

# Solar Based Automatic Coffee Vending Machine

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**Abstract:** Solar energy is rapidly advancing as an important means of renewable energy resources. Solar panel has Photovoltaic arrays (PV) which directly converts lights into electricity. So, we have proposed the scheme which utilizes solar energy to power the controlling device of various equipment with battery backup. Today's home required sophistication control in its different gadgets which are basically electronic appliances. Here coffee vending machines are developed using android. Mobile connection is a wireless communication over an ad hoc network environment. Manufacturing of hardware with the assembly of the minimum system, microcontroller Atmega16. Net interface as a medium of communication to the database server. Android mobile will send a command given by the user to the database served through the Internet.

**Keywords:** Solar energy, Renewable energy Source, Microcontroller Atmega16

## I. INTRODUCTION

In India the major source for generation of electricity is Non- renewable energy source. Among which the coal is the major source to generate energy. But these sources are limited and present in certain amounts, so we must use them carefully so that it should remain for future generations. Due to development in technologies and people's standard of living, the use of this non- renewable energy is increasing day by day which in future can result in scarcity of energy.

Advancement in the machines is the more interesting factor. The technology development turns in the direction where advancement is lightning up. Automation encompasses a diverse set of technologies that run the gamut from sensing to adapting. The term mechanization is often used to refer to the simple replacement of human labour by machines, generally implies the integration of machines into a self- governing system. Such automation is done with coffee vending machines.

Generally, the coffee vending machine is operated manually with the help of switches provided with the machines can operate automatically, the coffee vending machine is running automatically with the help of mobile. Development in semiconductors and computer programming it is possible to run the machines automatically. Coffee vending machines operate through wireless connection to make it easy to get the coffee on your plate without leaving the place. Such an automation makes one's way of living easy and sophisticated.

## II. OBJECTIVES

1. To maintain the output voltage of Solar panel at 12V.
2. To obtain the temperature of water at 100°C.
3. Automatically switch ON/OFF of Coffee Vending Machine by mobile.
4. To obtain the coffee by adding different ingredients.

## III. PROJECT METHODOLOGY

This project is hardware based. In this project we are using Solar panel, buck boost converter, battery, microcontroller, relay and different parts of Coffee Vending Machine. We are using electrical energy from the solar panel and this energy is stored into the battery and utilized at the time of emergency. In this machine, we are preparing coffee using different types of ingredients like sugar, milk powder. This machine is automatically handled by the Arduino app. The system uses a programmable microcontroller and a constant power supply. Liquid Crystal Display (LCD) is connected to the microcontroller for display. Relay driver IC which in turn operates the motor is operated by Microcontroller Atmega16. Bluetooth module is interfaced to the microcontroller for automatic function of the machine. The motors connected to the relay IC runs giving the output in the form of coffee.

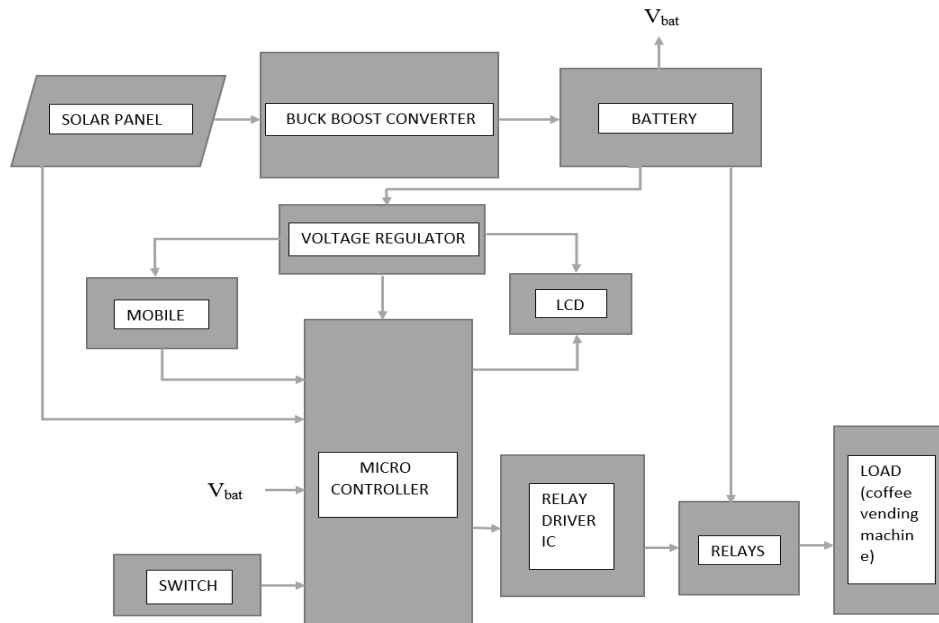


Fig.1 Block diagram of Coffee Vending Machine

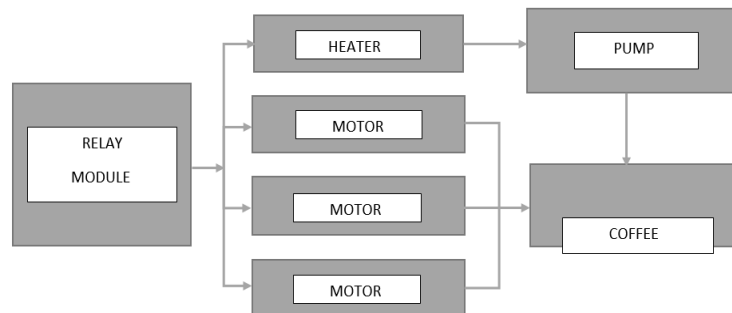


Fig.2 Load Diagram of Coffee Vending Machine

**IV. WORKING OPERATION**

Solar panels work by absorbing sunlight with photovoltaic cells, generating Direct Current (DC). The rating of Solar panel used in this machine is 10 Watt, 12Volts. The dc current is then flows through the Buck Boost Converter which decreases the voltage level to a steady state value i.e, 7.4Volts. The battery is kept between the Buck Converter and voltage regulator to store the extra amount of power in certain cases of emergency. 7805IC , a member of 78XX series of fixed linear voltage regulators used to maintain voltage fluctuation, and it provides +5 voltage at the output.

The programming is inserted in atmega16 microcontroller for the exact working of the machine as per the requirement. The Bluetooth module HC-05 is used to receive and transmit the data by the help of mobile. A switch is used to make or break a connection in a circuit so you can turn ON/OFF the machine.

The heating element in the machine is a Positive Temperature Coefficient (PTC) thermistors which is used to heat the water in the container. And a pump is used to flow the water from the container into the cup. (i.e, a place where coffee is collected).

Other loads such as Electric Motor and Relay Driver IC are connected to Atmega16 to convert electrical energy into mechanical energy and to open or close the circuit electromagnetically or electronically respectively. LCD being used for the smooth functioning of the machine and tom indicate error or services.

Services like there are four options available in the app to make the coffee. This is white coffee with sugar, White coffee without Sugar, Black coffee with Sugar and Black coffee without sugar. The user can order the coffee as per the requirement and hence the coffee will be served in the cup and LCD will display as ‘‘THANK YOU’’.

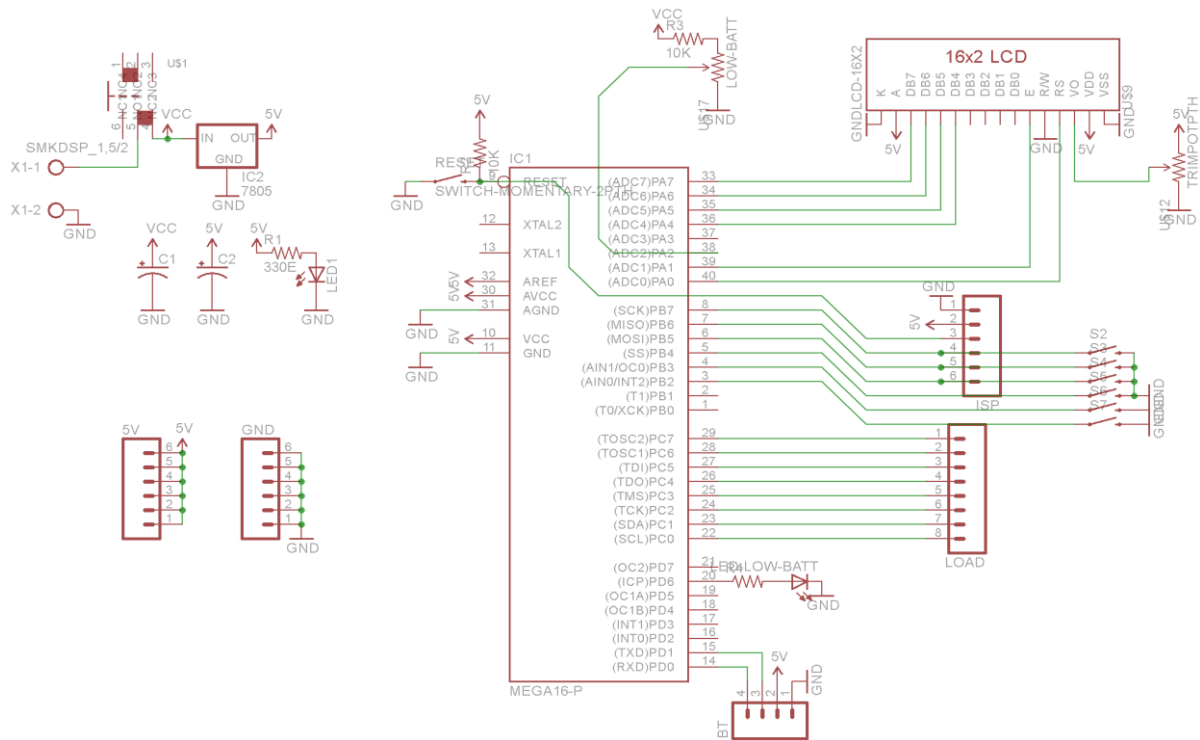


Fig.3 Circuit diagram of Coffee Vending Machine

### V. RESULT AND CONCLUSION

The result and conclusion are

1. Solar energy is obtained by using the solar panel of 12V, 10 Watt, which gets converted into electrical energy.
2. Battery has been charged at its annual rating of 7.4Volts.
3. Low battery indication is shown on the LCD screen and red LED glows.
4. The machine is operated manually with help of switches.
5. The machine is operated automatically with the help of mobile (Arduino).
6. Heating of water is upto 100°C
7. Coffee is being prepared with addition of different types of ingredients.
8. The task performed by the machine is displayed on LCD Screen.
9. One can get 4 types of coffee i.e, White coffee with sugar, white coffee without sugar, black coffee with sugar, and black coffee without sugar.

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