"BUILDING AUTOMATION SYSTEM USING SOLAR POWER": AN OVERVIEW

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Abstract- In this paper we aim at discussing a building automation system using solar power. The solar panel status and other parameters such as water level in overhead tank are registered and auxiliary units are run based on these signals. This way unnecessary wastage of energy can be curbed and intelligent homes with low energy consumption can be built.

Keywords- Electronics Engineering, Solar Power

I. INTRODUCTION:

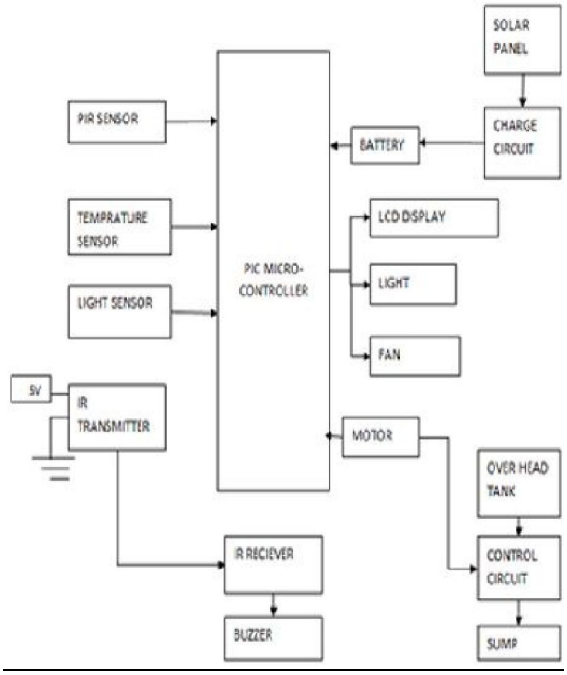
Solar power is the conversion of sunlight into electricity, either directly using photovoltaic's (PV), or indirectly using concentrated solar power (CSP). Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Photovoltaic's convert light into electric current using the photovoltaic effect. Building automation is the goal that a Building Management System or a (more recent terminology) Building Automation System (BAS) attempts to achieve. Both are examples of a distributed control system - the computer networking of electronic devices designed to monitor and control the mechanical, security, fire and flood safety, lighting (especially emergency lighting), HVAC and humidity control and ventilation systems in a building.

Usually, building automation systems implement control loops that can span across large areas of the building. These control loops require a reliable communication between the sensors, actuators and the process controller. When the buildings are designed with the possibility of building automation in mind, the communications can be implemented using different wired networks. When speaking of intelligent buildings, beside the automation, external communications, multimedia and many other aspects, it is necessary to think about reducing the power consumption and integrating alternative energy sources. The best possible method is to design a smart battery charger that draws power from a photovoltaic panel and powers the automation modules.

II. PROJECT DESIGN:

Fig 1 depicts how various circuits are interfaced with the micro controller so as to run the light fan water pump and alarm.

Fig 1



2.2 Solar panel: The solar PV panel is used, in essence, to trap the incident sunlight and charge the battery to be stored for future use. The panel is adjusted at specific inclination to enable maximum power point tracking. This provides maximum efficiency and most of the sunlight that falls on the panel is stored. The panel that we are making use of has a rated capacity of 12 volts and 5Watts power ideally.

2.3 Passive infrared sensor: A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors.

2.3.1 Operating principle

- All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually this radiation is invisible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose.
- The term passive in this instance refers to the fact that PIR devices do not generate or radiate any energy for detection purposes. They work entirely by detecting the energy given off by other objects.
- It is important to note that PIR sensors don't detect or measure "heat" instead they detect the Infrared radiation emitted from an object which is different from but often associated/correlated with the object's temperature (e.g., a detector of X-rays or gamma rays would not be considered a heat detector).
- A PIR-based motion detector is used to sense movement of people, animals, or other objects. They are commonly used in burglar alarms and automatically-activated lighting systems. They are commonly called simply "PIR", or sometimes "PID", for "passive infrared detectors".

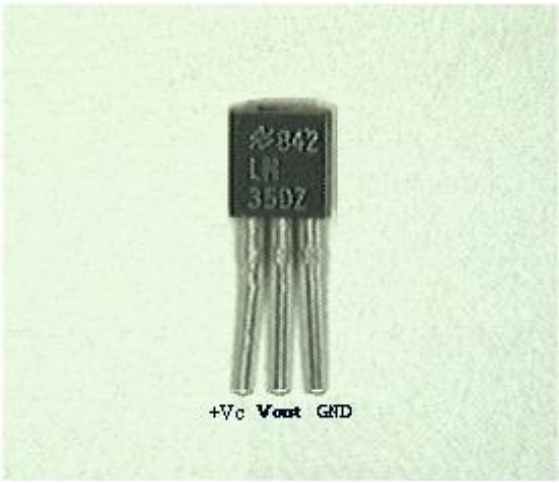
The PIR sensor is placed at the entrance so that it can detect human presence and during the night it can even set off a burglar alarm when required. The output of the PIR sensor is given to the PIC microcontroller and is interfaced accordingly.

Alarm application

When used as part of an alarm, the electronics in the PIR typically control a small relay. This relay completes the circuit across a pair of electrical contacts connected to a detection input zone of the burglar alarm control panel. The system is usually designed such that if no motion is being detected, the relay contact is closed—a 'normally closed' (NC) relay. If motion is detected, the relay opens, triggering the alarm.

2.4.1 Temperature sensor: We can measure temperature more accurately than a using a thermostat. The sensor circuitry is sealed and not subject to oxidation. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. It has an output voltage that is proportional to the Celsius temperature. The scale factor is .01V/ deg C. The LM35 does not require any external calibration or trimming and maintains an accuracy of +/-0.4 deg C at room temperature and +/- 0.8 deg C over a range of 0 deg C to +100°C.Another important characteristic of the LM35DZ is that it draws only 60 micro amps from its supply and possesses a low self-heating capability. The sensor self-heating causes less than 0.1 deg C temperature rise in still air.The operating temperature range is from -55 deg C to 150 deg C.

2.4 LM 35 design and working



Pin No	Function	Name
1	Supply voltage; 5V (+35V to -2V)	Vcc
2	Output voltage (+6V to -1V)	Output
3	Ground (0V)	Ground

We use LM 35 in our project for automatic switch on and switch off of the fan in the presence of human. The temperature must also be above the set threshold

of 31 deg C. LM 35 is used since accurate temperature measurement is not needed also its cheap n easily available in the market.

2.5 LDR sensors:

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. The animation opposite shows that when the torch is turned on, the resistance of the LDR falls, allowing current to pass through it.

The preset resistor can be turned up or down to increase or decrease, in this way it can make the circuit more or less sensitive.

The LDR is used to sense the light changes and hence decide whether it is day or night. The threshold value of the resistor can be changed according to the requirement. The output of the sensor is interfaced with the PIC microcontroller and the output drives the applications like the fan and light. If it is day the lights are turned off and if its night the lights are turned on. Similarly depending on the temperature the fan is turned on or off.

CONCLUSION:

In this paper we discussed about building automation system using solar power. We designed solar circuit, PIR sensor circuit, LDR circuit, and temperature sensor circuit, automatic water level sensor circuit successfully under the guidance of our internal and external guide. Building automation these days is mainly used for both leisure and security purpose due to increase in crime rate. Our project addresses these issues. Immense knowledge was gained while we were working for our project and the literature surveys and detailed study helped us in our work.

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