SUN TRACKING SYSTEM USING 8051 MICROCONTROLLER

MPMC Lab Project Report

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CERTIFICATE

This is to certify that the MPMC Lab Project work entitled "**SUN TRACKING SYSTEM USING 8051 MICROCONTROLLER**" submitted by **T.ROHIT (19311A1957), K.LAKSHANA (19311A1933), KEERTHI REDDY (19311A1938)** towards partial fulfilment for the award of Bachelor's Degree in Electronics & Computer Engineering from Sreenidhi Institute of Science & Technology, Ghatkesar, Hyderabad, is a record of bonafide work done by them. The results embodied in the work are not submitted to any other University or Institute for award of any degree or diploma.

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ABSTRACT

In recent years, the energy sources like fossil fuel, gas, crude oil, coal, nuclear fuel, etc,. are becoming scared due to excessive use of it for domestic as well as commercial purposes. These are non-renewal sources of energy. The situation was energy resources are scared, so it is vital to use renewable sources of energy for example solar energy, Wind power, Tides, Hydroelectricity, and Geothermal power. A solar tracking system produces more energy since the solar panel remains aligned to the sun. The uses of alternative sources of energy are becoming widely spread all over the world. Our sun is also a very good source of different energies; light energy has a very remarkable value. The Solar panel converts the light energy into electrical energy. The efficiency of solar panels can be maximized by aligning the solar panel with the sun. The sun tracking system designed in this project offers a reliable and affordable method of aligning a solar panel with the sun on a single axis. This project is based on microcontroller 8051 with a simple circuit and sun tracking software
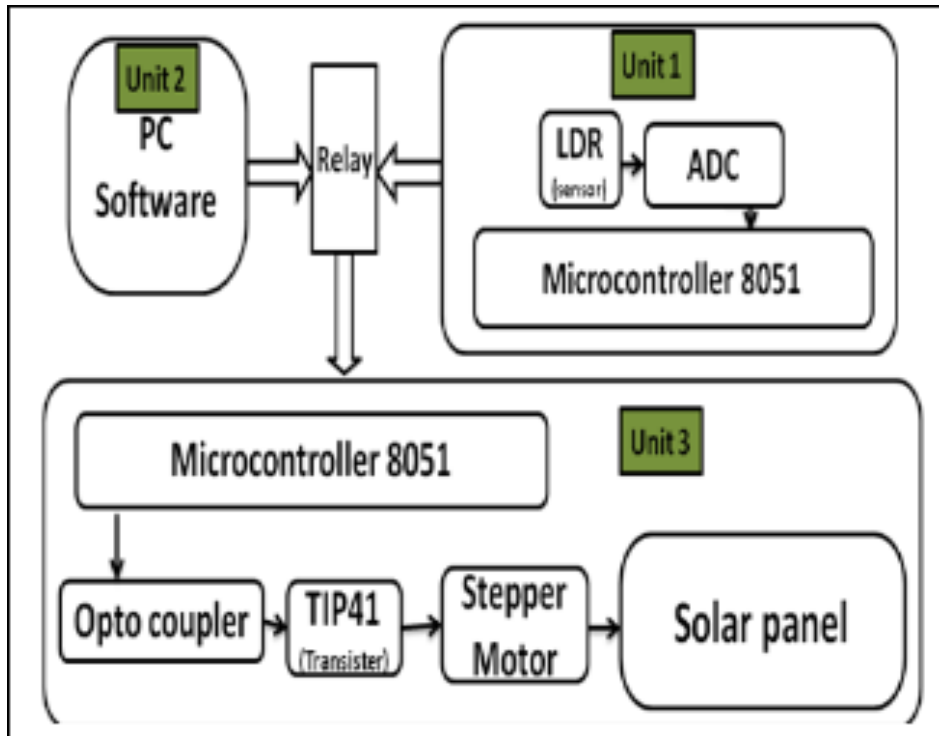
CONTENTS

1.1 BLOCK DIAGRAM

1.2 BLOCK DIAGRAM/CIRCUIT DESCRIPTION:

The block diagram of this project has three basic units, descriptions of these units are as follows:

1.2.1 UNIT 1:

1.2.1.1 1 LDR Sensor:

In this project, the unit 1is using the LDR sensor to get input data of light, this data is in the analog form, on the basis of this data, system track the sun.

1.2.1.2 ADC (analog to digital converter):

Analog to digital converter (ADC) is using to convert the analog data, by the LDR sensor, into digital data. The microcontroller uses this digital data for tracking.

1.2.1.3 Microcontroller (8051):

The microcontroller 8051 has a basic role in this project; it takes action according to its program on the basis of ADC's data.

1.2.1.4 Relays:

Relays are also playing an important role in this tracking system, they are using as a switch between unit 1 and unit 2.

1.2.2   UNIT 2:

This unit has the software portion for tracking; this unit allows the user to track the sun manually.

1.2.3   UNIT 3:

1.2.3.1 Microcontroller (8051):

In unit 3, the microcontroller 8051get the instructions from the unit 1 or unit 2 and give the instructions to the stepper motor to track the sun.

1.2.3.2 Opto-coupler and Tip41 (transistor):

In unit 3, the opto-coupler is using to safe the microcontroller 8051 in the circuit and the Tip41 is using as a power transistor for the stepper motor.

1.2.3.3 Stepper motor:

The stepper motor plays an important role in this project; it directed the panel towards the sun.

1.2.3.4 Solar panel:

All the system works to keep the solar panel directed toward the sun, the solar panel generate the DC voltages.

Input power: This system is using +5V DC power, as the input, for all three units and also +12V DC for the stepper motor of unit 3.

Chapter 2

Hardware Requirements

2.1 Components Required to for Circuit:

- Solar panel
- ATmega328 Micro Controller
- Light Dependent Resistor (LDR) x 2
- 10KΩ x 3
- Servo Motor
- 16MHz Crystal
- 22pF Ceramic Capacitors x 2
- Push Button
- Breadboard
- Cardboard
- Connecting Wires

2.2 LDR:

Light Dependent Resistors or LDRs are resistors whose resistance values depend on the intensity of the light. As the intensity of light falling on the LDR increases, the resistance value decreases. In dark, LDR will have maximum resistance. LDR will output an analog value which should be converted to digital. This can be done using an analog to digital converter. ATmega328 has an analog to digital converter internally. It has six ADC channels from ADC0 to ADC5 (Pins 23 – 28). The two LDRs are connected to ADC pins i.e. 27 and 28 in a voltage divider fashion with the help of individual 10KΩ Resistors. ADC conversion is done using the successive approximation method.

CHAPTER 3

CIRCUIT DIAGRAM
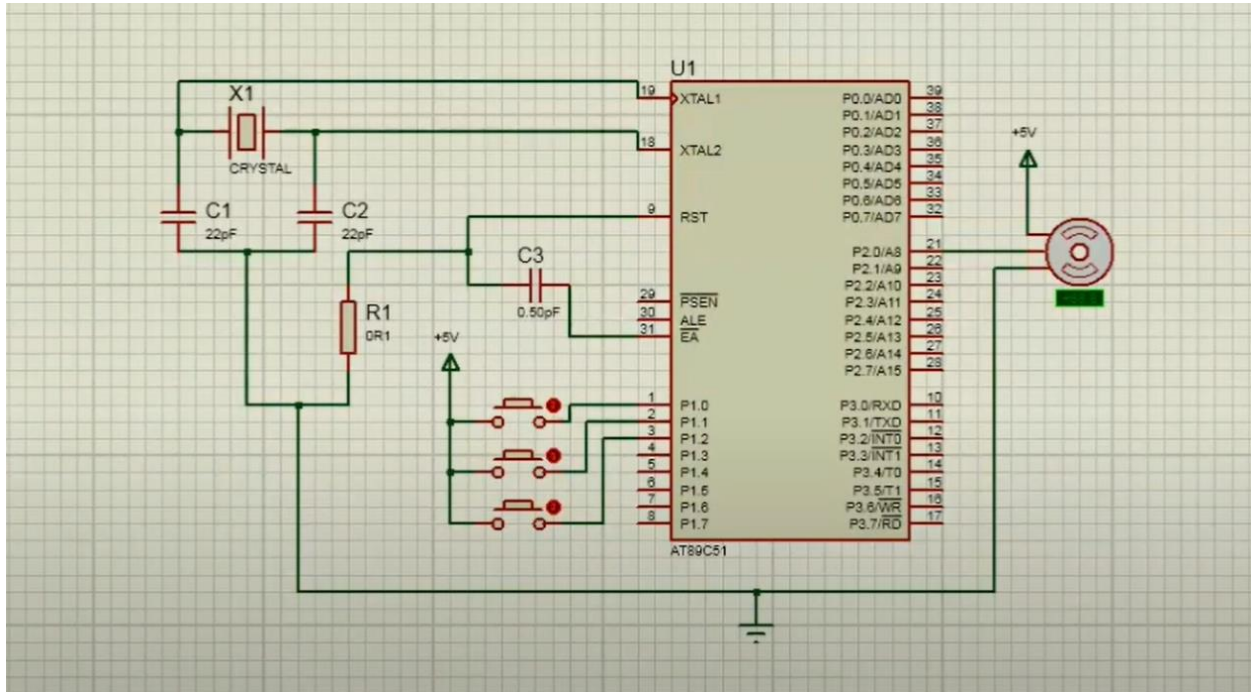
3.1.2 Working of the Circuit:

This project has two ways of tracking:

1.   Auto tracking (By the sensor)
2.   Manual tracking (By the software)

Auto Tracking (By The Sensor, Unit 2):

The auto tracking is performed on the basis of sensor LDR. In this system the LDR get the light intensity data, this analog data is converted into the digital form by passing through ADC, now microcontroller of unit 1 get the eight bits data of light, The microcontroller 8051 of unit 1 gets the several readings of ADC, it's subroutines compare these values, If any of the values are equal, the unit 1 microcontroller 8051 not take any decision for unit 3, it waits for few minutes and check again later. If it gets the greater value of the difference, which is defined in it, it sends a bit, to move,

for unit 3. If light intensity below the low light threshold level, the tracker will keep measuring at whatever position it is at until the threshold is reached. The threshold for this portion has been assigned a constant in microcontroller. This level corresponds to what was measured with the solar panel during daytime. The last portion of the routine in microcontroller allows the system to reset itself at the end of a day. After every motor movement, a register is incremented or decremented so that the net position of the tracker can be known at any given time. Once the tracker moved 180 degrees, light intensity is checked; the system will return to its starting point and enters in sleep mode.

Manual Tracking (By The Software, unit 3)

In manual tracking we used software named "Sun Tracking Software"; this software is created on VB.NET, with the help of this software we can move the solar panel in our desired direction on one axis, this software uses the parallel port to communicate with the circuit of unit 3, when the system using manually then it's circuit switched on solar tracking software from sensor and user can move the solar panels on one axis by the arrow keys. It can be used as an optional part in this system, if it is not in use so the system works on auto tracking. Figure 2 (a) and (b) shows the two different views of software. 3.3 WORKING OF UNIT 3 SECTION Both the unit 1 and unit 2, sends the instructions to unit 3. Basically unit 3 operates the stepper motor.

SOFTWARE CODE: Code is written in C and Keil UVersion 4.0 is used.

```
#include sbit en1=P1^4;

 sbit mtr1=P1^0;

sbit mtr2=P1^1;

 sbit LDR1=P1^2;

sbit LDR2=P1^3;

 void delay(unsigned int);
```

```c
void clockwise();

void anticlockwise();

void stop();

void main()

{

mtr1=0; mtr2=0; LDR1=0XFF; LDR2=0XFF;

while(1)

{

        if(LDR1==1 && LDR2==0)

         clockwise();

        elseif(LDR1==0 && LDR2==1) anticlockwise();

        else stop();

}

}

void clockwise(void)

{

        mtr1=1;

        delay(25);

        mtr2=0;

        delay(75);

}
```

```c
void anticlockwise(void)

{

mtr1=0; delay(25);

mtr2=1;

delay(75);

}

void stop(void)

{

mtr1=0;

mtt2=0;

}

void delay(unsigned int value)

{

unsignedinti.j;

for(i=0; r(i=0;I<value;j++)

for(j=1;j<1275;j++;

}
```

CHAPTER 4

ADVANTAGES,DISADVANTAGES AND FUTURE SCOPE

Advantages:

- It is Easy to use.
- Sample programs are available.
- Good documentation is available.
- It is Very cheap.
- Good to learn the fundamentals.

Disadvantages:

- It is a 8 Bit microcontroller.
- It has low speed.
- No GCC support

Future Scope:

This tool can be used in solar cooker, solar heater, solar cell, etc. where the electric energy is required. Instead of electric energy we can make the use solar energy. The very embodiment through which the futuristic conundrum be set aside, is the project called "Automatic Solar Tracking System". A trailblazer by its spirit, this system works in its utmost efficiency, whether that be in terms of its pecuniary ability or in terms of its accessibility. In the smoke of the darkness where pollution engulfing every spheres of advancement as an outcome of producibility, this device in its very efficiency work towards only advancement and development by flushing out the pollution at large.
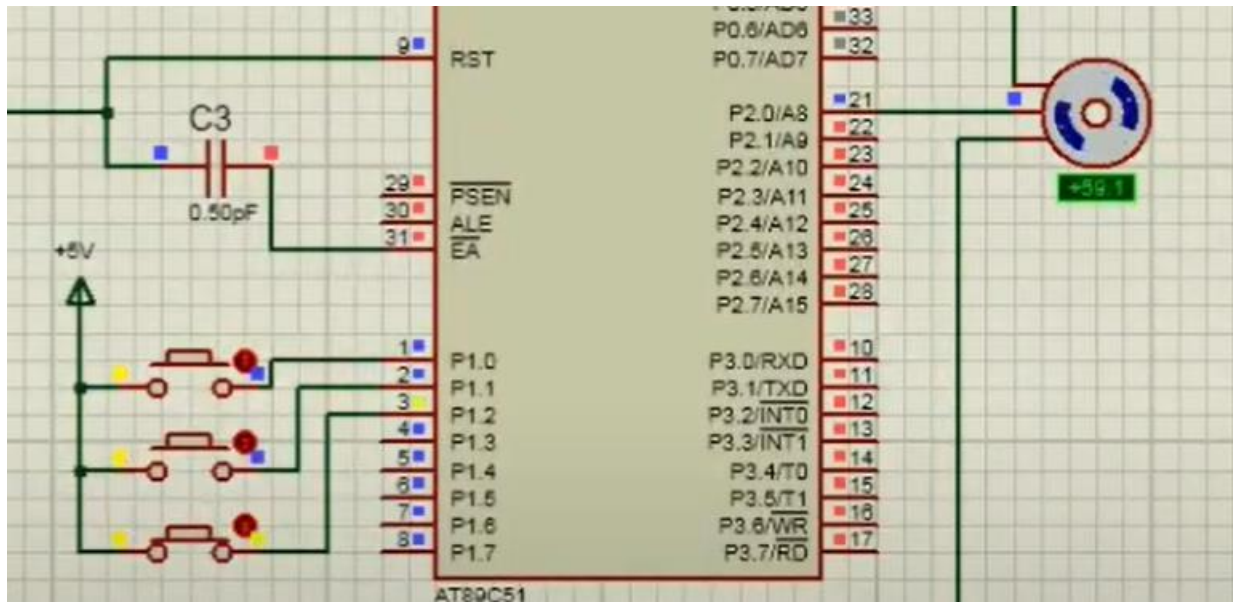
CHAPTER 5

CONCLUSION

Today in the world of rampant productivity, energy is the fundamental source upon which the whole civilization is based upon. As it is said that energy can neither be created nor be destroyed and, in that response, it can be signified that it can somehow be stored. The attempt towards making such goal substantiated, this project has been endeavoured towards unravelling the path of such objectivity. It is quite natural that constant utilisation of energies somehow opens the door of scarcity as per as earthly sources are concerned. Sun, in the stand of which, the tallest source, spiked over for age's right from the origin of the whole universe, through which life has been conceived, is the basic and the mother source of all the energies. Considering the very fundamental from the viewpoint of storing such energy, the project has been unravelled. Energies other than from the Sun, are the process from which such are been produced through the burning of various materials, involving emission of a large amount of pollution, causing the environment and the atmosphere sick day by day. Fastness and smartness of the world's current behavioural visibility, where easy access of every sphere of life is in need of the acute comfortability, every day is a new challenge of hatching something new and unique which makes an energy to be the ultimatum source behind all the hard work exists. In that regards it would be worthier to reveal that commercialisation has boomed its wings to such an extent in the need of money and power that we are somehow present in the pool of acute ignorance of the world's resources scarcity, in consequence of which the whole world is wounded. Healing the world is the basis cultivation with which the hour clock is calling and this project presents the eye, therefore, to open the corridors of reducing the amount of pollution in storing of energy culled out from the pace of advancement revved aroundSun and also to make the pace of advancement.

CHAPTER 6

RESULT

Case 1

Case 2

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