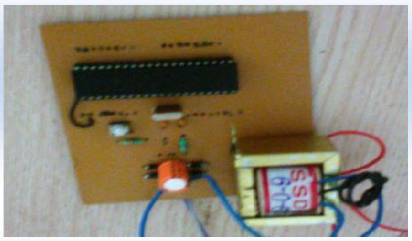


Fig.7 PCB CIRCUIT

RESULTS

Results include the successful operation of the intelligent traffic light control and monitoring system. The IR sensor with IR transmitter is placed at a gap. Gap acting as a prototype indicating a road. The system is placed near road as a standalone device. Whenever any obstacle like vehicle passes between IR transmitter and IR sensor, microcontroller detects and increase number of vehicle count in a recording interval for particular traffic light. Traffic light is placed ahead of IR sensor at a distance so that decision taken by microcontroller to control traffic light can help in reducing the congestion at traffic light. On the basis vehicle count microcontroller decide the traffic light delays for next recording interval. Traffic light delays are classified as LOW, MEDIUM, HIGH range. Thee ranges are predefined by varying vehicle count [6].

The working of the system can be demonstrated in the following tabular form.

Lane 1 is selected when the vehicle density is highest in lane 1 and second highest would be turned yellow i.e. lane2 as shown in Table 2.

Lane 2 is selected when the vehicle density is highest in lane 2 and second highest would be turned yellow. I.e.lane3 as shown in Table 3.

Lane 3 is selected when the vehicle density is highest in lane 1 and second highest would be turned yellow. i.e..lane4 as shown in Table 4.

Lane 4 is selected when the vehicle density is highest in lane 1 and second highest would be turned yellow. i.e.lane1 as shown in Table 5.

TABLE 2 LANE 1

L A	G R	Y E	R E

NES	EEN LIGHT	LLOW LIGHT	D LIGHT
LANE 1	ON	OFF	OFF
LANE 2	OFF	ON	OFF
LANE 3	OFF	OFF	ON
LANE 4	OFF	OFF	ON

TABLE 4 LANE 3

LANES	GREEN LIGHT	YELLOW LIGHT	RED LIGHT
LANE 1	ON	OFF	OFF
LANE 2	OFF	ON	OFF
LANE 3	OFF	OFF	ON
LANE	OFF	OFF	ON

4			

TABLE 3 LANE 2

LANES	GREEN LIGHT	YELLOW LIGHT	RED LIGHT
LANE 1	ON	OFF	OFF
LANE 2	OFF	ON	OFF
LANE 3	OFF	OFF	ON

LANE 4	OFF	OFF	ON

TABLE 5 LANE 4

LANES	GREEN LIGHT	YELLOW LIGHT	RED LIGHT
LANE 1	ON	OFF	OFF
LANE 2	OFF	ON	OFF
LA	OF	OF	ON

NE 3	F	F	
LANE 4	OFF	OFF	ON

CONCLUSION

Thus in this paper authors have developed an advanced traffic light controller for densely populated Cities using IR sensors and microcontroller. By using this system configuration the possibilities of traffic jams are reduced, caused by traffic lights, to an extent and same is implemented successfully with the help of above mentioned techniques. Number of passing vehicle in the fixed time slot on the road will be decided on the basis of the density of vehicle present on the crossing and on the basis of vehicle count microcontroller decide the traffic light delays for next recording interval.

In future this system can be used to inform people about different places traffic condition. Data transfer between the microcontroller and computer can also be done through telephone network .This technique allows the operator to gather the recorded data from a far end to his home computer without going there. Traffic lights can be increased to N number and traffic light control can be done for whole city by sitting on a single place.

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HOME AUTOMATION USING ATmega328 MICROCONTROLLER AND ANDROID APPLICATION

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ABSTRACT:

Automation is the use of control systems and information technologies to reduce the need for human work in the production of goods and services. In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provided human operators with machinery to assist them with the muscular requirements of work, automation greatly decreases the need for human sensory and mental requirements as well. Automation plays an in-creasing important role in the world economy and in daily experience. In this paper, we describe the design and development of a remote household appliance control system using ATmega328 microcontroller and android mobile through GSM technology.

INTRODUCTION :-

The rapid growth of wireless communication motivated us to use mobile phones to remotely control a household appliance. In this paper we describe a remote appliance control system which can control different household appliances by sending an SMS message from a mobile phone. This controller is extremely handy at places where we have to control the ON and OFF switching of the devices but no wired connection to that place is available. The microcontroller would then control and device based on the information given to it. The proposed solution will need to be easy to use, simple, secure, robust and be useful on most mobile phones. A remote household appliance control has been described in [1]-[4] using internet. A Bluetooth based home automation control is described in [5]. In [6] a GSM based system for home automation is described which uses voice commands for control. In [7] voice commands for home automation is being described. In this paper we describe a simple remote home appliance control using ATmega328 microcontroller and GSM SMS (Short Messaging Service) via android application.

NEED OF AUTOMATION

An automated device can replace good amount of human working force, moreover humans are more prone to errors and in intensive conditions the probability of error increases whereas, an automated

device can work with diligence, versatility and with almost zero error. Replacing human operators in tasks that involve hard physical or monotonous work. Replacing humans in tasks done in dangerous environments (i.e. fire, space, volcanoes, nuclear facilities, underwater, etc) performing tasks that are beyond human capabilities of size, weight, speed, endurance, economy improvement etc. Automation may improve in economy of enterprises, society or most of humankind. For example, when an enterprise that has invested in automation technology recovers its investment, or when a state or country increases its income due to automation like Germany or Japan in the 20th Century. That's why it looks into construction and implementation of a sys-tem involving hardware to control a variety of electrical and electronics system.

SYSTEM DESCRIPTION

The system has two parts, namely; hardware and software. The hardware architecture consists of a stand-alone embedded system that is based on 8-bit microcontroller (ATmega328), a GSM handset with GSM Modem and a android phone. The GSM modem provides the communication media between the homeowner and the system by means of SMS messages via android phone The SMS message consists of commands to be executed. The format of the message is predefined. The SMS message is sent to the GSM modem via the GSM public networks as a text message with a definite predefined format. Once the GSM modem receives the message, the commands sent will be extracted and executed by the microcontroller. The system will interpret the commands and turn the appliances ON/OFF accordingly via android application. The detail description of individual modules in the system is as shown in Fig 1.

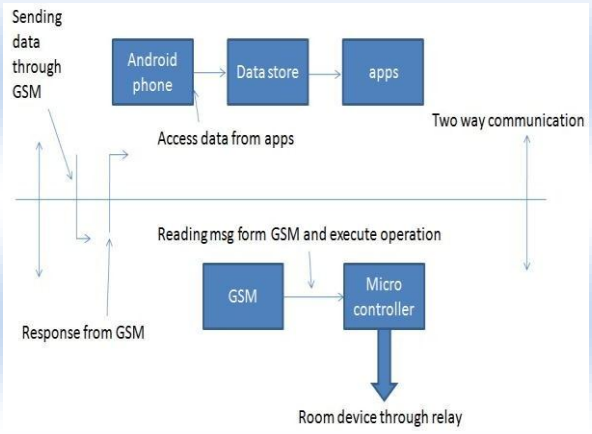

Fig 1: Block Diagram

User GSM mobile Handset

Cellular phone containing SIM (Subscriber's Identifying Module) card has a specific number through which communication takes place. The mode of communication is wireless and mechanism works on the GSM (Global System for Mobile communication) technology. Here, the user transmits instructions to the system to control the appliance in the form of SMS.

Receiver GSM Handset

This receiver GSM handset is used to receive the SMS sent by the user and then to transmit an acknowledgement or status to the user's mobile. The receiver handset has to be equipped with an android operating system and a valid SIM card. In our design we have used a android platform GSM handset model. The handset has a built in AT modem with UART interface and supports most of the AT command instructions. This handset is attached with the microcontroller used to control the appliance through UART. AT Modem is a Modem which supports AT commands, also known as Hayes command. The Hayes command set is a specific command language originally developed for the Hayes Smart modem. The command set consists of a series of short text strings which combine together to produce complete commands for operations such as dialing, hanging up, and changing the parameters of the connection. Most modems follow the specifications of the Hayes command set. AT commands are instructions used to control a modem. AT is the abbreviation of ATtention. Every command line starts with "AT" or "at".

Microcontroller Board

This contains the micro-controller (ATmega328) and a timeout generator circuit. This is the main module of the system. On receipt of the SMS message, text words are checked with predetermined format which includes desired device ON/OFF commands. To read a message the microcontroller sends the appropriate AT command to the Receiver GSM Modem through UART. The Modem then responds with the message and the microcontroller stores the message in the RAM. When the message ends there is no way to know by the microcontroller. The time-out generator circuit performs the vital function of providing the microcontroller board with the ability to detect the end of a message from the receiver GSM mobile. The output of the time-out generator circuit (connected to port1_3 of the microcontroller) is low until the message is being received and becomes high at the end of the message. The microcontroller then processes the command and sends the appropriate controlling signal to the switching module.

Android

Android is a mobile operating system that is based on a modified version of Linux. It was originally developed by a start-up of the same name, Android, Inc. In 2005, as part of its strategy to enter the

mobile space, Google purchased Android and took over its development work as well as its development team).Google wanted Android to be open and free; hence, most of the Android code was released under the open source Apache License, which means that anyone who wants to use Android can do so by downloading the full Android source code.

Android Application

Android is a software stack for mobile devices that include and operating system, middleware and key applications. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. By providing an open development framework, Android offers developers the ability to build extremely rich and innovative applications. Developers have full access to the same framework APIs used by the core applications. Android includes a set of C/C++ libraries used by various components of the Android system. They include System C library, Media library, Surface Manager, LibWebCore, SGL, SQLite, FreeType and3D libraries. Android applications are written in Java programming language. The Android SDK compiles the code along with any data and resource files into an Android package, an archive file with an .apk file extension. All the code in a single .apk file is considered to be one application and is the file that Android

powered devices use to install the application. Once installed on a device, each Android application lives in its own security sandbox. Some important application fundamentals are: The Android operating system is a multi-user Linux system where each application is a different user. By default, the system assigns each application a unique user ID. The system sets permission for all the files in an application so that only the user IDassigned to that application can access them. Each process has its own virtual machine, so an application's code runs in isolation from other application. Every application runs its own Linux process. Fig 2 shows android application created in mobile.

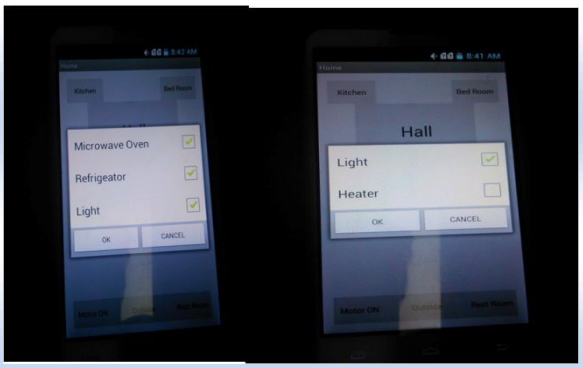

Fig 2: Android application

ALGORITHM

The system operates as per the algorithm shown in Fig 3.Upon power up the microcontroller initializes the AT Modem. During initialization the microcontroller configures the Modems UART speed, message format etc. to be used. After the initialization is complete the microcontroller continuously checks the Modem for any new message. Upon receipt of a message the microcontroller reads the message and extracts the command and authentication information. The authentication information may be the remote users mobile phone number or a text string sent along with the message for command.

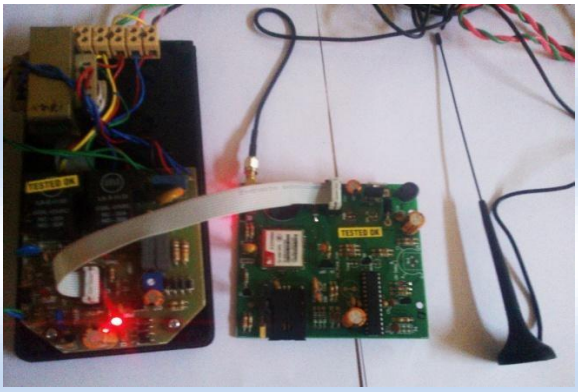

Fig 4: Photo of complete system

After the authentication is verified the microcontroller then sends the appropriate control signal to the switching module to control the appliance. The command is executed and the devices are switched ON or OFF according to the command by android application. The microcontroller then sends an SMS to the user through the AT modem stating the Status of the appliance as an acknowledgement. Fig 4 shows complete setup of the system.

CONCLUSION

In the paper low cost, secure, ubiquitously accessible, auto configurable, remotely controlled solution for automation of homes has been introduced. The approach discussed in the paper has achieved the target to control home appliances remotely using the SMS-based system satisfying user needs and requirements. The extensive capabilities of this system are what make it so interesting. From the convenience of a simple android mobile, a user is able to control and monitor virtually any electrical device in a

household. By connecting all the appliances with the system through power line communication or wireless to the system, all electrical household appliances can be controlled by sending a message from a android mobile.

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DESIGN OF SMOKE DETECTION USING MICROCONTROLLER

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ABSTRACT:

Approximation methods exist to provide estimates of smoke detector response based on optical density, temperature rise, and gas velocity thresholds. The objective of this study was to assess the uncertainty associated with these estimation methods. Experimental data was used to evaluate recommended alarm thresholds and to quantify the associated error. With few exceptions, less than 50 percent of the predicted alarm times occurred within ± 60 seconds of the experimental alarms. At best, errors of 20 to 60 percent (in under-prediction) occurred for smouldering fires using an optical density threshold. For flaming fires, errors in predicted alarm times on the order of 100 to 1000 percent in over-prediction of the experimental alarms were common. Overall, none of the approximation methods distinguished themselves as vastly superior. Great care must be exercised when applying these approximation methods to ensure that the uncertainty in the predicted alarm times is appropriately considered.

INTRODUCTION:

A smoke detector is a device that senses smoke, typically as an indicator of fire. Commercial and residential security devices issue a signal to a fire alarm control panel as part of a fire alarm system, while household detectors, known as smoke alarms, generally issue a local audible or visual alarm from the detector itself.

Smoke detectors are typically housed in a disk-shaped plastic enclosure about 150 millimetres (6 in) in diameter and 25 millimetres (1 in) thick, but the shape can vary by manufacturer or product line.

Most smoke detectors work either by optical detection (photoelectric) or by physical process (ionization), while others use both detection methods to increase sensitivity to smoke. Sensitive alarms can be used to detect, and thus deter, smoking in areas where it is banned.

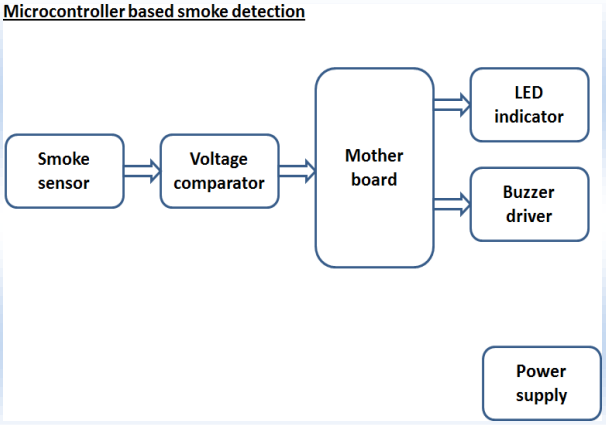
Smoke detectors in large commercial, industrial, and residential buildings are usually powered by a central fire alarm system, which is powered by the building power with a battery backup.

However, in many single-family detached and smaller multiple family housings, a smoke alarm is often powered only by a single disposable battery.

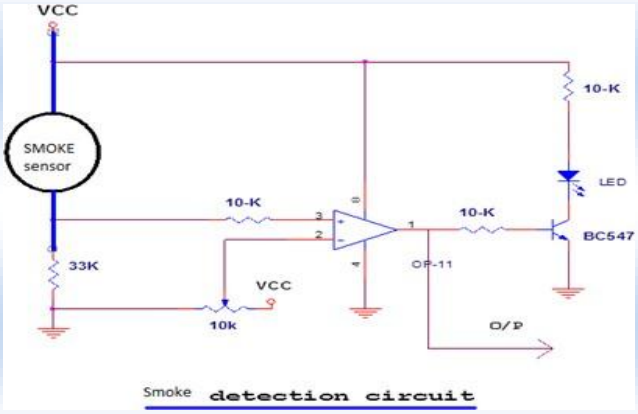
Design principle:

In the present scenario technological environment the embedded system is getting first choice for designer for its flexibility and miniature size. This telecom interfaced security system is very much useful product for remote surveillance and one can monitor the office, home, industrial premise etc from the remote place.

The micro controller based system monitors the condition of the system and on receiving the fault the controller activate a buzzer for information and monitor it in a LED.



MICROCONTROLLER:



Smoke detection using mq-7 sensor:The analog gas sensor - MQ2 is used in gas leakage detecting equipment in consumer and industry markets, this sensor is suitable for detecting LPG, i-butane, propane, methane ,alcohol, Hydrogen, smoke. It has a high sensitivity and fast response time. And the sensitivity can be adjusted by the potentiometer

Power supply

In this project the power supply required is very much precession and also requires different level of power supply. Basically the power supply used for the transmitter and receiver is arranged from a battery. Along with the battery the power supply requirement are +12 Volt and +5Volt.

Description

The power supply designed for catering a fixed demand connected in this project. The basic requirement for designing a power supply is as follows, The different voltage levels required for

operating the devices. Here +5Volt required for operating microcontroller. And +12Volt required for drivers etc. The current requirement of each device or load must be added to estimate the final capacity of the power supply.

The power supply always specified with one or multiple voltage outputs along with a current capacity. As it is estimate the requirement of power is approximately as follows,

Out Put Voltage = +5Volt, +12Volt Capacity = 1000mA

The power supply is basically consisting of three sections as follows,

Step down section

Rectifier Section

Regulator section

Design principle:

There are two methods for designing power supply, the average value method and peak value method. In case of small power supply peak value method is quit economical, for a particular value of DC output the input AC requirement is appreciably less. In this method the Dc output is approximately equal to Vm. The rectifier output is approximately charged to Vcc due to charging of the capacitor. The capacitance provides the backup during the discharge period. So, the value of the capacitor is calculated

Circuit connection: - In this we are using Transformer (0-12) vac, 1Amp, IC 7805 & 7812, diodes IN 4007,LED& resistors. Here 230V, 50 Hz ac signal is given as input to the primary of the transformer and the secondary of the transformer is given to the bridge rectification diode. The o/p of the diode is given as i/p to the IC regulator (7805 &7812) through capacitor (1000mf/35v). The o/p of the IC regulator is given to the LED through resistors.

Circuit Explanations:- When ac signal is given to the primary of the transformer, due to the magnetic effect of the coil magnetic flux is induced in the coil(primary) and transfer to the secondary coil of the transformer due to the transformer action." Transformer is an electromechanical static device which transformer electrical energy from one coil to another without changing its frequency". Here the diodes are connected in a bridge fashion. The secondary coil of the transformer is given to the bridge circuit for rectification purposes. During the +ve cycle of the ac signal the diodes D2 & D4 conduct due to the forward bias of the diodes and diodes D1 & D3 does not conduct due to the reversed bias of the diodes. Similarly during the –ve cycle of the ac signal the diodes D1 & D3 conduct due to the forward bias of

the diodes and the diodes D2 & D4 does not conduct due to reversed bias of the diodes. The output of the bridge rectifier is not a power dc along with rippled ac is also present. To overcome this effect, a capacitor is connected to the o/p of the diodes (D2 & D3). Which removes the unwanted ac signal and thus a pure dc is obtained. Here we need a fixed voltage, that's for we are using IC regulators (7805 & 7812)."Voltage regulation is a circuit that supplies a constant voltage regardless of changes in load current." This IC's are designed as fixed voltage regulators and with adequate heat sinking can deliver output current in excess of 1A. The o/p of the bridge rectifier is given as input to the IC regulator through capacitor with respect to GND and thus a fixed o/p is obtained. The o/p of the IC regulator (7805 & 7812) is given to the LED for indication purpose through resistor. Due to the forward bias of the LED, the LED glows ON state, and the o/p are obtained from the pin no-3.

BUZZER DRIVER

This section interfaces one audible piezo electric buzzer with the controller. The controller activates the buzzer whenever there is any fault appears in any of the channel.

Piezoelectric Buzzer

BUZZER DRIVER

CONCLUSION:

This project is designed and tested in the laboratory condition and found to be working satisfactorily. The response time for any fault in this design is approximately 1 sec. The system tolerance is well below the limits of experimental errors.

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REAL TIME-BASED SMART TRAFIC LIGHT SYSTEM WITH ITS SIMULATION USING 8051 MICROCONTROLLER

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ABSTRACT:

The street lighting system is based upon the electronic controller that utilizes the traffic density survey data. An android mobile app was developed for this purpose. Data was collected and analyzed at different busy junctions of Kathmandu Valley. The app maintained a database record of each vehicles type that enter in the system and simultaneously records the time they enter the junction. The data gives an insight into the number of vehicles entering the junction and the time required for them to cross it. This is helpful to calculate the stoppage time which was programmed into the system for optimized and efficient traffic management.

INTRODUCTION:

Traffic congestion has become a serious problem with each passing day. The inadequacy of the infrastructures to manage the increasing number of vehicles has resulted in the traffic jam affecting an average of millions of people in Kathmandu valley every day. When vehicles are fully stopped for a certain period of time, this is colloquially known as a traffic jam or traffic snarl-up. Digital systems could be deployed to control the traffic lights that will result in better traffic movement and consequently reduce traffic congestions.

LITERATURE REVIEW

At the international level, many research works have been carried out for the automatic detection of vehicles using DIP (Digital Image Processing) algorithms. Some such works include Image Processing Based Intelligent Traffic Controller. [1]. In New York City, 7,660 (of a total of 12,460) signalized intersections are controlled by a central computer network and monitored by traffic management centers [2]. Similarly, in Toronto, 83% of its signals are controlled by the Main Traffic Signal System (MTSS). 15% also use the SCOOT (Split Cycle and Offset Optimization Technique), an adaptive signal control system.

TRAFFIC CONGESION IN NEPAL

In Nepal too, academicians and stakeholders have done some level of research to develop solution to tackle traffic congestion in the cities, mostly in the Kathmandu valley. However, no concrete solution has been found yet and the problem of traffic congestion has been a troublesome. Metropolitan Traffic Police Division, Kathmandu and Road Division under Government of Nepal have done a kind of traffic assessment on the cities of Kathmandu valley which has already been almost four to five years. Although civil engineering students need to do road assessments and traffic survey under their course, it has only been focused to be submitted as a requirement for the degree.

The existing traffic is controlled manually by traffic policemen. However, as the complexity of road networks are increased to service the growing demand for road users, a sophisticated traffic control technology is needed in abating this problem. We are now totally dependent on the manual service of the policeman with boards on their hand commanding to the people which are not good in terms of efficiency and safety.

An immediate solution in the context of Nepal can be a microcontroller-based traffic light system. This system is based on real-time data. An app known as Traffic Counter was used to manually log the vehicles crossing the junction. A minimum of four volunteers was employed to collect the data of each route.

In order to know the present situation and analyze the traffic congestion, volunteers firstly stood on target junction for about an hour and recorded the data with a team of volunteers simultaneously standing on the different routes within a junction. The similar Out of the huge data collected, the represented one is just a model to clarify the concept.

Route	Morning	Evening
Maitighar to Pulchowk	1220	514
Maitighar to Tripureshwor	1350	772
Pulchowk to Maitighar	1292	1019
Tripureshwor to Pulchowk	635	582

Table 1: Vehicle Number at two different time

Time graph of the vehicle density in the various route in the intersection can be obtained from field surveys. Multiple surveys can be taken Various probabilistic approach is under research and has been found effective be used to such time-varying data to determine the dwell time, lost time and delay time of the vehicles [3]. Such estimated value can result in the efficient calculation of traffic signal delays. Moreover, advanced technologies including camera-based detection and classification are also progressing which can be used as a feedback mechanism to vary the signal time around the tolerance value.

The size of each vehicle is different. Traffic jam contributed by a single public bus is completely not equivalent to the traffic jam caused by a motorbike. So, in order to make the distribution equal, we have expressed all the vehicle unit to a single unit equivalent to the Car which is termed as PCU [4]. Passenger Car Equivalent (PCE) or Passenger Car Unit (PCU) is a metric used in Transportation Engineering, to assess traffic-flow rate on a highway.

The data presented here was collected at two different time periods. One from 8:45 to 9:30 in the morning and another from 3:15 to 3:45 in the evening. The total vehicles passing through the junction in respective routes are shown in table 1. As seen on the map in figure 1, there are three possible routes for vehicle stoppage which are Maitighar to Pulchowk, Pulchowk to Maitighar, Maitighar to Tripureshwor and Tripureshwor to Pulchowk. Since the vehicles are allowed to move continuously in the Pulchowk to Tripureshwor route, the data count in this route was not taken into consideration.

The table 1 shows that the highest number of vehicles (1350) in the morning pass from Maitighar to Tripureshwor whereas the lowest (635) pass through Tripureshwor to Pulchowk. Similarly, in the evening, the highest number vehicles (1019) have moved from Pulchowk to Maitighar and the lowest (514) being through Maitighar to Pulchowk.

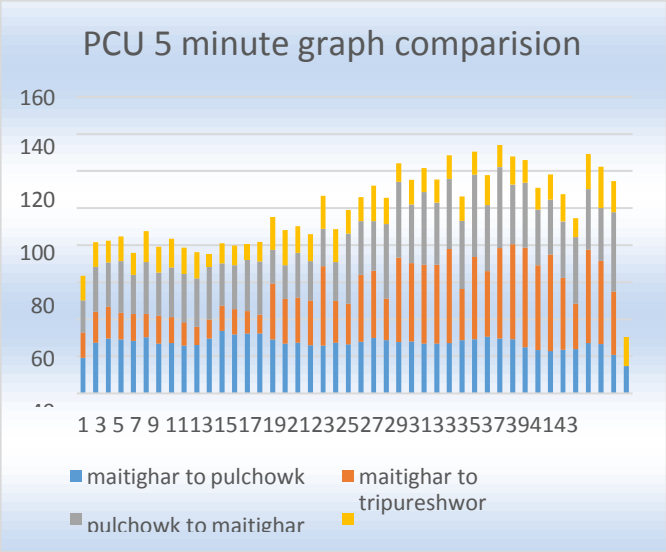

Figure 3: percentage PCU in a cycle of 15 minute

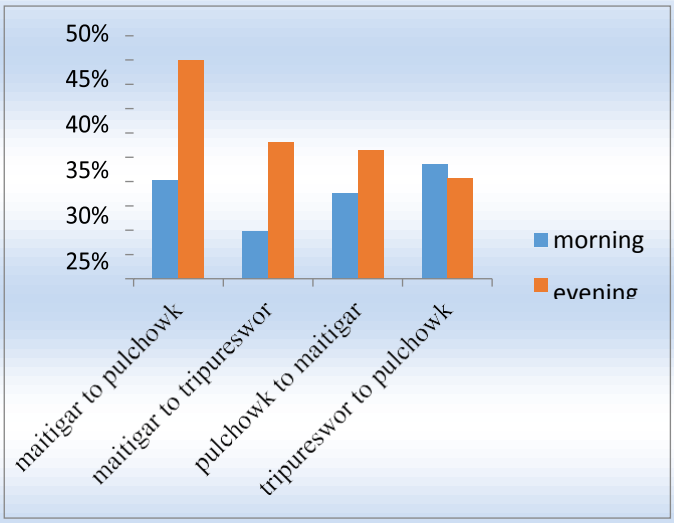

Figure 4: PCU at different directions in interval of 5 minutes

The PCU data count was divided in cycles each of fifteen minutes such that each cycle represents the blinking of red light at each turning once. In each cycle, the Maitighar to Pulchowk route was found to have the highest percentage of PCU (Per car Unit) in the evening and the Tripureshwor to Pulchowk route with the highest PCU in the morning. This information is used to calculate the stoppage time and vehicle flow time for each route

CALCULATIONS

Throughout the calculation we have considered the following relation:

Car/Micro Vehicles equivalent to 1 car unit Bus/Large Vehicles equivalent to 2 car unit Bike/Scooter equivalent to 0.5 car unit Let D be the data obtained during a survey and T(x) represent timestamp recorded in the data x. Difference between two consecutive data, d = T(Dn)-T(Dn-1) in second

For each data Dn: Stoppage value Sn= IF (d/60 <1, 0, ROUND (d, 2)) Total stoppage time value Flow time Fn = elapsed time after last stoppage

Total flow time value Such values for flow and stoppage time can be calculated with number of surveys at varying time of the day consecutively for a number of weeks.

Morning				
Location	Vehicle stoppage (sec)	Time limit (sec)	Through	Stop
Maitighar Pulchowk	960	132	11%	89%
Maitighar to Tripureshwor	90	120	57%	43%
Pulchowk Mai	90	96	52%	48%

tighar				
Tripureshwor to Pulchowk	78	324	81%	19%
Evening				
Location	Vehicle stoppage (sec)	Time limit (sec)	through	stop
Maitighar Pulchowk	120	420	78%	22%
Maitighar to Tripureshwor	84	282	77%	23%
Pulchowk Maitighar	90	180	67%	33%
Tripureshwor to Pulchowk	90	420	82%	18%

Table 2: Vehicle Stoppage and Flow time

RESULT AND ANALYSIS

The stoppage time was calculated using the PCU percentage of a cycle. We can observe in table 4 that Maitighar to Pulchowk route having the greatest number of vehicles in the evening also have the largest vehicle stoppage time and also the vehicle flow time. Analyzing figure 3, the descending order of vehicle flow in the morning is through the routes: Tripureshwor to Pulchowk, Maitighar to Pulchowk, Pulchowk to Maitighar and Maitighar to Tripureshwor. Depending on this number, the stoppage time for Maitighar to Pulchowk route should have been less than Maitighar to Tripureshwor and Pulchowk to Maitighar route. Owning to the same order, the flow time for Pulchowk to Maitighar route should have been more than Maitighar to Tripureshwor route but it is not which is depicted in table 2. The amber light timing and its calculations are incorporated inflow time and stoppage time. The actual delay time for traffic light either fixed or can be estimated dynamically with flow and stoppage time.

Similarly, if we analyze the evening data, the descending order of vehicle flow routes is Maitighar to Pulchowk, Maitighar to Tripureshwor, Pulchowk to Maitighar and Tripureshwor to Pulchowk. This implies the Maitighar to Pulchowk route must have least stoppage time and maximum flow time. It does have a larger flow time; however, the stoppage time is also large in its case. This directs us that had the Maitighar to Pulchowk route given more priority owing to the fact that more vehicles flow in this direction in the evening, there would have been fewer chances of traffic jams.

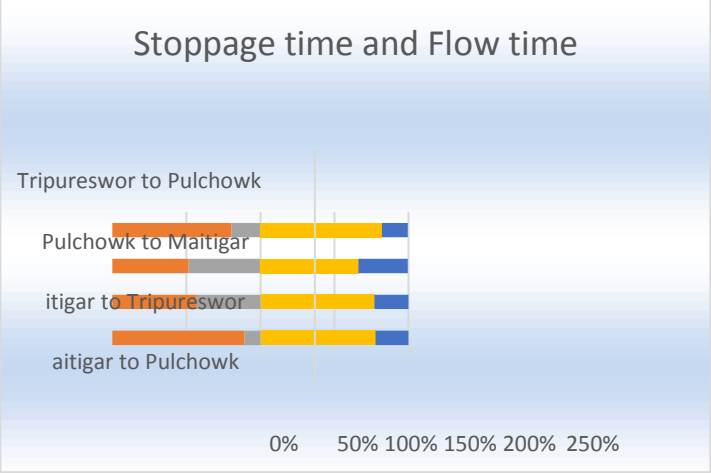

Table 3: Stoppage time and Flow time calculation

HARDWARE SIMULATION

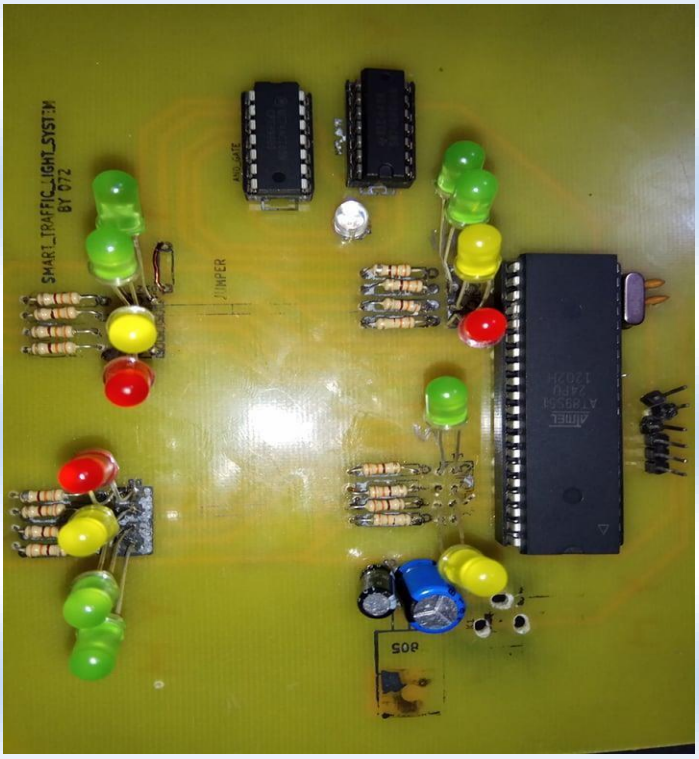

Figure 5: Implemented hardware circuit with 8051

We used the 8051 Microcontroller and implemented the project on hardware successfully. All four junctions of Thapathali was simulated along with the pedestrian consideration. We also did it using 555 Timer generating the pulses for our warm-up type simulation A separate lighting system was made for the pedestrian. We made the simulation on Proteus and designed the PCB circuit on Kicad and used a programmer to transfer the program to 8051 Microcontroller.

CONCLUSION

We conclude that the traffic system in Nepal needs to be shifted to the electronic system. The analysis of the current traffic data shows that the human analysis of real- time traffic is not robust enough to prioritize directions for stoppage time to avoid the traffic jam. So, in the near future, the manual system should be substituted by the microcontroller so that the Traffic Light System gets

implemented at every section. And to implement the Traffic Light system it is best to set the time of each command with reference to the real data and for that, the data we collected manually through a mobile based app can be a better option until further methods like image processing etc. are adopted which is highly advanced and costly too.

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SMART ELECTRONIC WHEELCHAIR USING ARDUINO AND BLUETOOTH MODULE

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ABSTRACT:

This paper describes the design of a smart, motorized, voice controlled wheelchair using embedded system. Proposed design supports voice activation system for physically differently abled persons incorporating manual operation. This paper represents the "Voice-controlled Wheel chair" for the physically differently abled person where the voice command controls the movements of the wheelchair. The voice command is given through a cellular device having Bluetooth and the command is transferred and converted to string by the BT Voice Control for Arduino and is transferred to the Bluetooth Module SR-04connected to the Arduino board for the control of the Wheelchair. For example, when the user says „Go" then chair will move in forward direction and when he says Back" then the chair will move in backward direction and similarly „Left", „Right" for rotating it in left and right directions respectively and „Stop" for making it stop. This system was designed and developed to save cost, time and energy of the patient. Ultrasonic sensor is also made a part of the design and it helps to detect obstacles lying ahead in the way of the wheelchair that can hinder the passage of the wheelchair.

INTRODUCTION:

This paper is conceived as an idea to ease the lives of those among us who are unfortunate enough to have lost the ability to move their legs due to a significant amount of paralysis, accident or due to old age. Many differently abled people usually depend on others in their daily life especially in moving from one place to another. For the wheelchair users, they need continuously someone to help them in getting the wheelchair moving. Their lives are made difficult by the fact that there is lack of an intuitive control system for their wheelchairs that allows moving independently. Using an electrical wheelchair leads to a large amount of independence for persons with a physical disability who can neither walk nor operate a mechanical wheelchair alone as it requires great effort and help of other people [1]. The problem is that in some cases the disability causes someone to lose the ability to use his hands, therefore in this case, the way of controlling a

power wheelchair can be done using speech commands for hands-free patients leading to an interesting and promising outcome. But, still the availability of the smart wheelchair solutions is often limited due to the high costs and not-so-friendly operation. By the proposed approach, described in this paper, the low-cost, simple and friendly solution for the voice controlled platform will be presented that is user friendly, fully-customizable according to the language spoken by the user and will help in enhancement of user‟s independent mobility. Using a Smartphone as the "brain" of a robot is already an active research field with several open opportunities and promising possibilities [2]. Another recent and very successful technology, Bluetooth has changed how people use digital device at home or office, and has transferred traditional wired digital devices into wireless devices [3]. This research is based on Voice-controlled Wheelchair design based on mobile platforms, by means of Bluetooth technology, design and implementation of wireless remote control solutions. The project also incorporates use of ultrasonic sensors to detect obstacles within range of 4 metres and notifies the system and stop the wheelchair till further command. In this work, Smart Wheelchair control using Arduino Uno microcontroller and Bluetooth Module via android application is presented. The rest of this paper is organized as follows: Section 2 specializes to display the related most recent works. Section 3 concerns with the Flowchart of the project and application instruction. Section 4 discusses the result. The last section is dedicated to the main conclusions.

RELATED WORKS

The objective of this research project is to equip the present motorized wheelchair control system with a voice command system at low-price and friendly operation. By having these features, differently abled people especially with a severe disability who are unable to move like normal people will be able to move independently. Prototypes of several smart wheelchairs have been developed, based on advanced technology to help the differently abed. In 2012, Megalingam, Rajesh Kannan,et al, proposed a system that uses a small camera mounted very close to the user‟s hand, which tracks the small movements of their fingers to understand the direction of movement of the wheelchair. A gesture recognition system which identifies the gesture is then interfaced to the wheelchair control system inorder move it to the desired location [4]. In 2014, Andrej Škraba et al, presented a prototype speech controlled cloud based wheelchair platform. The control of the platform is implemented using low-cost available speech WebKit in the cloud. Besides the voice control, the GUI is implemented which works in the web browser as well as on the mobile devices

providing live video stream [5]. In 2014, Sobia, M. Carmel et al, proposed a wheelchair command interface that does not require the other's hands. It includes 3 major modules. They are face detection, facial expression recognition and command generation. The software contains digital image processing for face detection, principal component analysis for facial expression recognition and generating a command signals for interfacing the wheelchair [6]. In 2014, Klabi I. et al, presented controlled the movement of wheelchair in different directions by monitoring voice commands and also the simple movement of the patient's face. Automatic obstacle detection and avoidance had been done using ultrasonic and infrared sensors which helps the patient to apply a temporary brake in case any obstacle suddenly comes in the way of the wheelchair. Also wall tracking and target tracking algorithms had been developed in the wheelchair [7]. Each one of the works above has its drawbacks and weakness. In this project, simple package with very cheap electronics that would not intricate the wheelchair and with high efficiency voice recognizer that could achieve sometimes to 100% of recognition rate, is used to build an effective voice-controlled smart wheelchair.

SYSTEM DESCRIPTION

The system has two parts, namely; hardware and software. The hardware architecture consists of an embedded system that is based on Arduino Uno board, a Bluetooth Module, Motor Driver and an Android phone. The Bluetooth Module provides the communication media between the user through the android phone and the system by means of voice command given to the android phone. The user speaks the desired command to the "BT Voice Control for Arduino voice (AMR Voice Application)" software application installed in the android phone that is connected through Bluetooth with Bluetooth Module SR-04. The voice command is converted to an array of string and the string is passed to Arduino Uno connected to it. Once the Bluetooth Module receives the message, the command sent will be extracted and executed by the microcontroller attached to it and depending on the commands fed to the Motor Driver, the motors will function accordingly. The system will interpret the commands and control the Wheelchair accordingly via android application. Meanwhile, the ultrasonic sensor works while the circuit is on and makes sure the path has no obstacle and if any obstacle occurs it notifies the Arduino and stops wheelchair till further command is obtained from the user.

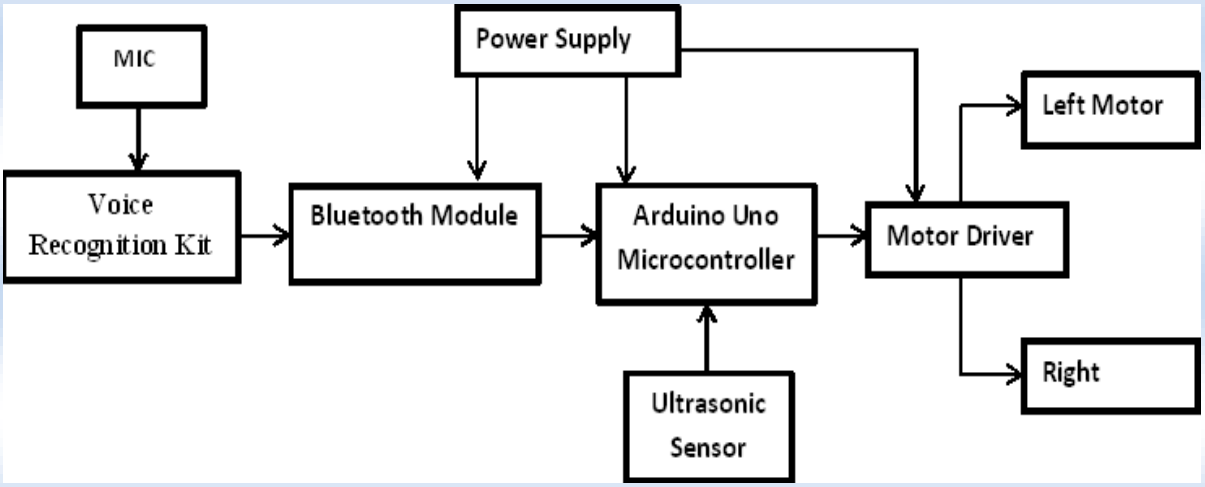

Figure 1: Block Diagram of the Project

APPLICATION INSTRUCTION

The different directions of motions possible are: forward, backward, left, right and stop. In achieving the task the controller is loaded with program using the arduino programming language and arduino development environment.

- First make sure Bluetooth module is paired with the android mobile. The default password for pairing is “1234” or “0000”.
- When the user says “GO”, AMR Voice application sends the data in form of string “*GO#” to Bluetooth module connected to the circuit. When microcontroller detects “GO”, the motor attached to the wheelchair moves FORWORD.
- When the user says “BACK” AMR Voice application sends the data in form of string “*BACK#” to Bluetooth module connected to the circuit. When microcontroller detects “BACK”, the motor attached to the wheelchair moves REVERSE.
- When the user says “LEFT” AMR Voice application sends the data in form of string in form of string “*LEFT#” to Bluetooth module connected to the circuit. When microcontroller detects “LEFT” the moves the motor attached to the wheelchair LEFT side.
- When the user says “RIGHT” AMR Voice application sends the data in form of string

"*RIGHT#" to Bluetooth module connected to the circuit. When microcontroller detects "RIGHT" the moves the motor attached to the wheelchair RIGHT side.

- When the user says "STOP" button which is in the Centre of remote the AMR Voice application sends the data in form of string "*STOP#" to the Bluetooth module connected to the circuit. When microcontroller detects "STOP" the wheelchair gets stopped.
- Click on "DISCONNECT" icon to disconnect the paired Bluetooth module.

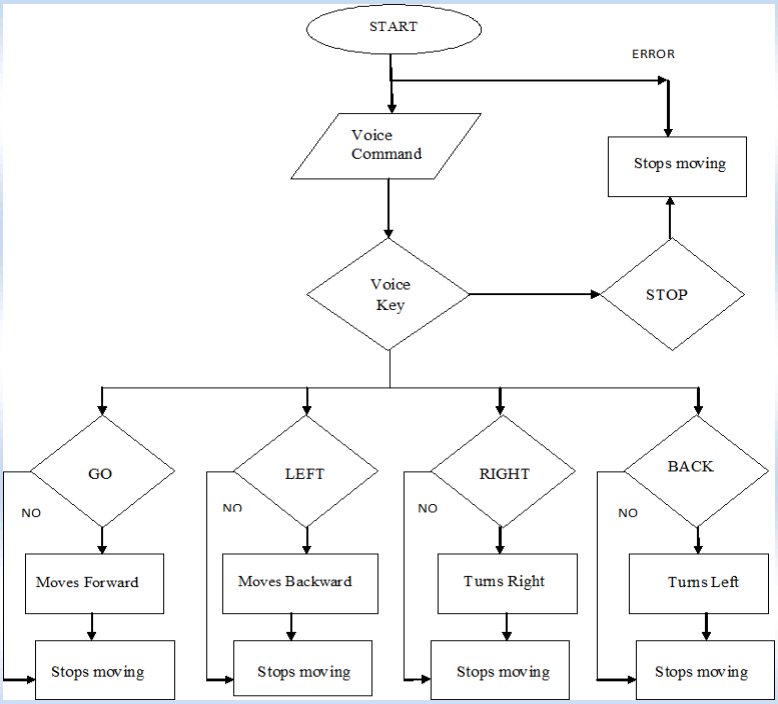

Figure 2: Flowchart of the Project

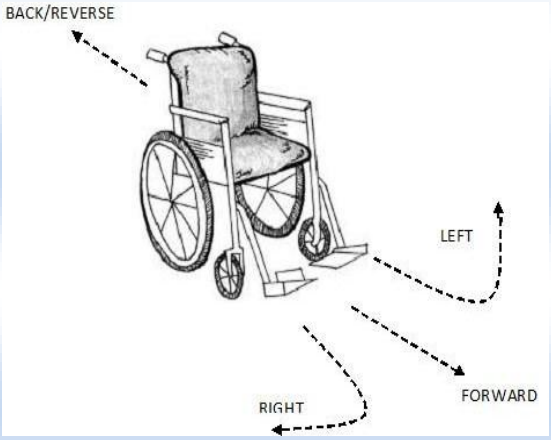

Figure 3: Wheelchair Movement Paths

RESULTS AND DISCUSSION

In order to evaluate the performance of the presented speech recognition system to drive the wheelchair following test done to test the effectiveness of the Voice-recognition to drive the wheelchair. The recognition rate of each Keyword word programmed to operate when spoken by the user is calculated by the following equation:

RR% = Number of Recognized Words divided by Number of Tested Words

In order to test the accuracy and effectiveness of the project, four volunteers were asked to become a part of testing of the project. Each volunteer was asked to give 10 commands and based on how many the commands are followed will give the result. The test was carried in silent and noisy environment by both male and female users. This test will determine the accuracy and effectiveness of the project.

Volunteer	Number of commands spoken	Number of times the command is followed	Accuracy
A(Male) Silent Environment	10	10	100%
B(Female) Silent Environment	10	10	100%
C(Male) Noisy Environment	10	9	90%
D(Female) Noisy Environment	10	9	90%

Table 2: Test Results based on Voice Commands given and followed

There is a maximum of 1 word wrong every 10 times repeating words leading to an error of 10% i.e. recognition rate not less than 90%. This percentage might reach 100% if the test is done in clear environment with good pronunciation of words with moderate time. This test proved that there is no big difference in RR if the speaker is male or female. The voice commands are interpreted and translated to

string and provided to the Arduino that in turn produces and actuates the wheelchair accordingly as shown in Table 5.

Voice Command	Condition	String command	Left/Right Motor
GO	Moves Forward	*Go#	On/On Forward
BACK	Moves Backward	*BACK#	On/On Backward
LEFT	Moves Left	*LEFT#	Off/On Forward
RIGHT	Moves Right	*RIGHT#	On/Off Forward
STOP	Stops	*STOP#	Off/Off

Table 5: Voice and String Commands Action

Designing a simple and efficient automatic speech recognition system for isolated command words to satisfy the motion control of an electric motorized wheelchair for differently abled persons is the interest of this project. The processing units (the speech kit and the microcontroller) are directly attached to the wheelchair in one package that made the design representing a complete autonomous and smart wheelchair. The speech recognizer is tested to prove its performance to generate exact movement of the chair. It proved a recognition rate of above 90%.

CONCLUSION

This project elaborates the design and construction of Smart Electronic Wheelchair with the help of Bluetooth Module. The circuit works properly to move as the command given by the user. After designing the circuit that enables physically disabled to control their wheel using an android application in their smartphones and it has also been tested and validated. The detection of any obstacle is successfully controlled by the microcontroller. As the person switches on the circuit and starts moving, any obstacle which is expected to lie within a range of 4 metres will be detected by the Ultrasonic sensor. This proposed system contributes to the self-dependency of differently abled and older people.

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SMART MEDICINE REMINDER BOX

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ABSTRACT:

Our project's main aim is to make a Smart medicine box for those users who regularly take medicines and the prescription of their medicine is very long as it is hard to remember to patients and also for their care giver. Also Old age patients suffer from problems of forget to take pills on proper time which causes certain health issues for patients having Permanent diseases like diabetes, blood pressure, breathing problem, heart problems, cancer diseases etc. We saw these problems in hospitals & people around us who have such kind of diseases and thus based on these two problems we made smart medicine box which solve these problems by Setting up time table of prescribed medicines through push buttons as given in prescription. Present time will be saved in RTC module and notification time will be saved in EEPROM. Therefore at the time of taking medicine system generate Notification sound and display the Bright light in certain pill boxes. So, patient can know the specific number of box from which he has to take out medicines. All pill boxes are pre-loaded in the system which patient needs to take at given time. And our system has quality that it can sense if the patient had taken out pills from the box or not. Another advantage of our system includes of Sensing capability if the patient tries to postpone the time of taking medicine by suddenly opening and closing the medicine boxes to stop the sound. Compare to other devices available in market are capable to generate sound at one time and afterwards it stops. Thus, final result of our system provides fast curing of patient health by using our advantageous system.

INTRODUCTION

In day-to-day life most of the people need to take medicines which was not there in past couple of years and the reason behind this is diseases are increasing in large amount. So sooner or later many people come in contact with these diseases. Some diseases are temporary diseases while many are permanent life threatening diseases. Life threatening diseases gets mixes with the human body in such a way that they can't leave the body ever and they increases in rapid time. Life span of humans became less because of such diseases and to overcome or to live a better life we need to take medicines regularly and also in large amount. We need to be in advice of Doctor who tells us to take desired pills in desired

way so that patients face problems like forgetting pills to take at right time and also when Doctor changes the prescription of

medicine patients have to remember the new schedule of medicine. This problem of forgetting to take pills at right time, taking wrong medicines and accidentally taking of expired medicine causes health issues of patient and this leads to suffer from unhealthy life. Our project is to made Arduino-Uno based Smart medicine box which uses Real time clock. The new awaited feature in our project is our system is sensible that patient has taken medicine or not and thus the patient can't postpone the time on which he needs to take pills. It is compulsory for the patient to take pills from the box at the right time otherwise our systems continues to make large sound until the medicine is taken out from the box. This notification feature adds life years to the patient and thus this thing is not available in any device which is the necessity for present days.

BLOCK DIAGRAM

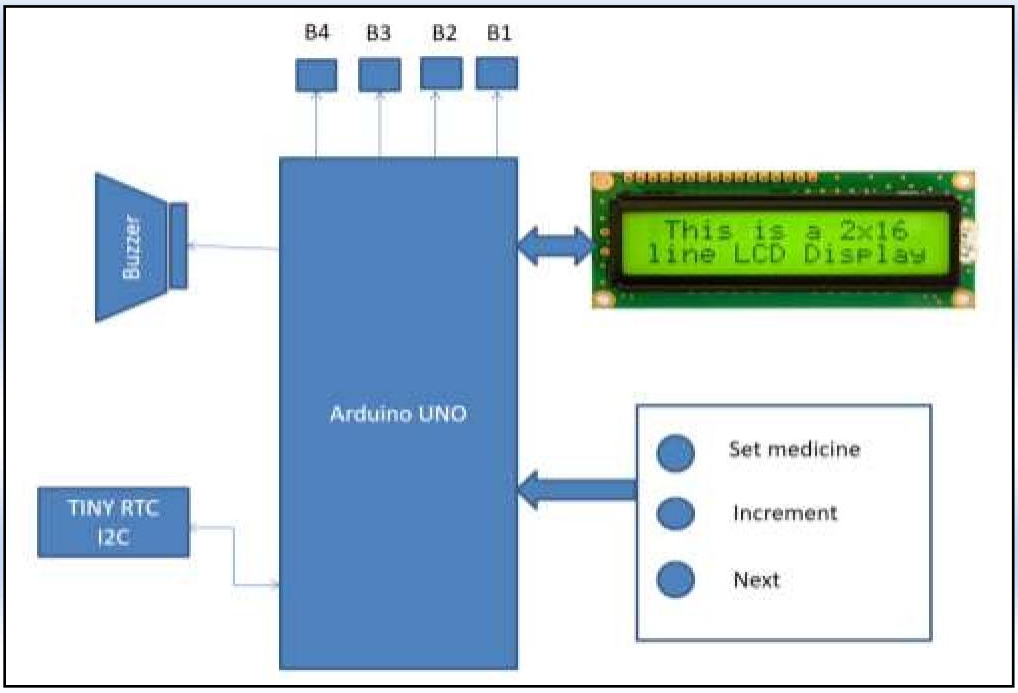

Fig. 1: Block Diagram of System

EXPLANATION OF BLOCK DIAGRAM

Arduino UNO:

We are using Arduino UNO because it use 8 bit microcontroller ATmega328P and it has 32KB flash memory. These features are beneficial in our project and that's why we used Arduino UNO. Arduino UNO board is connected with all other modules also it controls all other modules & made the interfacing easier. It also has internal EEPROM which stores real time data in it.Our project is based on embedded system we are using Arduino Uno for interfacing all things In that Arduino is an open-source which is easy-to-use hardware and connected software. So Arduino is path between hardware and software. Arduino boards read inputs from a press a button- and turn it into an output, turning on an LED and buzzer, you can tell your board what to do by sending a set of instructions to the microcontroller of Arduino. To do so you use the Arduino programming language , and the Arduino Software (IDE), based on Processing. The programming platform is Arduino IDE and programming language is standard C. we made program for all different module that we are using in our project. Like RTC module, LCD module 16*2 so firstly we have to add library in Arduino IDE software and after that we made programming.

LCD interfacing:

We used 16*2 LCD module in our project which is connected to Arduino UNO through a LCD interface IC or directly to its address and data bus and few control pins. LCD shows the current time and date which RTC sends the data to LCD module.

RTC module:

We used Tiny RTC I2C module which uses I2C protocol and it is useful in our project. RTC module has internal CMOS cell so it does not needs external power supply to update time and date.

Buzzer:

Buzzer will ring at proper time when pills have to be taken.

LED:

We have 7 boxes having an LED in each box which blinks to show us the specific box from which the pills needs to be taken at given time.

Pushbuttons:

We used 3 push buttons from which first one is used for setting medicine, second one is used for increment and third one is used for next. First button takes us to the menu of setting medicine, second button is used to increment the number of hour and minute which we needs to set and third button takes us forward from hour to minute and from minute to the next time.

WORKING OF SCHEMATIC

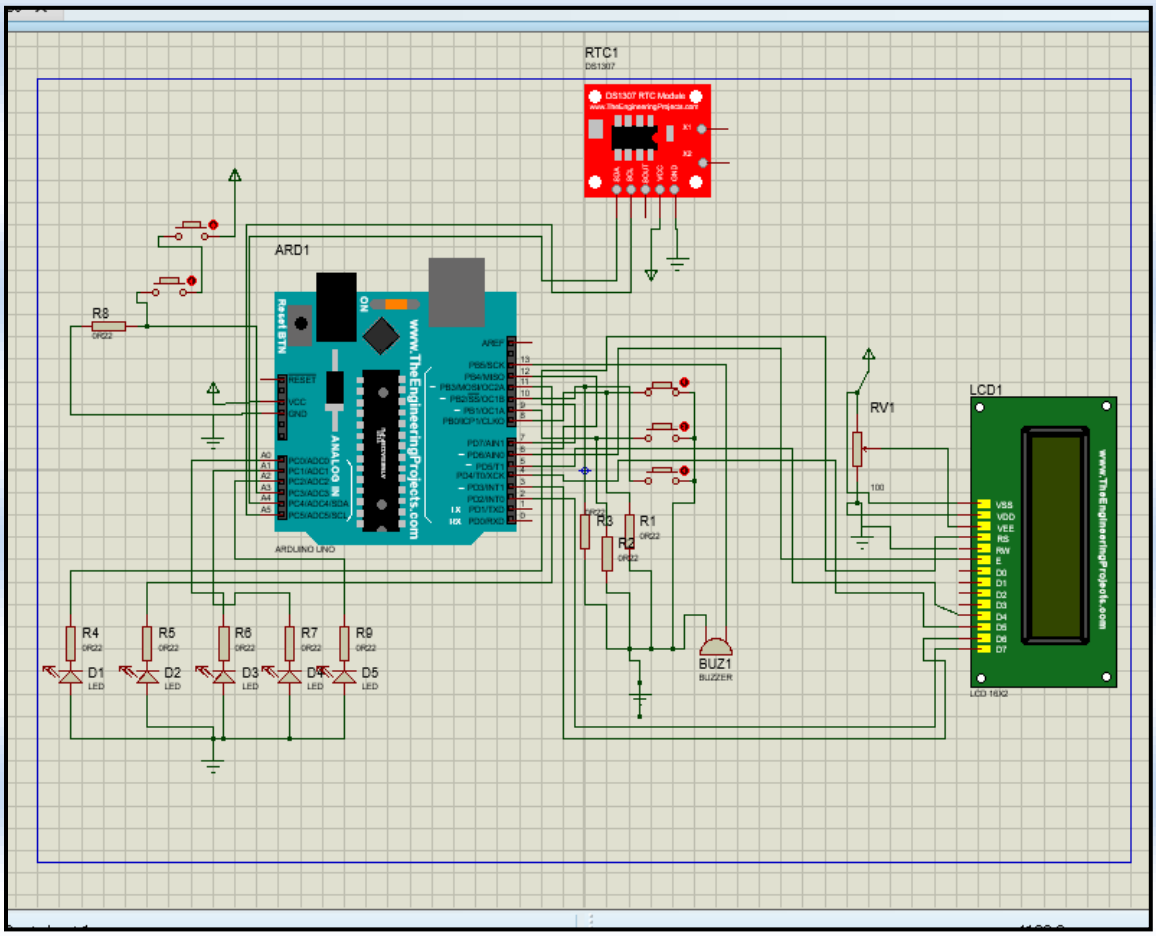

Fig.2: Schematic Diagram Table -1

List of Pin Work:

SR NO.	PIN	WORK OF PIN
1	A3	Inputs
2	11,12,13,A0,A1,A2	Output
3	A5,A4	RTC
4	8,9,10	Push Button
5	5V	Vcc
6	Gnd	GND

Operation of Schematic

We made schematic in software PROTEUS 8 and will check simulation in it. Firstly we add all part from library of Arduino, LCD and RTC module. We also add other part registers, LED, Buzzer etc. Power supply is applied to the Arduino module. All modules including RTC, LCD, Buzzer, LED, etc are connected with Arduino. We used Arduino Uno in system. RTC is always working whether external power supply is applied to it or not. RTC module contains a 3V CMOS cell. We also connected certain boxes in which user will load the pills. When system gets started time and date will show on LCD module. Through push buttons we can enter in the menu of setting time of pills prescription. Using another push buttons names increment and next we can set the time of prescription of medicine. At the time we set, buzzer will rang and LED's will blink in the desired box notifying the user to open that box and take out pills from that box in which LED blinks. Buzzer and LED will turn off when user opens the box otherwise buzzer and LED will continuously notify until the time is passed of taking medicine. If the user open and closes the box immediately, system once again starts generating loud sound and forces the user to take pills again.

FLOWCHART OF SYSTEM

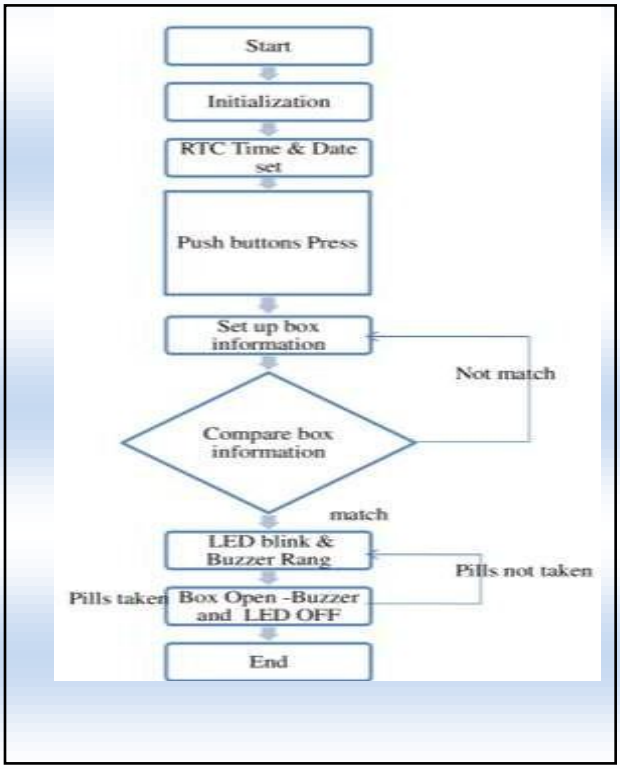

Fig. 3: Flowchart of System

As shown in flowchart when time & date are set through push buttons, devise will continuously compare the real time & set time. If the time is matched, LED will blink & buzzer will ring. It then senses the box is opened by the user or not. If box is opened, LED & buzzer stops and if it is not opened, LED will continuously blinks & buzzer will continuously rings.

ADVANTAGE

Cost efficient:

Our product cost is affordable compare to other product available in market.

User friendly:

User can set time table of medicine by himself.

Highly reliable:

Good in quality and performance; able to be trusted for patients & old age people.

Provide comfort and health:

Comfortable for old age people and provide healthy life for patients who are regularly take medicines.

Long-Lasting:

The product can be used for long time.

Easy to use and manufacture:

It is very easy to use and manufacture.

Accurate result:

Alarm will ring at proper time which is set by user previously.

Easy to maintain:

It need less Maintenance. It is one time investment afterwards it can be used continuously.

RESULT

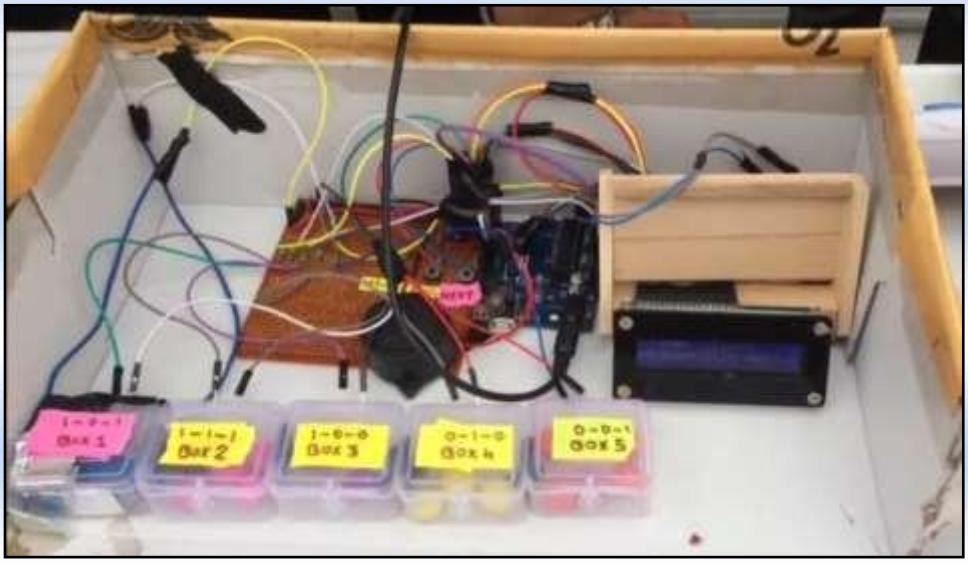

Fig. 4: Result of our Project

We made our project as useful for the patient who needs this and all related users. We conclude result that our project is useful for those people who are taking pills regularly, prescription of medicine is very long and hard to remember for those users. Our product is so useful that it can cure those patients illness and there will no need of taking care of these types of patients so caregiver has no tension about their health and they will live healthy and tension free life.

CONCLUSION

The goal of our project is to provide healthy and tension free life to those users who are taking regularly pills and to provide this product at affordable cost also. Our project is also reusable by exchanging those other medicine box that has only alerting system and are non-usable or unaffordable compare to our product.

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BLUETOOTH BASED HOME AUTOMATION AND SECURITY SYSTEM USING ARM9

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ABSTRACT:

Today we are living in 21st century where automation is playing important role in human life. Home automation allows us to control household appliances like light, door, fan, AC etc. It also provides home security and emergency system to be activated. Home automation not only refers to reduce human efforts but also energy saving and time efficiency. The main objective of home automation and security is to help handicapped and old aged people who will enable them to control home appliances and alert them in critical situations.

This paper put forwards the design of home automation and security system using ARM7 LPC2148 board. The design is based on a standalone embedded system board ARM7 LPC2148 at home. Home appliances are connected to the ARM7 and communication is established between the ARM7 and ARM9 with Bluetooth device. The home appliances are connected to the input / output ports of the embedded system board and their status is passed to the ARM7. We would develop an authentication to the system for authorized person to access home appliances. The device with low cost and scalable to less modification to the core is much important. It presents the design and implementation of automation system that can monitor and control home appliances via ARM9 S3C2440A board.

INTRODUCTION

The “Home Automation” concept has existed for many years. The terms “Smart Home”, “Intelligent Home” followed and has been used to introduce the concept of networking appliances and devices in the house. Home automation Systems (HASs) represents a great research opportunity in creating new fields in engineering, architecture and computing (Huidobro and Millan, 2004). HASs becoming popular nowadays and enter quickly in this emerging market. However, end users, especially the disabled and old aged due to their complexity and cost, do not always accept these systems. Due to the advancement of wireless technology, there are several different of connections are introduced such as GSM, WIFI, ZIGBEE, and Bluetooth. Each of the connection has their own unique specifications and applications. Among the four popular wireless connections that often implemented in HAS project, Bluetooth is being chosen with its suitable capability. Bluetooth with globally available frequencies of 2400Hz is able to

provide connectivity up to 100 meters at speed of up to 3Mbps depending on the Bluetooth device class [1]. In addition, a Bluetooth master device is able to connect up to 7 devices in a "Piconet" [2]. This paper will describe the approach which we are implementing to control various home appliances with ARM7 processor.

From the overall papers reviews, HAS according to [3-10] never mentioned about the existing physical electrical switches in their system. Without the switches on the wall, the designed system limited the control only at the GUI. This issue brings inconvenient to the people in the house. This designed system remains the physical switches with the modified low voltage activating method, in order to provide safer physical control to the user compared to the conventional high voltage switches. The Bluetooth connection in this system is established by Bluetooth module that directly receives/ transmits commands from/to ARM9/ARM7.

IMPLEMENTATION

Wince6.0

For this home automation and security system we are targeting ARM9 S3C2440A platform since it has huge market and open source. Wince6.0 is a operating system which is used for ARM9 devices that includes middleware and key applications. The Wince6.0 OS is based on WindowsCE.net 5.0Standard. The ARM9 provides the tools and APIs necessary to begin developing applications on the Wince6.0 platform.

Software Design

As discussed earlier we are developing graphical user interface(GUI) application by using visual basics .net. The application consists of main function like light controlling, Door controlling, etc. When the application starts user is first authenticated, if user is authorized he will be navigated to main screen. The main screen has a list of all functions among which user can select any one function which he want to control. After selecting a function he would be able to see a current status of a particular device. If user wishes, he can enable or disable intended device.

The system is programmed to auto on/off lights during late night hours. If room temperature goes very high or low user can manually adjust fan/AC as per user requirement.

MDK-ARM

The MDK(microcontroller Development Kit)- ARM is a complete software development environment for ARM7™ and ARM9™processor-based devices. MDK- ARM is specifically designed for microcontroller applications, it is easy to learn and use, yet powerful enough for the most demanding

embedded applications. MDK-ARM is available in four editions: MDK-Lite, MDK-Basic, MDK-Standard, and MDK-Professional. All editions provide a complete C/C++ development environment and MDK-Professional includes extensive middleware libraries

Figure 1 ARM7 LPC2148 kit

Figure 2ARM9 S3C440A kit

The Kiel MDK board provides input and output pins that you can implement through the use of attachments called "shields". With an Micro controller devices and the ‘ARM MDK’, you can use whatever sensors and actuators you require to create your own accessories. This may include a LED outputs, and temperature and light sensors.

BLOCK DIAGRAM

Micro controller Device - It is the device through which application interacts with home applians.

USB Connector - It is the hardware port in the kit through which the USB device is attached to the embedded kit.

Embedded Device - It consists of individual embedded kits along with respective home appliance.

In this project we are implementing ARM9 Wince6.0 based device control with the help of blue tooth. For this one ARM9 is required in the transmitter section. In the receiver section two devices are interfaced to microcontroller with Bluetooth module. User responsibility is to develop one application software(GUI) in ARM9 with VB.net which is used to send the commands with the help of Bluetooth. In the receiver side Bluetooth module is interfaced to the controller to transreceive the data from the ARM9 processor. Based on that data microcontroller will decide the devices operation like on/off the devices and lock/unlock the door.

SOFTWARE DEVELOPMENT

Graphical User Interface (GUI) Module

Themost important feature of our application is to hide several processes from the user while allowing some degree of interaction with the application. By using the GUI package, we were able to customize the application to include a variety of user interface elements such as text boxes, choice groups, alert messages, lists and command buttons. Figure 3 illustrates some designs for the graphical user interface

Figure 4:ARM9 GUI for controlling home appliances

Communication Module

The Serial Port Profile (SPP) is the Bluetooth profile that realizes the RFCOMM connection between two devices. The RFCOMM protocol is an emulation of the RS-232 2011 IEEE 15th International Symposium on Consumer Electronics 978- 1-61284-842-6/11/$26.00©2011 IEEE

The Program Flow chart

Upon the execution of the program, it first checks if Bluetooth is already enabled on the ARM9. If Bluetooth is enabled, the device and service discovery process will run. The software will check if there are already predefined devices stored in the ARM9s memory. 2011 IEEE 15th International Symposium on Consumer Electronics 978- 1-61284-842-6/11/$26.00©2011 IEEE

If they do exist, they will be listed down for the user to select one. The program then checks to see if the selected device is in range. It will then verify if the device is a

Bluetooth transceiver

(ARM7-MDK board).

Now if there are no devices stored in memory, the program will search for Bluetooth-enabled devices within the area. Once discovered, these devices will be displayed on the screen and also stored in memory. Once it is confirmed that the device is indeed a transceiver, the software will store the unique addresses of all the controller modules connected to it, in this case ARM7-MDK. If the address of a controller module has not been saved, then it will be designated a number i.e.MDK- LAMP. Otherwise, it will be given its saved name and will prompt the user to enter the pairing password for ARM7-MDK board. Upon entering the correct password, the program stores all connected controller modules names inside the ARM9 memory, then only the Main Menu user interface will be displayed.

The Main Menu displays three options: Options, List of Lamps and Exit. A List of Lamps is a combination of one or more lights which have been preset to a certain status or state. These states are either ON or OFF. There are two options to choose from in the List of Lamps interface: they are either LAMP ON or LAMP OFF. When the certain instruction has been chosen, the software will send data to the ARM7-MDK transceiver, which in turn will send the data to the controller modules.

The List of Lamps option in the Main Menu will display the entire controller modules saved in memory. The user can modify the lights status from here. Options will display instructions on how to use the software. Lastly, Exit will let the user end the program.

CONCLUSION

In conclusion, this low cost system is designed to improve the standard living in home. The remote control function by ARM9 provides help and assistance especially to disabled and elderly. In order to provide safety protection to the user, a low voltage activating switches is replaced current electrical switches. Moreover, implementation of wireless Bluetooth connection in control board allows the system

installation in more simple way. The control board is directly installed beside the electrical switches thereby the switching connection is controlled by relay. Furthermore, flexible types of connections are designed as backup connections to the system. The connected GUIs are synchronized to the control board. They

indicate the real-time switches status. The system is designed in user-friendly interface. The easy to use interface on Window and wince6.0 GUI provides simple control by the elderly and disabled people. For future work, the Window GUI will be implemented with speech recognition voice control. The wince6.0 GUI will be implemented as a remote Bluetooth microphone to the Window GUI. All the voice signal inputs to the ARM9 will be transmitted to the Window GUI for signal processing. Also, the push buttons implemented in low voltage activating switches will be replaced by capacitive sensing switches. All the future work is expected without spend extra cost, even one cent from the current system.

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WIRELESS ACCIDENT INFORMATION SYSTEM USING GSM AND GPS

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ABSTRACT:

This study discusses about designing a Smart Display and Control (SDC) which will monitor the zone and maintains the specified speed in the zone levels, which runs on an embedded system. This system includes three modules; automatic speed control module, accident detection and information sending module and security enabling module. Automatic speed control module includes RF transmitter placed in specific location and RF receiver in the vehicle. Accident detection module includes GSM and GPS technology. Security enabling module includes sensory units which ensures the condition of seat belt and the driver. This module includes alcohol sensor and eye sensor. The smart display and control is composed of two separate units: Zone status Transmitter unit and Receiver (speed Display and Control) Unit.

INTRODUCTION

Nowadays accidents occur in all the places but major accidents occur in school zone and college zone. Because of high speeding of vehicle. The main objective of the system is to provide security for the vehicle user and also detects the accident if occurred and informs the respective authority through wireless technologies. If any accident occurs in highway or any other place. the accident information system will get activated and message will be transmitted to respective authority (Rajesh et al., 2010). Statistical report says that the accident occur due to the following reasons; drunk driver not using the seat belt properly. This system will check all these things before the vehicle starts. This automatic accident detection system will overcome the above mentioned problems in an effective way. Present system checks only the seat belt condition and lacks much security constrains.

According to this system, whenever a person sits in driver seat of the vehicle, the system checks for the following parameters with the driver. The Alcohol sensor, which checks if the person has consumed alcohol or not. The eye sensor makes sure that the person in driver seat does not falls asleep. In case of

any accident, the vibration in vibration sensor increases beyond the limit and information is sent to GSM module. The GSM can send message to respective authority. Thus this system ensures the life security.

Overview of the system frame work: In this design process three modules were used, automatic speed control module, accident detection module and security enabling module. In automatic speed control module the RF transmitter and RF receiver are to be used. The wireless Transmitter can send the data up to 100 feet away from the vehicle. The RF module used here operates with a carrier frequency of 418 MHZ within the 260 MHZ to 430 MHZ RF Spectrum (unlicensed Spectrum) thus avoiding any FCC (Federal Communication commission) charges or regulations. The RF transmitter is placed in a specific location and RF receiver is placed in vehicle. When the vehicle reaches the zone like school zone or U turn, it will automatically reduce the speed and when it leaves the zone it will automatically regain its speed. From this the occurrence of accidents will get reduced. In information sending module GSM, GPS and vibration sensors are used. In this system, the vibration sensor, GPS and GSM is placed in the vehicle. If an accident occurred the vibration sensor senses the vibration level and if it exceeds the threshold limit, the system will consider that there is an occurrence of accident in that particular location. Then the system will activate the GPS to gather the location detail and sends the location of the vehicle through GSM to the control station. Security enabling module includes eye sensor and seat belt detector which will ensure the security condition of the driver.

Nowadays the accident occurs due to a drunken driver and improper use of belt. The main cause of accident is due to the driver drowsy and tired condition, which will be noticed by the help of eyes sensor which will not start and also informs the status of the driver to the base station along with the vehicle ID.

PROTOTYPE DESIGN

Transmitter design: Figure 1 shows the transmitter module. Transmitter module is placed in the specific zone. Transmitter and receiver both operate at a frequency of 430 MHZ. transmitter receives data serially and sends the data to the receiver continuously. The RF transmitter is

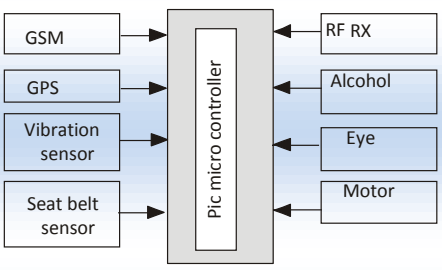

Fig. : Prototypic design of accident detection, speed control and security module

placed in zones like school zone, college zone, U turn. When the vehicle reaches those zones, it will automatically reduce the speed (Ben Carroll et al., 2010) to 20 KM. When the vehicle leaves the zone it will regain its speed. The receiver module is placed in the vehicle. When the signal from transmitter is received it will decode the encoded data and indicate the controller to reduce or limit the speed of the vehicle

When the vehicle leaves the zone it will regain its speed. The receiver module is placed in the vehicle. When the signal from transmitter is received it will decode the encoded data and indicate the controller to reduce or limit the speed of the vehicle.

Receiver design: Figure 2 shows the receiver prototypic design. The RF module consists of RF transmitter and RF receiver. The RF module has an encoder in transmitter and decoder in the receiver. The encoder is used for encoding the parallel data for transmission while the reception is decoded by decoder in the receiver. The RF receiver is connected with PIC microcontroller. The RF receiver will be always in listening state, if it receives any signal of same frequency as of receiver, it will automatically indicate the controller which in turn reduces or limits the speed of the vehicle until the vehicle leaves that particular zone. From this, the accident in school and college zone will get reduced. The accelerometer is connected with microcontroller and placed in vehicle. If any accident occurs in the highways, the accelerometer sensor (vibration sensor) will indicate the controller and controller will in turn transmit the message to the hospitals and police stations through GSM technology.

The message will contain the details of vehicle number, place of accident which was gathered using GPS. The function of Global Positioning System (GPS) is the most promising technology to acquire the position information in outdoor environments. In recent days most of the accident occurs due to drunken driver and improper use of seat belt. Before the vehicle starts the driver will be checked by the alcohol Sensor. Also if the driver is not wearing the seat belt it will also indicate it and also will not allow the driver to move the vehicle.

Design process: In automatic speed control module RF nodes are used, the RF module consists of RF transmitter and RF receiver. The RF transmitter is used for the transmission of data the a rate of 1 to 10 kbps it will operate at a frequency range of 430 MHZ. RF transmitter is placed in specific zone and RF receiver is placed in the vehicle. The RF receiver also works with same frequency. The transmitted data which is sent by RF transmitter is received by the receiver and is validated. Accelerometer sensor (vibration sensor) is connected to the port A, which will provide analog value to the ADC port of controller. The GSM is interfaced to PIC microcontroller.

PIC controller used here is PIC16f877A. It has got five ports namely PORTA, PORTB, PORTC, PORTD and PORTE. PORTA and PORTE are meant for analog input data. PORTS B, C and D are used for input and output purpose. The purpose of GSM is for sending the message to police, ambulance and relatives. The GSM will communicate via the UART communication through RS232 standard. The GPS suits best for vehicle location or tracking. To know the location of vehicle GIS software can be used. Alcohol sensor is connected to port A which will indicate if the driver is in drunken state and will not allow the vehicle to move. Seat belt detector is also used to detect whether the driver is wearing the seat belt or not and an eye sensor will monitor the drivers cautiousness constantly.

LCD is connected to port B of the controller to which all data pins of LCD are connected. The alcohol sensor is connected to port pin RA0.The eye sensor is connected to RA1. Vibration sensor is connected to RA2. RA0, in that 1, 3 pins take as the analog inputs from sensors and convert them to digital values. The alarm circuit is connected to port D. GSM, GPS and RF modules are connected to TX and RX of PIC microcontroller.

The Fig. 3 shows the flow diagram of the overall system. First step in that process is alcohol detection and seat belt detection. The alcohol sensor and seat belt detectors are used to find out the status. If these sensors find any abnormality, it will immediately alert the driver and will also not allow the vehicle to start. Next step after successful validation of the status of driver, the vibration detection and RF reception module will get initiated.

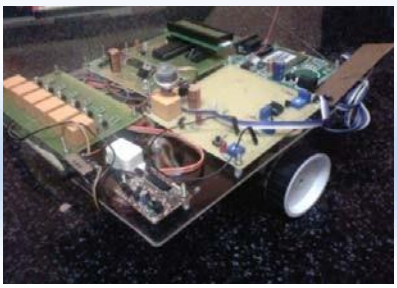

Fig.: Vehicle speed control module

When the vehicle enters the school zone or any public zones where the vehicle has to maintain a particular speed, the RF transmitter will send the signal indicating that there is a school or college in that zone. The transmitted signal will be received by the RF receiver and alert the controller immediately, which will in turn reduce or limit the vehicle speed to 20 Kmph in that particular zone. After the vehicle leaves the particular speed limit zone it will automatically regain its speed. If the moving vehicle meets with an accident the vibration sensor interfaced with the micro controller will detect the vibration and

indicate the controller which will immediately activate the GPS (Wu and Shenzhangyi, 2011) and collects the location detail and sends the message to the respective numbers stored in that controller (the number may be hospital or police stations number).

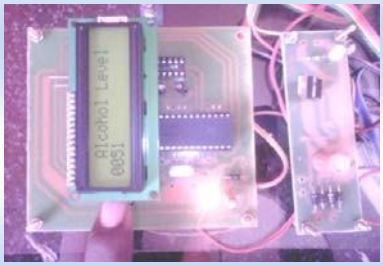

Fig. :Sensory unit

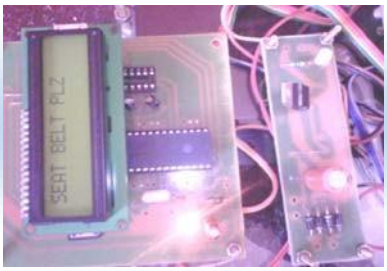

Fig. Seat belt detection

EXPERIMENTATIONS AND RESULTS

Figure 4 shows the prototypic model of the vehicle enabled with RF module, Alcohol sensor, GSM, GPS and Seat belt detector. Figure 5 and 6 shows the alcohol level indication and the seat belt off indication.

CONCLUSION

This study solves the issues like automatic speed control mechanism, accident detection and information sending. From this we conclude that this system will reduce the accidents and save the human lives. On the whole this system proves to be very cost effective and efficient. The experimentations and results prove that the system is easily implementable in real time. This system can also be extended by inducing automation concepts like automatic driverless vehicle system, inter vehicular communication etc.

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