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AURDINO BASED SMART HOME ENERGY MANAGEMENT STRATEGY BY AUTOMATIC SWITCHING OF CHARGING UNIT

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Abstract:-

Energy is the primary and most universal measure of all kinds of work by human beings and nature. Everything what happens in the world is the expression of flow of energy in one of its forms. Most people use the word energy for input to their bodies or to the machines and thus think about crude fuels and electric power. The conventional sources of energy are depleting and may be exhausted by the end of the energy or beginning of the next century. Solar energy and Wind energy, and other non-conventional energy sources are the sources, those are to be utilized in future. The proposed work focus on Arduino controlled Electrical vehicle charging Management System (EVCMS) using Renewable Resources.

Keywords: - EMS, EVCMS, ATMEGA Controller, Arduino Voltage sensor.

I INTRODUCTION

Today, every country draws its energy needs from a variety of sources. We can broadly categorize these sources as commercial and non commercial. The commercial sources include the fossil fuels (coal, oil and natural gas), hydroelectric power and nuclear power, while the non-commercials sources include wood, animal waste and agricultural wastes. Solar energy has the greatest potential of all the sources of renewable energy and if only a small amount of this form of energy could be used, it will be one of the most important supplies of energy especially when other sources in the country have depleted. Energy comes to the earth from the sun. This energy keeps the temperatures of the earths above that in colder space, causes current in the atmosphere and in ocean, causes the water cycle and generate photosynthesis in nature.

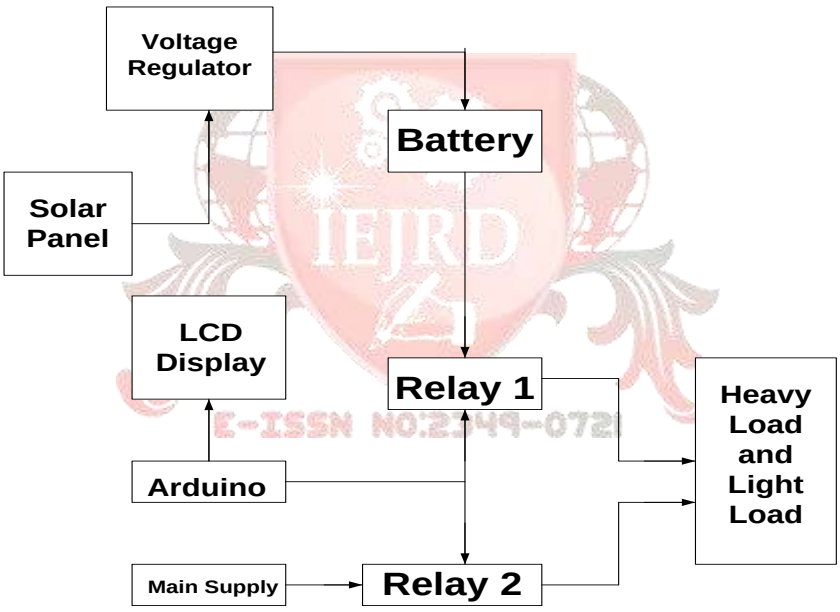
Wind Energy can be economically used for the generation of electrical energy. Winds are caused from two mains factors, heating and cooling of the atmosphere which generates convection currents. Heating is caused by the absorption of solar energy on the earth's surface and in the atmosphere. The rotation of the earth with respect to atmosphere, and its motion around the sun. The potential of wind energy as a source of power is large. The energy available in the winds over the earth's surface is estimated to 1.6×10^7 MW, which is of the same order of magnitude as the present energy consumption on the earth.

II. METHODOLOGY OF WORKING MODEL HARDWARE DEVELOPMENT

In this case, the electrical equipment controls conventional and non conventional energy. Arduino is firstly programmed to communicate with the relay. It is designed as a controller to control the relay that acts as switch. The relay is used in this circuit because it is an electrically operated switch that can be connected directly to the output. The relay module is electricity operated switch that allows you to turn ON/OFF the circuit using voltage and current much higher than microcontroller could handle. Each channel in the module has connections named NC, COM, and NO depending on the input signal trigger mode. The jumper can be placed at a high level effective mode which closes the normal open switch at high level input.

In this paper solar power is used for generation of energy. This generated energy is stored in lead acid battery. For charging this battery we require constant voltage supply. For this purpose we are using voltage regulator named as LM78XX series supply to the battery for safe charging.

Figure 1:- Block Diagram



III INTRODUCE INNOVATION IN AUTOMATION OF ARDUINO UNO

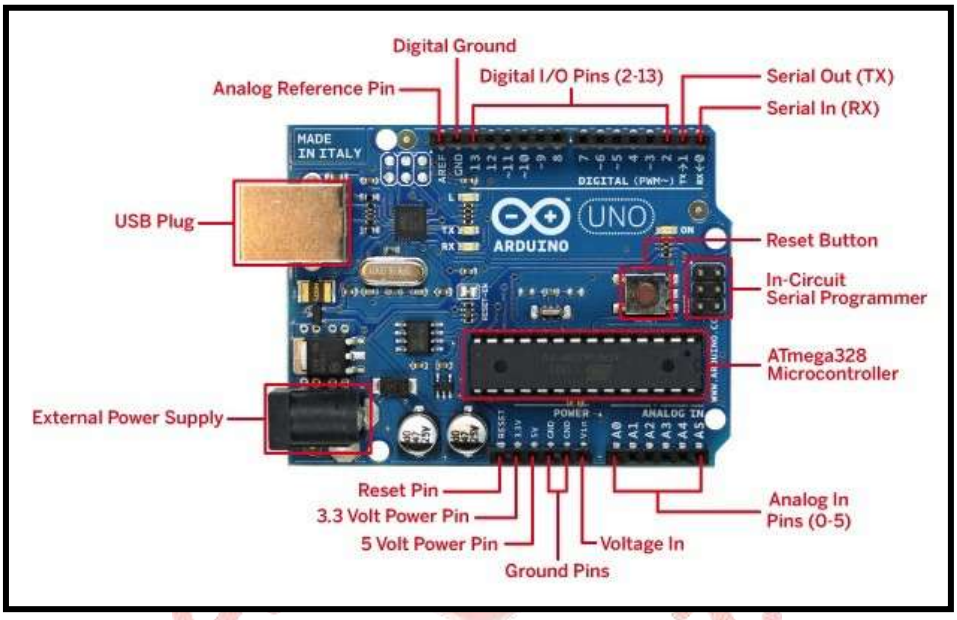
It is a microcontroller board developed by Arduino Uno and based Atmega 328. Electronic device are becoming compact, flexible and cheap those are capable of doing more function as compared to their predecessors that happened to cover more space, turned out costly with the ability to perform fewer functions.

Experts always strive to introduce innovation in automation that requires minimum effort and gives maximum output. The microcontroller was introduced in the electronics industry with the purpose of making our tasks easy that come with even a remote connection with automation in any way. Microcontrollers used in embedded systems and make devices work according to our needs and requirements.

Arduino Uno is a very valuable addition in the electronics that consist of USB interface, 14 digital I/O pins, 6 analog pins, and Atmega 328 microcontroller. It also supports serial communication using Tx and Rx.

There are many versions of Arduino boards introduced in the market like Arduino Uno, Arduino Due, Arduino Leonardo, Arduino Mega, however most common versions are Arduino Uno and Arduino Mega. If you are planning to create a project relating to digital electronics, embedded system, robotics, or IoT, then using Arduino Uno would be the best, easy and most economical option. It is an open source platform, means the boards and software and readily available and anyone can modify and optimize the boards for better functionality. The software used for Arduino devices is called IDE (Integrated Development Environment) which is free to use and required some basic skills to learn it. It can be programmed using C and C++ language.

Figure 2:-



IV RESULT

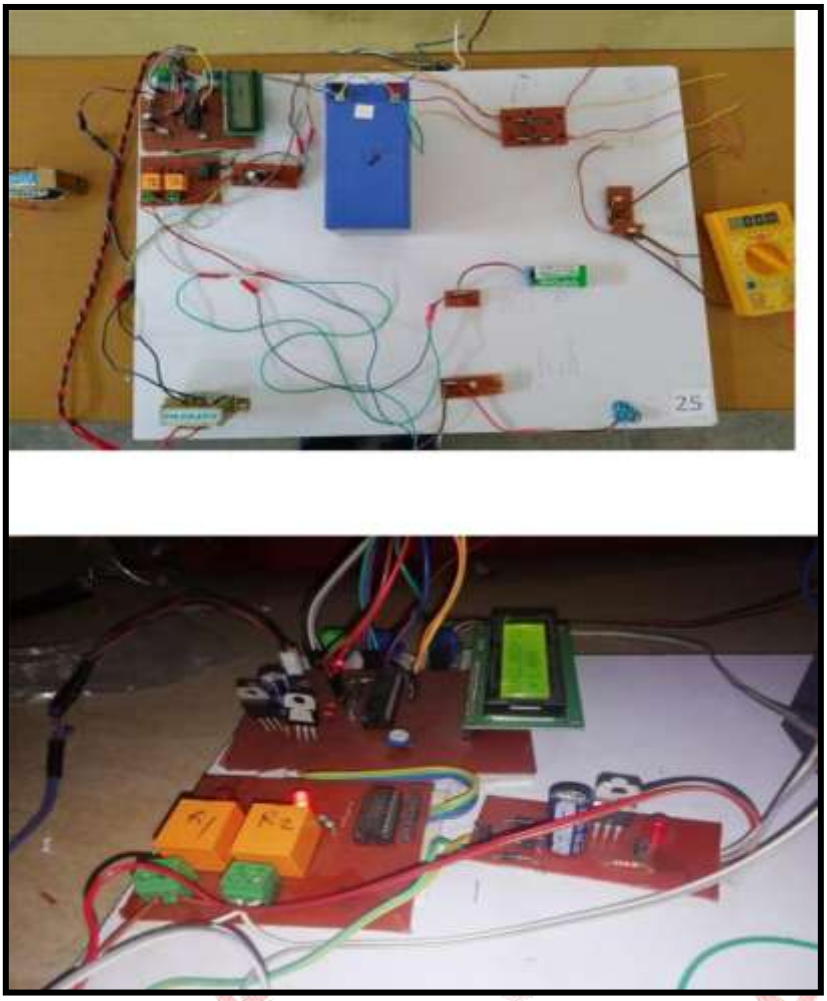
In this paper, the LCD display will show the value of voltage V_1 which is measured at the battery and voltage V_2 is the voltage measured at the rectifier circuit. These two voltages are compared using microcontroller and relay will operate accordingly.

If the voltage V_1 is less than 10V then relay 2 will operate and it will take supply from grid otherwise relay 1 will continue to operate. Two LED are provided one after relay 1 and one after relay 2. As per the relay operates the LED will glow accordingly. This two relay will provide supply to charging station named as charging station 1 and charging station 2. Charging knob 1 is connected to renewable power supply while charging knob 2 is connected to grid supply. The following tables will show the operation of relay.

Table 1:-

Sr. No.	Condition (Reference = 10 V)	Relay switching operation	Charging Knob
01.	IF $V_1 > 10V$	RELAY 1 = ON	1
02.	If $V_2 < 10V$	RELAY 2 = ON	2

Figure 3:- Assembly of Electronic components



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