WASTE ENERGY UTILIZATION FOR ELECTRICITY GENERATION

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Abstract - *Man has needed and used energy at an increasing rate for the sustenance and well-being since time immemorial. Due to this a lot of energy resources have been exhausted and wasted. This paper addresses the proposal for the utilization of waste energy in the form of sound, light and pressure for generating electricity. Making use of such kind of energy, can help in preserving the non-renewable energy resources. The sound generated from noise pollution if utilized properly, can be used in electricity generation. The waste energy generated by human locomotion can be used as a power source and also with the use of light energy we can build solar charging stations for charging electric vehicles. Thus, by making use of these energy sources we can decrease the dependency on the non-renewable sources of energy and can provide alternate source of electricity generation. Therefore, can be used in various fields such as home automation, mobile charging, railway platforms, street lights, industries, stadiums, electric vehicles, overcrowded places etc.*

Key Words: **Piezoelectric Sound Sensor, Piezoelectric Pressure Sensor, Photovoltaic Light Sensor, Arduino, LCD, Relay, External battery circuit etc.**

1. INTRODUCTION

The need for an alternative source of energy is rising fast. Until now, majority of power needs of the world relies upon the exploitation of the non-renewable fossil fuels. However recent estimates put the use Of oil and coal up to 2030, after which the world will need to foster the need for a more efficient and widespread use of technology. The search for a renewable source of energy that can satisfy our ever growing needs is the need of the hour. However, Sound, pressure and light can be considered as more readily available and huge potential sources of energy.

Basically, the project is based on piezoelectric effect and Photovoltaic effect. Piezoelectricity refers to the ability of some materials to generate an electric potential in response to applied pressure and strain. Sound waves are a form of mechanical energy. Piezoelectric effect can be used for converting sound to electric energy. Sound waves applied on piezoelectric material can produce small amount of voltage in response. In case of pressure, when the flooring is engineered with Piezo electric technology, the electric energy produced by the pressure is captured by the floor sensors and converted to an electrical charge by Piezo transducers, then stored and used as a power source.

The photovoltaic effect is the creation of voltage and electric current in a material upon exposure to light and is a physical and chemical phenomenon. When light rays incident on the photovoltaic material, then the material produce voltage in response.

Based on these, the target of this project is to make use of such waste energy in order to provide alternate sources for electricity generation.

1.1 Block Diagram

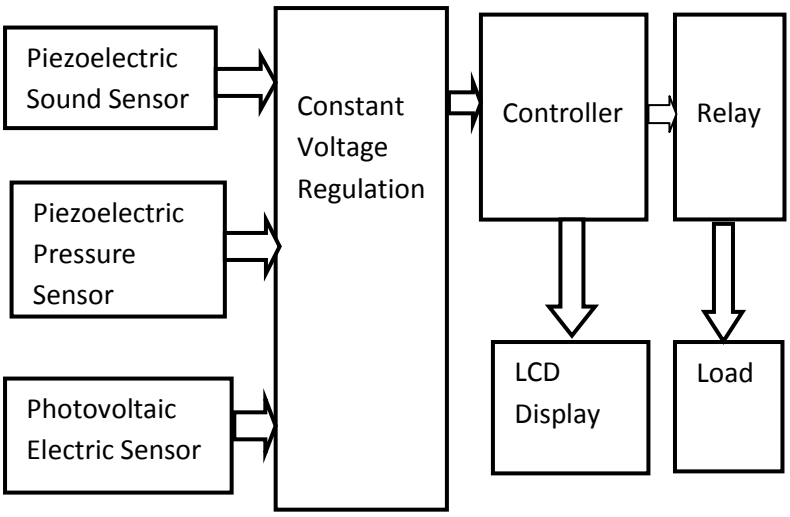


Fig: Block Diagram

1.2 Specification

- **Arduino UNO:**

Operating voltage: 5VDC
DC Current per I/O pin: 120 mA
DC Current for 3.3V pin: 50 mA
No. of pins: 28 pins

- **Piezoelectric Sound Sensor:**
  Operating voltage: 5v DC
  Current: 500 mA
  No. of pins: 2
  Output Voltage: 0 to 12V
- **Piezoelectric Pressure Sensor:**
  Operating voltage: 5v DC
  Current: 120 mA
  No. of pins: 2
  Output Voltage: 0 to 12v
- **LED:**
  Operating voltage: 2.2VDC
  Current: 10mA
- **Photovoltaic Light sensor:**
  Operating voltage: 5v DC
  No. of pins: 3
  Output Voltage: 0 to 12V
- **LCD:**
  5 x 8 dots with cursor
  Built-in controller
  + 5V power supply
  1/16 duty cycle
- **External Battery charging Circuit:**
  Operating voltage: 12v DC
  Current Rating: 4.2Ahr
  Type: Rechargeable

2. HARDWARE DESIGN

Arduino UNO Micro controller:

•Arduino UNO is a micro-controller board based on the ATmega328P.

• Frequency (Clock speed): 16MHz

• Flash program memory: 32KB (0.5 KB is used for Boot loader)

• Operating Voltage: 5V

• Recommended Input Voltage: 7-12V

• Digital I/O pins: 14(Out of which 6 provide PWM output)

• DC Current on I/O Pins: 40mA

• DC Current on 3.3V Pin: 50mA

• SRAM: 2KB

•EEPROM: 1KB

Sensors:

[1]Piezoelectric Sound Sensor -

Piezoelectric elements as strain sensors. These sensor converts sound energy into electrical signal i.e. acts as transducer. The nature of the piezoelectric effect is closely related to the occurrence of electric dipole moments in solids. The behavior of s of the charge generated by the element as a result of the direct piezoelectric effect.

[2]Piezoelectric Pressure Sensor -

This sensor consists of a piezoelectric crystal (made from quartz) which functions as a force-sensitive voltage source where the piezoelectric will be in between two plates. Pressure exerted on the crystal surface is proportionate to the voltage produced by the crystal.

[3]Photovoltaic Light Sensor:

These sensor converts light energy into electrical. By using photovoltaic materials it converts the radiant energy directly into electrical energy.

Power supply design:

Power supply is used to drive the various components of the electronic systems. In this system we require a 5v supply for digital IC's and a 12v supply to drive the motor. For this we require two separate voltage regulator ICs which are IC 7805 for 5v and IC7812 for 12v.

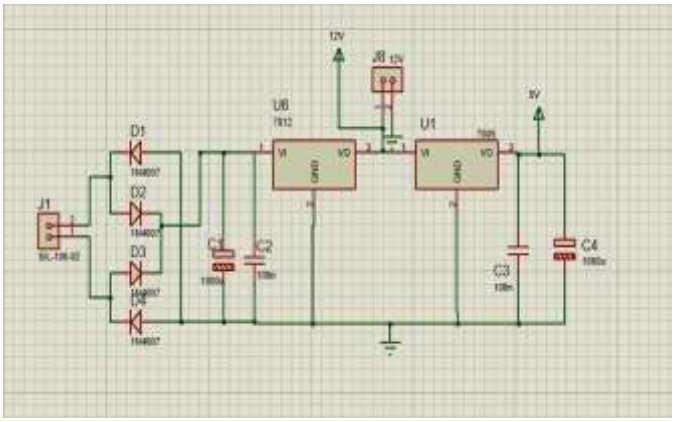
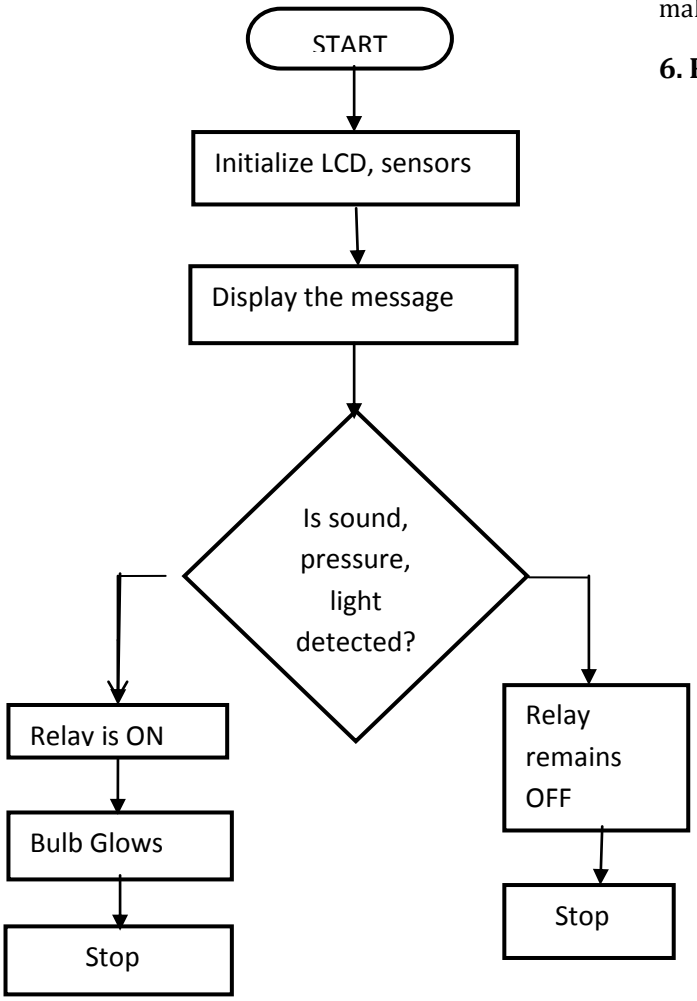


Fig: Schematic fig of power supply simulation.

3. SOFTWARE DESIGN

Flowchart:



4. RESULT AND ANALYSIS

Parameter	Input Reading	Output
1) Sound	About 150dB	12V
2) Light	For 1500 Lux	12V
3) Pressure	About 30Bar	3V

5. CONCLUSIONS:

The sound,light,pressure energy are unexplored sources which has enormous potential to meet the future growing requirements of the electricity and serve as the eco-friendly and renewable source of energy.

This technology is not only practically usable up till now due to efficiency concerns but the present work on this field makes its future quite promising.

6. REFERENCES:

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