WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

IMPLEMENTATION OF UNMANNED ELECTRIC GROUND VEHICLE USING SOLAR POWER AND CONTROL THROUGH ANDROID

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ABSTRACT

This project deals with the concept which can detect accidents without any human assistance and also can monitor vital information of a patient in an ambulance. Detection of accidents is done automatically by using a simple setup that will be embedded in the vehicle. Once the vehicle met with an accident the accident detection setup will sense the accident and immediately sends the location of the accident to an ambulance. After receiving the coordinates to the accident spot the ambulance will be rushed to the same. Once the victim is collected into the ambulance the patient will then be attached to another setup which will continuouslymonitor his vital information such as pulse, temperature, and blood pressure.

Keywords*: GPS, Bluetooth, ATMEGA Microcontroller, Obstacle sensor*

1. INTRODUCTION

The rising obligation to harvest renewable source of energy to make technology environment friendly, we have adopted several alternative sources of clean energy like the sun, the wind, energy from flowing water and geothermal energy. Solar energy is the most abundant and richest source of energy that is available. With solar radiation varying from 1000 kWh/m2 to 3000 kWh/m2, solar energy is the most practical source of energy besides hydro-energy. However, effective tapping of solar energy has stood out to be the greatest concern of the past decade. With solar plants having efficiency in the range of 10%-35%, gaining suitable power from solar has been a topic of concern. With advances in technology several kinds of photovoltaic cells like the silicon photovoltaic cell, Nano-carbon based photovoltaic cell has been developed with efficiency increasing rapidly at each stage of innovation.

2. METHODOLOGY

Analysis:

The system's services, constraints and goals are established by consultation with system users.

Design:

The systems design process partitions the requirements to either hardware or software systems. It establishes overall system architecture. Software design involves representing the software system functions in a form that may be transformed into one or more executable programs.

Implementation:

During this stage, the software design is realized as a set of programs or program units.

Testing:

The individual program units or programs are tested. Then they are integrated and tested as a complete system to ensure that the software requirements have been met. After testing, the software system is delivered to the customer.

3. BLOCK DIAGRAM

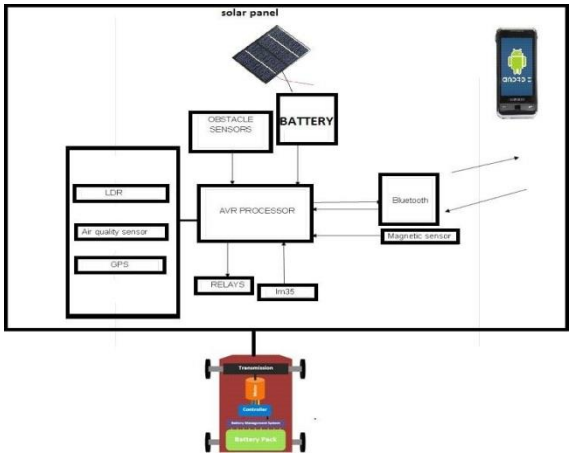


Fig 1 shows the block diagram.

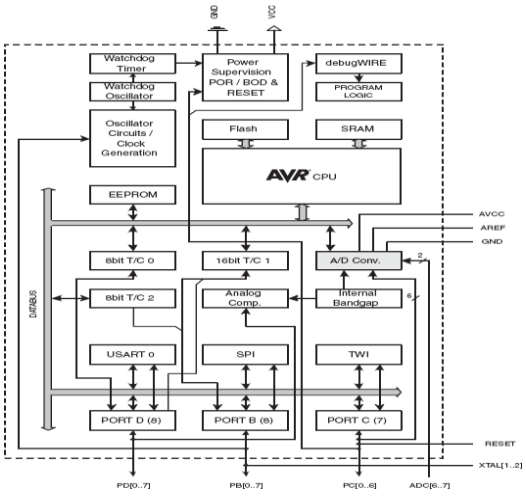
Figure 1 shows, the block diagram of unmanned ground vehicle and it will use Bluetooth to control the interface amongst it and android phone with user and the robot and high level software. It will also use the Avr processor to control software such as the motors for motion of unmanned ground vehicle, light temperature, and the battery level, obstacle detection, obstacle The user will be able to enter a specific command from android phone get information. User will be able to control over by giving the commands through android application program running on the phone. The commands include front, back, left, right for movement. Temperature, obstacles and magnetic field, light commands to get the information pertaining to it.

4. HARDWARE AND SOFTWARE REQUIREMENTS

1. ATmega48 Micro controller:

The microcontroller is at the core of every embedded module. Hence, great care must be exercised in choosing the right microcontroller without compromising on functionality. Keeping in view many factors that governed the correct implementation of our project the Atmega48 microcontroller from Atmel Corporation's AVR microcontroller family was chosen. Few crucial reasons may be cited so as to justify our choice of this microcontroller. The first being, that all AVR microcontrollers are designed to deliver more performance at lesser power consumption. It is compatible with popular protocols like I2C and SPI. It also has advanced features like an on chip analog to digital converter, six pulse width modulation channels, and data retention is supported up to a hundred years at 25º C.

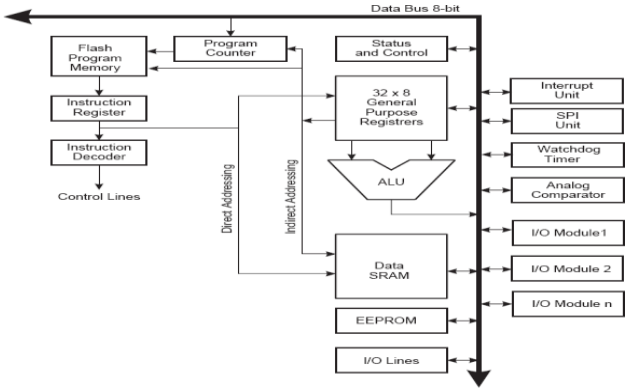
2. Architecture of ATmega48:



Architectural Block Diagram of ATmega48

The block diagram of ATmega48 and it is a low-power MOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega88 achieves throughputs approaching 1 MIPS per MHz allowing the

system designer to optimize power consumption versus processing speed. The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU).



3. AVR CPU Core:

The block diagram of the AVR core architecture in general. The main function of the CPU core is to ensure correct program execution. The CPU must therefore be able to access memories, perform calculations, control peripherals, and handle interrupts.

In order to maximize performance and parallelism, the AVR uses a Harvard architecture – with separate memories and buses for program and data. Instructions in the program memory are executed with a single level pipelining. While one instruction is being executed, the next instruction is pre-fetched from the program memory. This concept enables instructions to be executed in every clock cycle. The program memory is In-System Reprogrammable Flash memory.

4. LM7805C VOLTAGE REGULATOR:

Voltage regulator based on an active device (such as a bipolar junction transistor, field effect transistor or vacuum tube) operating in its "linear region" and passive devices like zener diodes operated in their breakdown region. The regulating device is made to act like a variable resistor, continuously adjusting a voltage divider network to maintain a constant output voltage.

5. CRYSTAL OSCILLATOR - 4MHz:

A crystal oscillator is an electronic circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time, to provide a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters and receivers. The most common type of piezoelectric resonator used is the quartz crystal, so oscillator circuits designed around them were called "crystal oscillators". A crystal is a solid in which the constituent atoms, molecules, or ions are packed in a regularly ordered, repeating pattern extending in all three spatial dimensions.

6. CODE VISION AVR CROSS COMPILER:

The Integrated Development Environment (IDE) has built-in AVR Chip In-System Programmer software that enables to automatically transfer of the program to the microcontroller chip after successful compilation/assembly. The In-System Programmer software is designed to work in conjunction with the Atmel STK500/AVRISP/AVRProg (AVR910 application note), Kanda Systems STK200+/300, Dontronics DT006, Vogel Electronic VTEC-ISP, Futurec JRAVR and MicroTronics ATCPU/Mega2000 programmers/development boards. For debugging embedded systems, which employ serial communication, the IDE has a built-in Terminal. Besides the standard C libraries

7. EMBEDDED C:

Embedded C is extensive and contains many advanced concepts. The range of modules covers a full introduction to C, real-time and embedded systems concepts through to the design and implementation of real time embedded or standalone systems based on real-time operating systems and their device drivers. Real time Linux (RT Linux) is used as an example of such a system. The modules include an introduction to the development of Linux device drivers. Embedded C covers all of the important features of the C language as well as a good grounding in the principles and practices of real-time systems development including the POSIX threads (threads) specification.

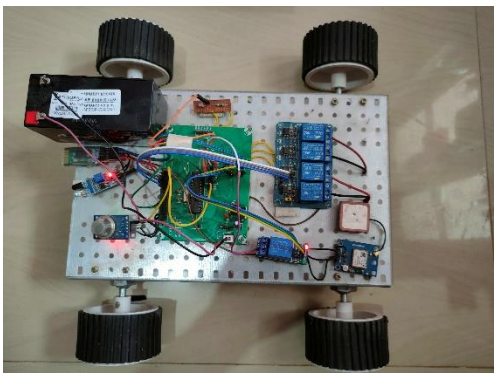
APPLICATIONS:

- The vehicle can be used anywhere with Bluetooth connection provided that is mounted on the robot.
- The vehicle is small in size so can be used for spying.
- This vehicle can be used for space research with the use of satellite communication in future scope.

ADVANTAGES:

- To explore places where human can cannot.
- Can be used rescue and recovery operation.

5. RESULT



By making use of the Bluetooth in the android and by operating through it the movement of the vehicle can be witnessed. By the use all the sensors provided over there the vehicle will make movement in perfect manner without getting discarded by any obstacle. The vehicle can sense the temperature and the Location for its identification purpose.

ACKNOWLEDGEMENT:

The creators wish to thank Bhavana S for giving a standard help for the length of diverse stages of venture work. More over credits to staffs and understudies of S.J.C. Institute of Innovation, Chikaballapura for making a difference with information collection. Too, the creators thusly make clear that there's no monetary intrigued related to this work and the creators too desire to hereby declare that there's no strife of intrigued of any kind concerning the distribution of this inquire about.

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