iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 4 **Issue:** III **Month of publication:** March 2016

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

Volume 4 Issue III, March 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Mobile Controlling and Video Streaming Robot in Remote Areas

Gudavalli Anusha
M. Tech Student (Embedded systems)
Vikas College of Eng and Tech.

Abstract—This paper presents the technical construction of the vehicle controlled by user mobile. The designed GSM based vehicle could be operated from almost anywhere if GSM network exists. The procedurecommences with initiating a call from thecell phone which is auto received by GSM module stacked in the vehicle. In the course of a call, if any of the keypad buttonswas pressed a tone corresponding to the button pressed is heard at the other end of the transmission which is called Dual Tone Multiple Frequency (DTMF) tone. The received tone in the cell phone at the vehicleis processed by the ARM7 LPC2148 controller. These processed signals are given as input to the motor driver IC (L293D) which drives the vehicle in360^0 and also to perform the actions needed by laser weapon system.
Keywords- GSM based remote, remote controlled vehicle, Wireless AV camera.

I. INTRODUCTION

A remote control vehicle is typically defined as any mobile device that is controlled by a means that does not restrict its motion. A remote control vehicle differs from a robot in that the remote control vehicle is always controlled manually and does not take any further action autonomously. It is vital that a vehicle should be able to proceed accurately to a target area; manoeuvring within that area to fulfil its mission and to returnaccurately and safely to base.

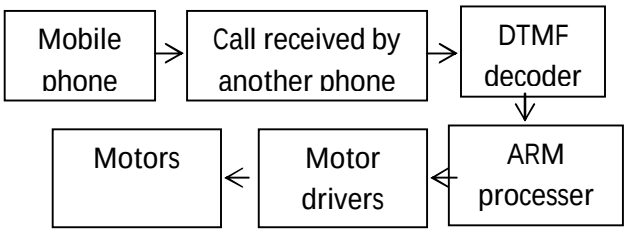


Fig.1: Block diagram of GSM based vehicle.

II. DESIGN AND CONSTRUCTION

Remote Controlled [7] vehicles do not have a wide range of wireless network. This means that the operator has to be in tender distance to the receiver of the vehicle. Thus it is clear that a remote controlled vehicle cannot be applied for an array of duty due to the lack of controlling range. This is where cell phone based remote controlled vehicle [5] steps in. Using the GSM mobile phone we can create a controlling technique for the vehicle and we do not have to worry about the range for operation. By using this prospect we can take this vehicle and turn it for human benefits. These vehicles can be used as fire fighting robots, battle vehicles or applied in vast areas where it's not possible or dangerous for any human being to go.

The vehicle is having a GSM module which is used to control the vehicle by user mobile phone. The mobile that makes a call to the GSM module placed in the vehicle will acts as a remote [5]. In the course of the call if any button in the keypad was pressed, pulse sound corresponding to the pressed button was heard at the other end of the call. This tone is called as Dual Tone Multi Frequency (DTMF) [3].

Volume 4 Issue III, March 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

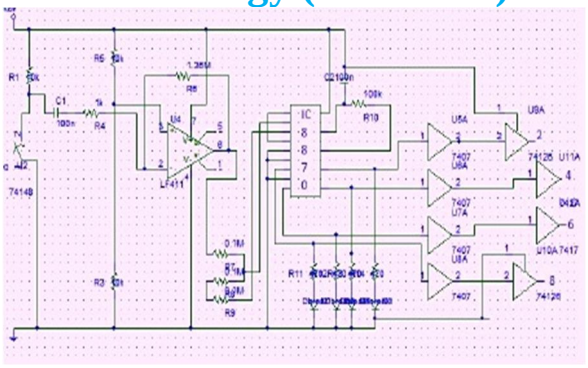


Fig.2: Circuit diagram of DTMF operation

MT8870DE IC is having an inbuilt Op-amp present inside the circuit. The electrical signals from microphone pin are fed to inverting input of the Op-amp via a series of resistance (100KΩ) and capacitance (0.1μF).

The non-inverting input of Op-amp is connected to the reference voltage (pin4-VREF). The voltage present at VREF is Vcc/2. Pin3 is the output of internal Op-amp; the feedback signal is given by connecting the output pin (pin3-GS) to inverting input (pin2-IN) through a resistor (270KΩ).

The output of Op-amp is passed through a pre filter, low group and high group filters. These filters contain switched capacitors to divide DTMF tones into low and high group signals. Next processing sections inside the IC are frequency detector and code detector circuits. Filtered frequency passed through these detectors. At last the four digit binary code is latched at the output of MT8870DE decoder IC.

The vehicle received this DTMF tone with the help of GSM module placed in the vehicle. With the help of a universal 3.5 mm audio jackthe connection between the module and the decoder is made.

Dual Tone Multi Frequency which is a combination of two frequency values generated when pressing a button in theuser mobile. This will generate a new frequency value.DTMF assigns a frequency to each key so that it can easily be identified by the electronic circuit. The signal generated by the DTMF encoder is the direct algebraic summation, in real time, of the amplitudes of two sine waves of different frequencies, i.e., pressing '5' will send a tone made by adding 1336 Hz and 770 Hz to the other end of the mobile [4]. The tones and assignments in a DTMF system are shown in table1.

Table1: DTMF data output [9]

Digit	Low Frequency (in Hz)	High Frequency (in Hz)	D_4	D_3	D_2	D_1	D_0
1	697	1209	H	L	L	L	H
2	697	1336	H	L	L	H	L
3	697	1477	H	L	L	H	H
4	770	1209	H	L	H	L	L
5	770	1336	H	L	H	L	H
6	770	1477	H	L	H	H	L
7	852	1209	H	L	H	H	H
8	852	1336	H	H	L	L	L
9	852	1477	H	H	L	L	H
0	941	1209	H	H	L	H	L
*	941	1366	H	H	L	H	H
#	941	1477	H	H	H	L	L
A	697	1633	H	H	H	L	H
B	770	1633	H	H	H	H	L
C	852	1633	H	H	H	H	H
D	941	1633	H	L	L	L	L
Any	…	…	L	0	0	0	0

L: Low (Logic 0)
H: High (Logic 1)

The DTMF decoder used is the IC MT8870DE which will receives the DTMF signals as inputs and generates the digital outputs as

Volume 4 Issue III, March 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

shown in Table1.The MT8870DE decoder IC uses a digital counting method to determine the frequencies of the limited tones and to verify that they correspond to standard DTMF frequencies.

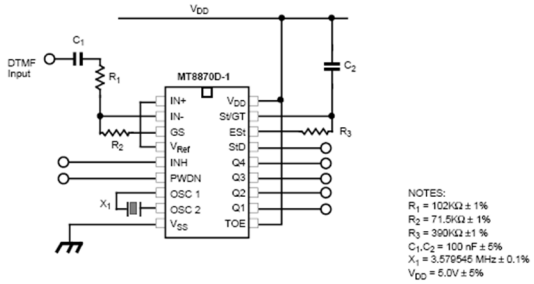


Fig.3: Connection diagram of DTMFcircuit

The decoded bits can be interfaced to the LPC2148 controller for further application.The LPC2148 consists of two ports Port0 and Port1 each having 32 pins. Port0 is a 32-bit GPIO port with individual direction controls for each bit. Total of 31 pins of the port0 can be used as a general purpose bidirectional digital I/O while P0.31 is output only pins. The operation of the port 0 pins depends upon the pin function selected via the pin connect block.Pins P0.24, P0.26, and P0.27 are not available.Port 1 is a 32-bit bidirectional GPIO pins with individual direction controls for each bit. The operation of Port 1 pins depends upon the pin function selected via the pin connect block.Pins P1.0 through P1.15 of port 1 are not available.

The design and implementation of this project mainly involves the integration of all thecomponents that we are discussed. The block diagram is having the vehicleand control unit.

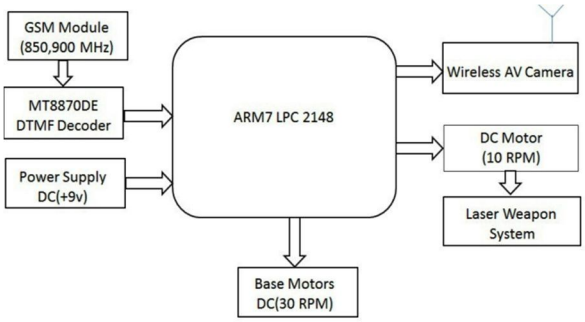


Fig.4: Block diagram of GSM based remote control vehicle

In this project we are using the Port 0 pins P0.16-P0.19 for connecting the DTMF decoder IC MT8870DE which will generate the digital output signals D0, D1, D2 and D3 that are received and processed by the LPC2148 controller.In Port1 P1.16-P1.19 pins are used for driving the inputs to the L293D boards. L293D board is the motor driver circuits for motor1 and motor2 which is used to move the robot in desired direction. P1.21pin is used to connect the laser weapon system.

P1.22 and P1.23 pins are used for driving the inputs to the L293D board of DC motor which is used to rotate the laser weapon system for target shooting.The block diagram of vehicleconsists of the GSM moduleto receive the call from the user mobile and it was connected to ARM 7 LPC2148 microcontroller through DTMF decoder. The GSM module operates within the850MHz, 900MHz, 1800MHz, or 1900 MHz frequency bands. The power supply used is battery powered DC +9v for the circuit and LPC2148 controller operates at very low power of DC +3.5v which is regulated internally by LPC2148 development board. Wireless AV camera used in this project is greatly suitable for mounting on vehicles and for getting the audio and video transmitted wirelessly. With high receive sensitivity of +18dB, receive signal picture sound 0.9G/1.2G with high quality output.Wireless AV camera used is a COLOR CMOS wireless camera with camera apparatus of 1/3, 1/4 picture sensor with pixel validity of 628x582 for PAL and 510x492 for NTSC. The figure shows the basic view of wireless AV camera.

The base motors used are DC motors [8] having 30 RPM are triggered when it receives the tone corresponding to it to make the robot to move in desired direction. The laser weapon system connected is used to serve as security application and it is mainly used in military forces to make the robot as battle robot by activating and deactivating the laser weapon system, for the rotation of laser weapon system it was equipped with a DC motor of 10 RPM to rotate the laser weapon system in clockwise and anticlockwise

Volume 4 Issue III, March 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

direction.

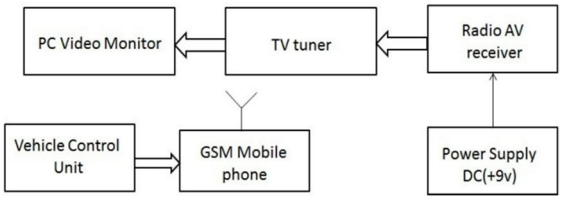


Fig.5: Block diagram of control unit

The GSM mobile phone is used to initiate call to the GSM moduleplaced in the vehicle to operate it.

The transmitted signal by the wireless AV camera is received by the Radio AV receiver. As the name mentioning, Radio AV receiver going to operate at Radio Frequency. The frequency range varies between 30 Hz to 300 GHz.

Fig.6: Radio AV receiver

There are two types of RF receiver modules available.Super-regenerative modules are usually low cost and low power designs using a series of amplifiers to extract modulated data from a carrier wave. Super-regenerative modules are generally imprecise as their frequency of operation varies considerably with temperature and power supply voltage. Super heterodyne receivers have a performance advantage over super-regenerative; they offer increased accuracy and stability over a large voltage and temperature range. This stability comes from a fixed crystal design which in turn leads to a comparatively more expensive product. The received signal is processed by the TV tuner circuit to make compatible to view in the PC or Television.

A TV tuner converts a radio frequency analog television or digital television transmission into audio and video signals which can be further processed to produce sound and a picture.Different tuners are used for different television standards such as PAL, NTSC, SECAM etc. An example frequency range is 48.25 MHz – 855.25 MHz, with a tuning frequency step size of 31.25, 50 or 62.5 kHz. Modern solid-state internal TV-tuner modules typically weigh around 45 g.

III. COMPLETED SYSTEM

As we are willing to make a cell phone based remote control vehicle where it can be operated almost anywhere if GSM network exists. As it was operated remotely deploying a wireless AV camera which will make the vehicle to operate in difficult terrains which are either out of range of human reach or area dangerous for human life [6]. The transmitted picture and sound signal by camera are received by radio AV receiver and monitored at the control unit. In addition the laser weapon system installed will make the project more efficient.

Volume 4 Issue III, March 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

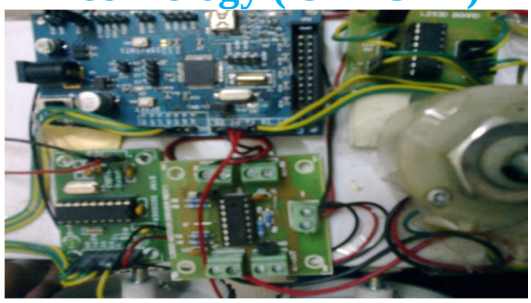


Fig.7: Connections between controller and the motor driver circuits

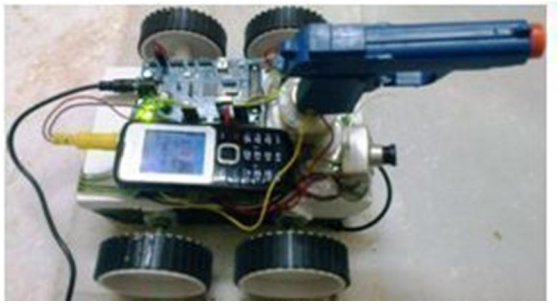


Fig.8: Implemented GSM controlled vehicle

So every time the vehicle has to be dependent on GSM module connectedto the vehicle and by default it was assumed that the cell phone's number is a secured one, which is only known by the system.

IV. FUTURE ENHANCEMENT

Evaluating this project, it is clearly noticeable that this project has opened the window for enormous future researches in this field for the next researchers.

A. Substituting the 2G GSM cell phone with 3G handset

3rd generation or 3G is the generic term used for the next generation of mobile communication systems. 3G technology is commonly used in smart phones, where a strong emphasis is put on internet and multimedia services while its predecessor, second generation or 2G technology emphases mostly on voice applications like talking, call waiting, etc. 3G technology has two more advantages over 2G which enables always connectivity to internet. Hence finally it can be stated/covered that replacing the existing handset with a 3G one will not only extends operation of the developed circuit but will also enable some more additional features to be employed alongside the present one.

B. Modification in the system design

This project can also be made perfect by means of conducting these simple modifications in this existing circuit:

Replacing the DTMF decoder with DTMF transceiver:

Future researchers can implement this assignment by substituting the DTMF decoder IC 8870 by a DTMF Transceiver IC 8880, allowing the system to generate a DTMF tone by itself. If an additional alarm circuit along with sensors is implemented along with existing one, the system will then be able to notify the user when an alarm initiates via calling a fixed number.

C. Replacing the battery powered circuit with renewable energy powered circuit

Future researchers can implement this assignment by substituting the battery powered circuit with a circuit powered by solar energy [10] using 5 watt photo voltaic (PV) panel, stored in 3 similar 4V rechargeable batteries. Most importantly as the vehicle will be running by solar energy, so the vehicle can be sent to a long distance not worrying about the charge of the battery, since it accumulates the greater portion of the energy required from the external PV panel that absorbs and converts sunlight to generate the driving power, though there will be DC battery as a backup [2].

V. CONCLUSION

The key purpose was to develop a circuit that can drive an electric vehicle in any directions using GSM based cell phones as a

distant controller, and the trial approached has been a success. The second part of this project highlights on deploying a camera which will enable the vehicle to operate in difficult territories which are either out of range of human reach or area hazardous for human life. This system can be a test-bed for any future projects and or appliances interested to work with both renewable energy and remote control communication technology together.

VI. ACKNOWLEDGMENT

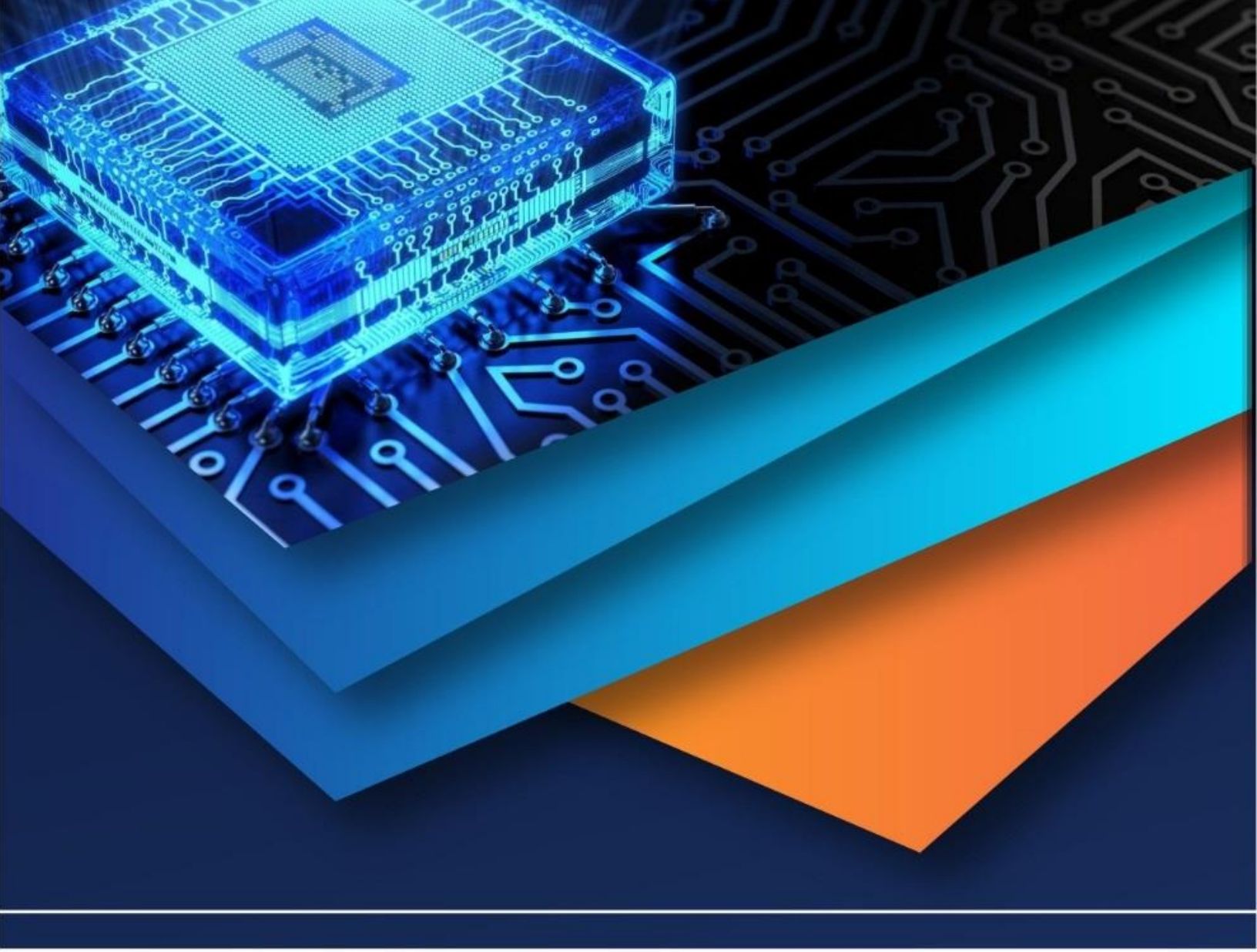
The authors would like to thank Mr V. Sekhar for the hardware development, useful discussion, and data acquisition.

REFERENCES

[1] A.S.M. A. Ahmed, L. Alamgir, A. Nayeem, and B. B. Pathik, "Development of a Cell Phone Based Vehicle Remote Control System", Proceedings of the IEEE InternationalConference on Intelligent Green Building and Smart Grid(IGBSG), 2014.
[2] K. Reddy, F. Althobeti, Dr. Md A. Hussain and R. Reddy, "GSMControllable Power Switch System for Industrial Power Management", International Journal of Engineering Trends and Technology, August 2011.
[3] Sheik Mastanvali, VamsiKrishna.P, Tarun.N, JanakiRaghava.T, Sailaja.B, "Hybrid Mobile Arm" , "International Journal of Computer Informatics & Technological Engineering" vol. 1, issue-1, March-April 2014 pp. 1-4.
[4] T. M. Ladwa, S. M. Ladwa, R. S. Kaarthik, A. R. Dhara and N. Dalei, "Control of Remote domestic System using DTMF", International Conference on Instrumentation, Communications, Information Technology, and Biomedical Engineering (ICICI-BME), Bandung, Indonesia, 2009, pp. 1-6.
[5] C. K. Das, M. Sanaullah, H. M. G. Sarower and M. M. Hassan, "Development of a cell phone based remote control system: an effective switching system for controlling home and office appliances", International Journal of Electrical & Computer Sciences IJECS, vol. 9 No: 10 pp3743, 2010.
[6] H. Haldun GÖKTAS, Nihat, "A Cellular Phone Based Home / Office Controller &Alarm System" DALDAL Gazi University TechnicalEducationFaculty, 06500, Besevler, Ankara, TURKEY.
[7] "Remote Control", Internet: http://www.newworldencyclopedia.org/entry /Remote_control, Nov. 28, 2008 [May 5, 2013].
[8] A. Gupta, "Controlling DC Motors" Internet:http://www.extremeelectronics.co.in/avrtutorials/pdf/avr_tutorial7---motor-control.pdf, 2007, [May 15, 2012].
[9] Texas Instruments, "MT8870 Data Sheet and Application Notes",Internet:http://www.datasheetarchive.com/MT8870-datasheet.html [May7, 2012].
[10] "Basics of Solar Charge Controllers", Internet:http://www.solarelectric. com/solar-charge-controller-basics.html [Sep 15, 2012].

BIOGRAPHIES

GUDAVALLI ANUSHA pursuing M-Tech in VIKAS college of engineering and technology, Vijayawada affidavit to JNTUK. Completed B-Tech in NIMRA College of Engineering affidavit to JNTU Kakinada.
Email Id: gudavallianusha405@gmail.com



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY