Available at www.ijsred.com

RESEARCH ARTICLE OPEN ACCESS

Sun Tracking Solar Panel Car

P.Prakash[*1], B. Manohar[*2], N.Sai Teja[*3], SK.Aabid[*4],A.Mahesh[*5]

1(ASSISTANT PROFESSOR, Email: prakashqisit@gmail.com)

2,3,4,5(UNDER GRADUATE STUDENTS, Email: ynsaiteja@gmail.com)

DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING,

QIS INSTITUTE OF TECHNOLOGY, VENGAMUKKA PALEM, ONGOLE, ANDHRA PRADESH-523272

****

Abstract:

With the impending scarcity of nonrenewable resources, people are considering using alternate sources of energy. From all other available resources sun energy is the most abundant and it's comparatively easy to convert it to electrical energy. Use of solar panel to convert sun's energy to electrical is very popular, but due to transition of the Sun from east to west the fixed solar panel may be able to generate optimum energy. The proposed system solves the problem by an arrangement for the solar panel to track the Sun. The solar panel is the primary source of energy for the car and is supplemented by the battery provided. When the car is in motion, the solar panel charges the battery and when adequate sunlight is available to the solar panel, it drives the car and also provides the electrical power to run the microcontroller which controls the movement of the solar panel. The requirements are solar panel, microcontroller, motor, Arduino, battery and robot car.

KEY WORDS: Remote, Microcontroller, Robo Car.

****

I. INTRODUCTION

The system discussed over here is based on natural and clean solar power. This is a whole automated system with self decision making capability. The decision making part will be carried out by the Microcontroller. The solar tracking system will help in capturing maximum sunlight from the sun. This energy will be stored in a DC Battery. The stored power will be used to drive the motor car. An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is specifically designed for a particular kind of application device. Industrial machines, automobiles, medical equipment, cameras, household appliances, airplanes, vending machines, and toys (as well as the more obvious cellular phone and PDA) are among the myriad possible hosts of an embedded system personal computer.

A. EXISTING SYSTEM

In past this project using a fixed solar panel to use the panel to store a solar energy in battery that energy converted into electricity energy by using this energy to move a car. In this method solar panel generated solar energy highly in noon time only. Old method having this type of one drawback.

B. Praposed system

Our praposed method is to store a solar energy in to battery by using solar panel. This solar panel was tracking

by the sun movement. Every time solar energy was highly energy was recived and storedin to a battery,by using ldr'sthe solar panel was rotate by using remote to control over all machine components.

II. BLOCK DIAGRAM

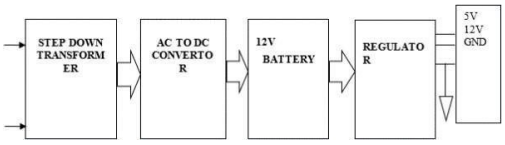

Fig: POWER SUPPLY

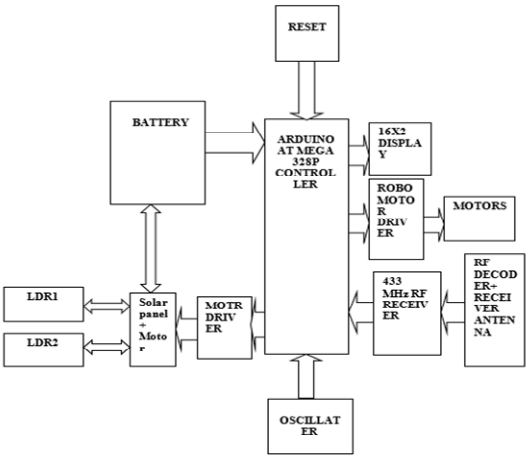

Fig: Block diagram

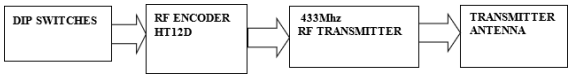

Fig: control system

III. SYSTEM ARCHITECTURE AND IMPLEMENTATION

Microcontroller

The atmel ATmega328/p is a low power cmos 8-bit microcontroller based on the AVR enhanced

RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328/P achieves throughputs close to 1MIPS per MHz. This empowers system designer to optimize the device for power consumption versus processing speed.

The Atmel 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), allowing two independent registers to be accessed in a single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers. The ATmega328/Pprovides the following features: 32Kbytes of In-System Programmable Flash with Read-While-Write capabilities, 1Kbytes EEPROM, 2Kbytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, Real Time Counter (RTC), three flexible Timer/Counters with compare modes and PWM, 1 serial programmable USARTs , 1 byte- oriented 2-wire Serial Interface (I2C), a 6- channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages) , a programmable Watchdog Timer with internal Oscillator, an SPI serial port, and six software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next interrupt or hardware reset. In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low power consumption. In Extended Standby mode, both the main oscillator and the asynchronous timercontinue to run. Atmel offers the Q Touch library for embedding capacitive touch buttons, sliders and wheels functionality into AVR microcontrollers. The patented charge-transfer signal acquisition offers robust sensing and includes fully de bounced reporting of touch keys and includes Adjacent Key Suppression technology for unambiguous detection of key events. The easy-to-use Q Touch Suitetoolchain allows you to explore, develop and debug your own touch applications. The device is manufactured using Atmel's high density non-volatile memory technology. The On- chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional nonvolatile memory programmer, or by an On-chip Boot program running on the AVR core. The Boot program can use any interface to download the application program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write

operation. By combining an 8-bit RISC CPU with In-System Self- Programmable Flash on a monolithic chip, the Atmel ATmega328/P is a powerful microcontroller that provides a highly flexible and cost effective solution to many embedded control applications. The ATmega328/P is supported with a full suite of program and system development tools including: C Compilers, Macro Assemblers, Program Debugger/Simulators, In-Circuit Emulators, and Evaluation kits.

3.1. Solar panel

Solar panels (arrays of photovoltaic cells) make use of renewable energy from the sun, and are a clean and environmentally sound means of collecting solar energy. Here at solar panel information, we've amassed a wealth of information relating to solar panels and the field of photovoltaic technology.Solar panels collect solar radiation from the sunand actively convert that energy to electricity. Solar panels are comprised of several individual solar cells. These solar cells function similarly to large semiconductors and utilize a large-area p-n junction diode. When the solar cells are exposed to sunlight, the p-n junction diodes convert the energy from sunlight into usable electrical energy. The energy generated from photons striking the surface of the solar panel allows electrons to be knocked out of their orbits and released, and electric fields in the solar cells pull these free electrons in a directional current, from which metal contacts in the solar cell can generate electricity. The more solar cells in a solar panel and the higher the quality of the solar cells, the more total electrical output the solar panel can produce. The conversion of sunlight to usable electrical energy has been dubbed the Photovoltaic Effect. The photovoltaic effect arises from the properties of the p-n junction diode, as such there are no moving parts in a solar panel.

DC Motor

An electric motor is a machine which converts electrical energy into mechanical energy. DC motors are configured in many types and sizes, including brush less, servo, and gear motor types. A motor consists of a rotor and a permanent magnetic field stator. The magnetic field is maintained using either permanent magnets or electromagnetic windings. DC motors are most commonly used in variable speed and torque. Motion and controls cover a wide range of components that in some way are used to generate and/or control motion. Areas within this category include bearings and bushings, clutches and brakes, controls and drives, drive components, encoders and resolves, Integrated motion control, limit switches, linear actuators, linear and rotary motion components, linear position sensing, motors (both AC and DC motors), orientation position sensing, pneumatics and pneumatic components, positioning stages, slides and guides, power transmission. Motors are the devices that provide the actual speed and torque in a drive system. This family includes AC motor types (single and multiphase motors, universal, servo motors, induction, synchronous, and gear motor) and DC motors (brush less, servo motor, and gear motor) as well as linear, stepper and air motors, and motor contactors and starters. In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities.

Relay circuit

H-bridge. Sometimes called a "full bridge" the H-bridge is so named because it has four switching elements at the "corners" of the H and the motor forms the cross bar. The key fact to note is that there are, in theory, four switching elements within the bridge. These four elements are often called, high side left, high side right, low side right, and low side left (when traversing in clockwise order).The switches are turned on in pairs, either high left and lower right, or lower left and high right, but never both switches on the same "side" of the bridge. If both switches on one side of a bridge are turned on it creates a short circuit between the battery plusand battery minusterminals.

3.3 Motor driver L293D

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoides, DC and stepping motors) and switching power transistors. To simplify use as two bridges each pair of channels is equipped with an enable input. A separate supply input is provided for thelogic, allowing operation at a lower voltage and internal clamp diodes are included. This device is suitable for use in switching applications at frequencies up to 5 kHz. The L293D is assembled in a 16 lead plastic package which has 4 center pins connected together and used for heat sinking The L293DD is assembled in a 20 lead surface mount which has 8 center pins connected together and used for heat sinking.

LDR sensor

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light resistance drops dramatically. Electronic of to

sensors are the devices that alter their electrical characteristics, in the presence of visible or invisible light. The best known devices of these types are the light dependent resistor (LDR), the photo diode and the phototransistors. Light dependent resistor as the name suggests depends on light for the variation of resistance. LDR are made by depositing a film of cadmium sulphide or cadmium solenoid on a substrate of ceramic containing no or very few free electrons when not illuminated. The film is deposited in a zig zag fashion in the form of a strip. The longer the strip the more the value of resistance. When light falls on the strip, the resistance decreases. In the absence of light the resistance can be in the order of 10 K ohm to 15 K ohm and is called the darkresistance.

Liquid Crystal Display

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. An LCD consists of two glass panels, with the liquid crystal material sandwitched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle.

Battery

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronics circuits and other devices. A power supply can by broken down into a series of blocks, each of which performs a particular function. A dc power supply which maintains the output voltage constant irrespective of ac mains fluctuations or load variations is known as "Regulated D.C Power Supply".

Regulator

The output voltage can only be held constant within specified limits.

5v

12v Gnd

Buzzer

A buzzer is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric.

Rated voltage : 6V DC.

Operating voltage : 4-8V.

Rated current : <30mA.

Sound type : Continuous Beep.

Resonant Frequency : 2300 Hz.

ip Switches

Dip switches are manual electric switches that are packed by group into a standard dual in line package. Dip switches are used to change the operating mode of a device. These switches are worked as ON & OFF functions in Analog signals.

IV. HARDWARE AND SOFTWARE

Hardware Used

- Solar Cell Panel.
- Light Dependent Resistor.
- Dc Motor
- Microcontroller ATMEGA32p.
- Remote Module.
- Antenna
- Power supply 5V. (Through Battery)
- Lcd
- Buzzer

Software used

The software program can be written in C or assembly language & complied using Arduino software.

V. CONCLUSION

In this paper the use of solar panel increases the efficiency & provides maximum output voltage during sunny days. This system can be implemented for efficient use & for future work of this paper external supply can be used to get the work done in All seasons.

REFERENCES

1. Islam, N.S. Wasi-ur-Rahman, M. “An intelligent SMS-based remote Water Metering System”. 12th International Conference on Computers and Information Technology, 2009, 21-23 Dec. 2009, Dhaka, Bangladesh. International Conference on Robotics, Vision, Information and Signal Processing 2007 (ROVISP2007), Penang, 28 – 30November 2007.

2. 2.Malik Sikandar Hayat Khiyal, Aihab Khan, and Erum Shehzadi. SMS Based Wireless Home Appliance Control System (HACS) for Automating Appliances and Security”, Issues in Informing Science and Information Technology. Vol. 9. pp. 887 – 894. 2009.

3. M.R.I. Sarker, Md. Riaz Pervez and R.A. Beg, Design,fabrication experimental study of a novel two-axis sun tracker, International Journal of Mechanical and Mechatronics Engineering IJMME-IJENS , Vol. 10 No. 01, 2010.

4. Nasir Ahmed Filfil, Deia Halboot Mohussen and Dr. Khamis A. Zidan, Micro controller based sun path tracking system, Eng. And Tech. Journal Vol. 29, No. 07, 2011.

5. S. Zubair, A Suleiman, H. T. Abdul azzez, B.A. Salihu, Design and construction of a microcontroller based single axis tracker Innovations in Science and Engineering,1(4)41- 47, 2011.

6. Jing-Min Wang and Chia-Liang Lu,Design and implementation of sun tracker with ad Dual-axis singlemotor for an optical sensor-based photovoltaic system, Sensors, pp. 3157-3168, 2013.

