ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Sun Tracking Schemes for Photovoltaic Panels and Robot Controlling and Moving By Solar Energy

Mr.A.Suman Chaitanya
M. Tech Student (DSCE), Annamacharya Institute of Technology & Sciences.

Mrs.M.Anitha, M.Tech
Assistant Professor, Annamacharya Institute of Technology & Sciences.

Mrs.A.Rajani
Assistant Professor, Annamacharya Institute of Technology & Sciences.

Abstract

Solar energy systems have emerged as a variable source of renewable energy over the past two or three decades , and are now widely used for variety of industrial and domestic applications. The project uses a solar panel coupled to a dc motor to track the Sun so that maximum sun light is incident upon the panel at any given time of the day. With the impending scarcity of nonrenewable resources, people are considering to use 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.

This tracking movement is achieved by coupling a dc motor to the solar panel such that the panel maintains its face always perpendicular to the Sun to generate maximum energy. LDR is used to measure the light intensity. The solar panel is arranged in the direction of maximum light intensity by using motor. This is achieved by programming microcontroller. The hole system is controlled by microcontroller ultra sonic sensor is used for detection of objects in forest. Buzzer will ring when object is there

Keywords Component

LDR sensor, ultrasonic sensor, motor, Arm board, Solar panel.

Introduction (Heading 1)

This template, modified in MS Word 2007 and saved as a "Word 97-2003 Document" for the PC, provides authors with most of the formatting specifications needed for preparing electronic versions of their papers. All standard paper components have been specified for three reasons: (1) ease of use when formatting individual papers, (2) automatic compliance to electronic requirements that facilitate the concurrent or later production of electronic products, and (3) conformity of style throughout a conference proceedings. Margins, column widths, line spacing, and type styles are built-in; examples of the type styles are provided throughout this document and are identified in italic type, within parentheses, following the example. Some components, such as multi-leveled equations, graphics, and tables are not prescribed, although the various table text styles are provided. The formatter will need to create these components, incorporating the applicable criteria that follow.

Ease of Use

An embedded system is a system which is going to do a predefined specified task is the embedded system and is even defined as combination of both software and hardware. A general-purpose definition of embedded systems is that they are devices used to control, monitor or assist the operation of equipment,

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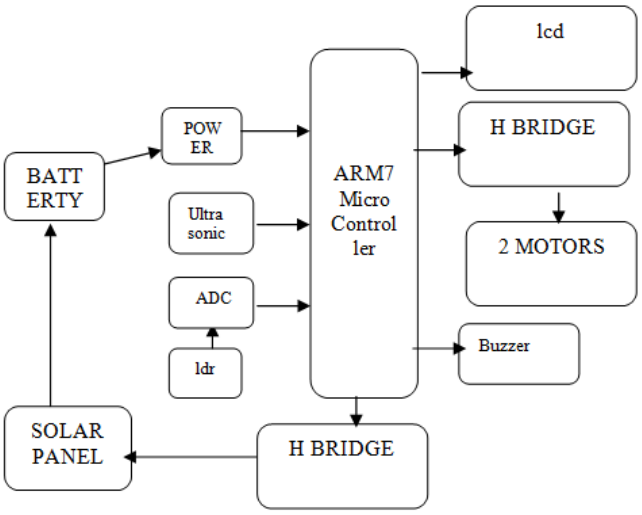
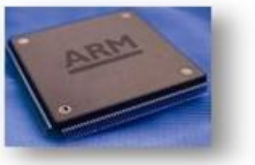
machinery or plant. "Embedded" reflects the fact that they are an integral part of the system. At the other extreme a general-purpose computer may be used to control the operation of a large complex processing plant, and its presence will be obvious. All embedded systems are including computers or microprocessors. Some of these computers are however very simple systems as compared with a personal computer. The very simplest embedded systems are capable of performing only a single function or set of functions to meet a single predetermined purpose. In more complex systems an application program that enables the embedded system to be used for a particular purpose in a specific application determines the functioning of the embedded system. The ability to have programs means that the same embedded system can be used for a variety of different purposes. In some cases a microprocessor may be designed in such a way that application software for a particular purpose can be added to the basic software in a second process, after which it is not possible to make further changes. The applications software on such processors is sometimes referred to as firmware.

Block diagram



ARM PROCESSOR OVERVIEW

ARM stands for Advanced RISC Machines. It is a 32 bit processor core, used for high end application. 0 It is widely used in Advanced Robotic Applications.



History and Development

ARM was developed at Acron Computers ltd of Cambridge, England between 1983 and 1985.

- RISC concept was introduced in 1980 at Stanford and Berkley.
- ARM ltd was found in 1990.
- ARM cores are licensed to partners so as to develop and fabricate new microcontrollers around same processor cores.

Key features:

- 16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.
- 8 KB to 40 KB of on-chip static RAM and 32 KB to 512 KB of on-chip flash memory.
  128-bit wide interface/accelerator enables high-speed 60 MHz operation.
- In-System Programming/In-Application Programming (ISP/IAP) via on-chip boot loader
  Software. Single flash sector or full chip erase in 400 ms and programming of
  256 bytes in 1 MS.

Power Supply:

- The input to the circuit is applied from the regulated power supply. The ac. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating dc voltage. So in order to get a pure dc voltage, the output voltage from the rectifier is fed to a filter to remove any ac components present even after rectification.

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- Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage.
- The abbreviation "i.e." means "that is," and the abbreviation "e.g." means "for example."

BUZZER:

1. Magnetic Transducer

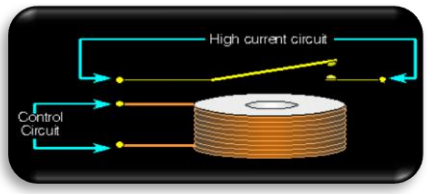
Magnetic transducers contain a magnetic circuit consisting of a iron core with a wound coil and a yoke plate, a permanent magnet and a vibrating diaphragm with a movable iron piece. The diaphragm is slightly pulled towards the top of the core by the magnet's magnetic field. When a positive AC signal is applied, the current flowing through the excitation coil produces a fluctuating magnetic field, which causes the diaphragm to vibrate up and down, thus vibrating air. Resonance amplifies vibration through resonator consisting of sound hole(s) and cavity and produces a loud sound.

2. Magnetic Buzzer (Sounder)

Buzzers like the TMB-series are magnetic audible signal devices with built-in oscillating circuits. The construction combines an oscillation circuit unit with a detection coil, a drive coil and a magnetic transducer. Transistors, resistors, diodes and other small devices act as circuit devices for driving sound generators. With the application of voltage, current flows to the drive coil on primary side and to the detection coil on the secondary side. The amplification circuit, including the transistor and the feedback circuit, causes vibration. The oscillation current excites the coil and the unit generates an AC magnetic field corresponding to an oscillation frequency. This AC magnetic field magnetizes the yoke comprising the magnetic circuit. The oscillation from the intermittent magnetization prompts the vibration diaphragm to vibrate up and down, generating buzzer sounds through the resonator

Relay:

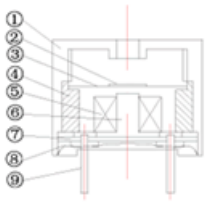
Relays are simple switches, which operated in both ways electrically and mechanically, we know already relays are using in industrial high end applications effectively. Relays are consist of an electromagnet and contacts. The switching mechanism carried out by with the help of electromagnet switch. A relay is used to separate one electrical circuit from another. It allows a small current control circuit to make contacts or break an electrically isolate high voltage path. The simple relay consists of a coil and a set op contacts. The most common relay coil is a length of magnet wire envelop around a metal. When the voltage is given to coil, current passes through the wire and generate a magnetic field. This magnetic field drags the contacts together and holds them there until the current flow in the coil after that when release the switch it is stopped. Diagram shows the parts of a simple relay.



MOTORS

Motor is a device that creates motion, not an engine it usually refers to either an electrical motor or an internal combustion engine.

It may also refer to:



- Electric Motor, a machine that converts electricity into a mechanical motion
- AC motor, an electric motor that is driven by alternating current

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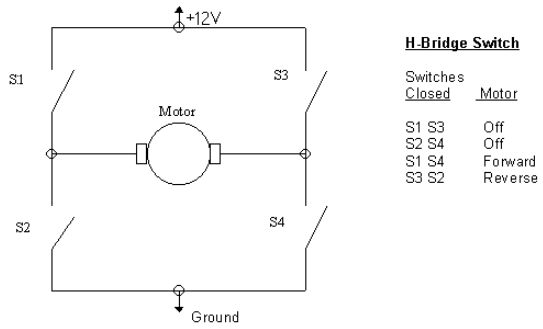
- Synchronous motor, an alternating current motor distinguished by a rotor spinning with coils passing magnets at the same rate as the alternating current and resulting magnetic field which drives it
- Induction motor also called a squirrel-cage motor, a type of asynchronous alternating current motor where power is supplied to the rotating device by means of electromagnetic induction

DC motor an electric motor that runs on direct current electricity Brushed DC electric motor an internally commutated electric motor designed to be run from a direct current power source Brushless DC motor a synchronous electric motor which is powered by direct current electricity and has an electronically controlled commutation system, instead of a mechanical commutation system based on brushes

- Electrostatic motor a type of electric motor based on the attraction and repulsion of electric charge
- Servo motor an electric motor that operates a servo, commonly used in robotics
- Internal fan-cooled electric motor, an electric motor that is self-cooled by a fan, typically used for motors with a high energy density

MOTORDRIVER CIRCUIT

- The name "H-Bridge" is derived from the actual shape of the switching circuit which control the motion of the motor. It is also known as "Full Bridge". Basically there are four switching elements in the H-Bridge as shown in the figure below.



As you can see in the figure above there are four switching elements named as "High side left", "High side right", "Low side right", "Low side left". When these switches are turned on in pairs motor changes its direction accordingly. Like, if we switch on High side left and Low side right then motor rotate in forward direction, as current flows from Power supply through the motor coil goes to ground via switch low side right.

LIQUID CRYSTAL DISPLAY

or Liquid Crystal Display. LCD display over comes the drawback of LEDs because of the following reasons:

1. LCD has the ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.
2. LED must be refreshed by the CPU to keep displaying the data. There is no need of refreshing for LCD.
3. Using programming LCD can display characters and graphics.
4. LCD used for writing different messages.

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LCD Connection:

LCD can be used as 4 bit LCD or 8 bit LCD. If 8 data lines are used for connection to the microcontroller then it is 8 bit LCD. If 4 data lines are used for connection to the microcontroller then it is 4 bit LCD. We can use any one of them. It has control pins:

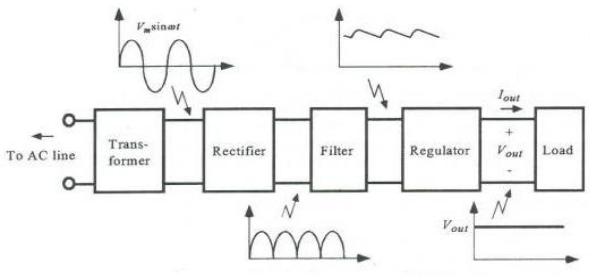
1. EN: To enable data to LCD.

2. RS: To send the data or commands to LCD

3. WR: To write the data on display.

POWER SUPPLY

In this project we gives the power supply +5v to -5v. when we give the power supply if it Ac supply it can be step down 12V/50Hz using of transformer , after that the bridge rectifier it can be used to convert Ac voltage into dc voltage ,here we are using two capacitor filters remove unwanted Ac pulses. Here the filters blocks Ac current and allows only dc current . After that the power goes to the voltage regulator Lm7805 , it gives the only five voltage to the controller why because the controller working with 5v dc only, If we use the dc supply no need of transformer.



Components of a regulated power supply

LIGHT DEPENDENT RESISTOR (LDR)

A photo resistor is an electronic component whose resistance decreases with increasing incident light intensity. It can also be called a light-dependent resistor (LDR), or photo conductor. Other light dependent resistors, or photo resistors have been made using materials including Cadmium Supplied, Lead Supplied and the more commonly used semiconductor materials including Ge,Si and GaAs. The photo resistor, or Light Dependent Resistor, finds many uses as a low cost photo sensitive element and was used for many years in photographic light meters as well as other applications. Such as flame, smoke, and burglar detectors, card readers and lighting controls for street lamps. Units for the light intensity are Lux or Lumence. Solar power us a renewable source of energy, which has become increasingly popular in modern times. It has obvious advantages over non-renewable energy sources, such as coal, oil and nuclear energy.

It is non-polluting, reliable and can produce energy anywhere that there is sun shining, so its resources are not going to run out anytime soon. It even has advantages over other renewable energy sources, including wind and water power. Solar power is generated using solar panels, which do not require any major mechanical parts, such as wind turbines. These mechanical parts can break down and cause maintenance issues and can also be quite noisy. Both of these issues are virtually non-existent with solar panels. Also, the solar cells that connected together make up the solar panels, can last up to several decades without replacement. However, there is a drawback to solar power- energy can only be produce when the sun is shining. To overcome this usually solar panels are coupled with back up rechargeable batteries, which can store excess power generated during the day and use it to provide energy to systems when there is no sun shining.

In this way solar power can be used to power houses and other large scale systems. In these systems DC-AC conversion is needed. This is because the solar panel produces an output that is DC (Direct Current) and the power supply in homes usually runs off AC (Alternating Current), so conversion is required. Provide clean, versatile, renewable energy. This simple device has no moving parts, negligible maintenance costs, produces no pollution and has a lifetime equal to

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that of a conventional fossil fuel.Photovoltaic cells capture solar energy and convert it directly to electrical current by separating electrons from their parent atoms and accelerating them across a one way electrostatic barrier formed by the function between two different types of semiconductor material

Battery storage:

The simplest means of storage on a smaller moderate scale is in electric storage batteries, especially as solar cells produce the direct electric current required for battery charging. The stored energy can then be delivered as electricity upon discharge. The common iead acid storage batteries, such as are used in automobiles, are not ideal for this purpose, but they are probably the best presently available. Extensive research in progress should lead to the development of more suitable batteries.

- A possible alternative is to use the direct current from solar cells to decompose water into hydrogen and oxygen gases. These gases would be stored in a suitable form and utilized as needed to generate electricity in a fuel cell.

- **Inverters:** these are the devices usually solid state, which change the array DC output to AC of suitable voltage, frequency, and phase to feed photo voltaically generated power into the power grid or local load, as shown in figure. These functional blocks are sometimes referred to as power conditioning. A general type of inverter circuit which is found best suitable for the utility application is shown in fig. the current can be used in

Two modes:

(1) As an inverter changing DC to AC or

(2) As a rectifier changing AC to DC,

Thus charging the battery. It is clear that the system photovoltaic offers the option of DC power, AC power, hydrogen and oxygen fuels in either gas or liquid forms from which electricity can be generated. The system has many advantages and disadvantages. The solar photovoltaic array consists of an appropriate number of solar cells connected in series and or parallel to provide the required current and voltage. The array is so oriented as to collect the maximum solar radiation throughout the year There may be tracking arrays or modules or fixed arrays. A tracking array is defined as one which is always kept mechanically perpendicular to the sun array line so that all times it intercepts the maximum isolation. Such arrays must be physically movable by a suitable prime mover and are generally considerably more complex than fixed arrays. A fixed array is usually oriented east west and tilted up at an angle approximately equal to the latitude of the site.

I.ABOUT KEIL SOFTWARE:

It is possible to create the source files in a text editor such as Notepad, run the Compiler on each C source file, specifying a list of controls, run the Assembler on each Assembler source file, specifying another list of controls, run either the Library Manager or Linker (again specifying a list of controls) and finally running the Object-HEX Converter to convert the Linker output file to an Intel Hex File. Once that has been completed the Hex File can be downloaded to the target hardware and debugged. Alternatively KEIL can be used to create source files; automatically compile, link and covert using options set with an easy to use user interface and finally simulate or perform debugging on the hardware with access to C variables and memory. Unless you have to use the tolls on the command line, the choice is clear. KEIL Greatly simplifies the process of creating and testing an embedded application.

II Projects:

The user of KEIL centers on “projects”. A project is a list of all the source files required to build a single application, all the tool options which specify exactly how to build the application, and – if required – how the application should be simulated. A project contains enough information to take a set of source files and

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generate exactly the binary code required for the application. Because of the high degree of flexibility required from the tools, there are many options that can be set to configure the tools to operate in a specific manner. It would be tedious to have to set these options up every time the application is being built; therefore they are stored in a project file. Loading the project file into KEIL informs KEIL which source files are required, where they are, and how to configure the tools in the correct way. KEIL can then execute each tool with the correct options. It is also possible to create new projects in KEIL. Source files are added to the project and the tool options are set as required. The project can then be saved to preserve the settings. The project is reloaded and the simulator or debugger started, all the desired windows are opened. KEIL project files have the extension

Simulator/ Debugger:

The simulator/ debugger in KEIL can perform a very detailed simulation of a micro controller along with external signals. It is possible to view the precise execution time of a single assembly instruction, or a single line of C code, all the way up to the entire application, simply by entering the crystal frequency. A window can be opened for each peripheral on the device, showing the state of the peripheral. This enables quick trouble shooting of mis-configured peripherals. Breakpoints may be set on either assembly instructions or lines of C code, and execution may be stepped through one instruction or C line at a time. The contents of all the memory areas may be viewed along with ability to find specific variables.

In addition the registers may be viewed allowing a detailed view of what the microcontroller is doing at any point in time. The Keil Software 8051 development tools listed below are the programs you use to compile your C code, assemble your assembler source files, link your program together, create HEX files, and debug your target program. µVision2 for Windows™ Integrated Development Environment: combines Project Management, Source Code Editing, and Program Debugging in one powerful environment.

- C51 ANSI Optimizing C Cross Compiler: creates relocatable object modules from your C source code,
- A51 Macro Assembler: creates relocatable object modules from your 8051 assembler source code,
- BL51 Linker/Locator: combines relocatable object modules created by the compiler and assembler into the final absolute object module,
- LIB51 Library Manager: combines object modules into a library, which may be used by the linker,
- OH51 Object-HEX Converter: creates Intel HEX files from absolute object modules.

b. What's New in µVision3?

µVision3 adds many new features to the Editor like Text Templates, Quick Function Navigation, and Syntax Coloring with brace high lighting Configuration Wizard for dialog based startup and debugger setup. µVision3 is fully compatible to µVision2 and can be used in parallel with µVision2.

CONCLUSION:

The project "A Gesture learning interface for simulated robot Path shaping with a human teacher" been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

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Author's Details:

Mr.A.Suman Chaitanya, did his bachelor of Technology in Electronics & Communication Engineering at PBR Visvodaya Institute of Technology and Science (PBR VITS), kavali, and doing Master of Technology in Digital Systems and Computer Electronics (DSCE) in Annamacharya Institute of Technology & Sciences (AITS), Karakambadi, Tirupati, Chittoor, Andhra Pradesh, India.

Mrs.M.Anitha M.Tech, Presently she is working as Assistant Professor in the Department of ECE, Annamacharya Institute of Technology and Science, Tirupati. She has 8 Years experience in teaching. Her research interests are in embedded system Design and Robotics Design

Ms.A.Rajani Obtained her B.Tech at Chaitanya Bharathi Institute of Technology (CBIT), Gandipet, Hyderabad and Master degree in Sri Venkateswara University College of Engineering (SVUCE), Tirupathi. Persuing (Ph.D) in Sri Venkateswara University College of Engineering (SVUCE), Tirupathi. Her area of interest is Digital Image processing And Signal Processing. She has 7 years of teaching experience. She is currently working as Assistant Professor in the Department of ECE, Annamacharya Institute of Technology & Sciences (AITS), Tirupati. Her research interests are in Digital Image processing and Signal Processing.