Eco-Friendly Power Generation- A Hardware Concept

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***Abstract*— India is facing an acute energy scarcity which is hampering its industrial growth and economic progress. Setting up of new power plants is inevitably dependent on import of highly volatile fossil fuels. Thus, it is essential to tackle the energy crisis through judicious utilization of abundant renewable energy resources, such as solar energy, wind energy and geothermal energy. Apart from augmenting the energy supply, renewable resources will help India in mitigating climate change. India is heavily dependent on fossil fuels for its energy needs. Most of the power generation is carried out by coal and mineral oil-based power plants which contribute heavily to greenhouse gases emission.**

This project mainly focuses on generating a electrical energy from wind energy. The idea proposed here is a new technique to generate electrical energy from wind energy produced due to the vehicle motion in highways. Using a turbine mechanism which is easy to implement, cost effective without disturbing the current road design or even disturbing the traffic. Mechanical energy from the turbine is converted into electrical energy using dynamo. This energy is stored in the battery and used to glow and monitor the street lights.

Keywords—Turbine, Boost Amplifier, Microcontroller

I. INTRODUCTION

In this model we show that how we can generate a voltage from the busy traffic. Conversion of the mechanical energy into electrical energy is widely used concept. It's a mechanism to generate power by converting the kinetic energy generated by a vehicle into rotational energy. We have used that simple concept to the project. Turbine is connected to the dynamo. When any vehicle moves on the highway the turbine starts rotating and mechanical energy is converted into electrical energy using dynamo. Voltage generated from dynamo is rectified and amplified. In actual practice with the help of this voltage we will charge the battery and then we use this voltage to light the small bulb.

The second part of this project is an efficient use of energy by using simple electronics. Road light continuously glow whether vehicle is passing or not. A concept is introduced to avoid a waste of light. Two sensors are used between some distances. When vehicle pass through the sensors it sends the signal to the microcontroller that the vehicle is passing along that particular distance then light will glow for that particular time.

II. COMPONENTS USED

1. Turbine
2. Dynamo
3. Bridge rectifier
4. Boost amplifier
5. Microcontroller 8051
6. LCD
7. IR sensor
8. LDR
9. ADC
10. ULN2803
11. Charging circuit
12. Battery
13. LEDs, bulb

BLOCK DIAGRAM

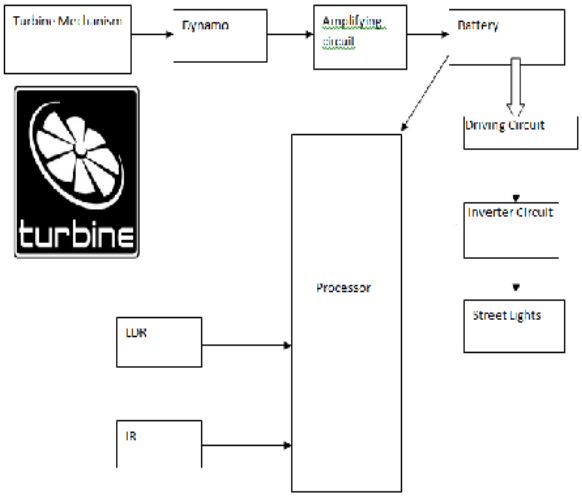

Fig.1: System Block Diagram

III. WORKING PRINCIPLE

While moving, the vehicles possess some kinetic energy and it is being wasted. This kinetic energy can be utilized to produce power by using a special arrangement . It is an Electro-Mechanical unit. It utilizes both mechanical technologies and electrical techniques for the power generation and its storage. Whenever the vehicle is allowed to pass over the road due to its

motion the turbine starts rotating and the kinetic energy is converted into mechanical energy. The turbine is connected to the dynamo which converts the mechanical energy into electrical energy. The conversion will be proportional to traffic density.

Whenever an armature rotates between the magnetic fields of south and north poles, an E.M.F (electro motive force) is induced in it. The power is generated in both the directions; to convert this voltage into one polarity and to convert ac to dc a bridge rectifier is used. This generated power is amplified and stored by using different electrical devices.

In this project IR sensors will be placed beside the roads. First IR will be placed at the beginning of the road, When the first IR sensor is sensed which indicates that vehicle has enter the street & its output is given to the controller depending upon which street lights in that road will be switched ON. Second IR will be placed at the end of the road, when is detected which indicates that vehicle is passed out of the street & its output is given to the controller depending upon which street lights will be switched OFF.

LDR is used to keep checking the sunlight .Whenever intensity of sunlight is less LDR resistance increases and street lights will be turned ON. When intensity of sunlight is more LDR resistance decreases and street lights will be turned OFF.

8051 architecture based P89V51RD2 microcontroller is used to implement this project. Microcontroller controls the whole system. It contains 1k RAM, 64k Flash, 3 Timers, 2 external interrupts, 1 UART, 32 GPIO's, ISP programming support etc. KEIL IDE is used to program the microcontroller and the coding will be done using C.

IV. METHODOLGY

Construction

This step basically comprised of constructing a wind turbine and later coupling it to a dynamo to convert the rotational energy generated by the turbine into electrical energy. The designing of the turbine was done considering various constraints such as the number of blades, the curvature of the blades

RECTIFICATION AND AMPLIFICATION

swept area, the material used, the diameter of the shaft, etc. The output shaft of the turbine was attached to a dynamo which acts as a generator taking mechanical energy as input and providing electrical energy as output.

Electrical energy(voltage) is generated in both the directions by the dynamo; to convert this voltage into one polarity and to convert ac to dc a bridge rectifier is used Voltage generated from the turbine is not sufficient to charge the battery. Therefore a boost amplifier is used to amplify the voltage. Output of the rectifier is fed to the amplifier and amplified.

CONTROLLING AND MONITORING

Microcontroller

The AT89S52 is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). The on-chip Flash allows the program memory to be reprogrammed in-system or by a Conventional nonvolatile memory programmer.

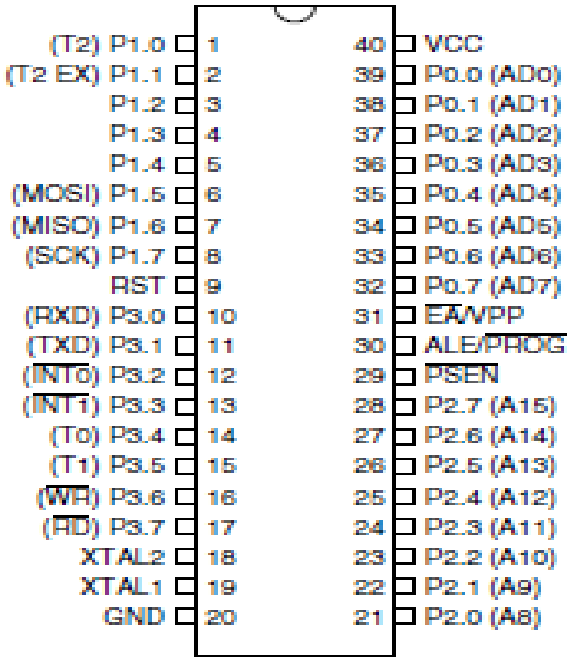

Fig. 3: pin diagram

Features

- Compatible with MCS-51™ Products
- 8K Bytes of In-System Reprogrammable Flash Memory
- Endurance: 1,000 Write/Erase Cycles
- Fully Static Operation: 0 Hz to 24 MHz
- Three-level Program Memory Lock
- 256 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Three 16-bit Timer/Counters
- Eight Interrupt Sources
- Full Duplex Serial port.
- On chip oscillator and clock circuitry.
- Low-power Idle and Power-down Modes.

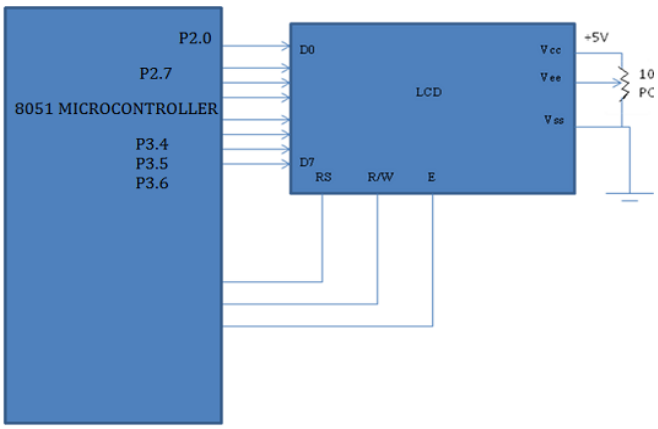

Fig. 4: Interfacing LCD with Microcontroller

Table 1:. LCD pin description

Pin	Symbol	I/O	Description
1	Vss	-	Ground
2	Vcc	-	+5V Power Supply
3	Vee	-	Power Supply to contrast
4	RS	I	RS = 0 to select command register
5	R/W	I	RS = 1 to select data register
6	EN	I/O	Enable
7 to 14	D0 to D8	I/O	8 bit data bus

Algorithm to send data to LCD

- Make R/W low.
- Make RS=0 ;if data byte is command .
- RS=1 ; if data byte is data (ASCII value).
- Place data byte on data register.
- Pulse E (HIGH to LOW).
- Repeat the steps to send another data byte.

Table. 2: LCD Command Codes

Code(HEX)	Command to LCD Instruction Register
1	Clear display screen
2	Return home
4	Decrement cursor (shift cursor to left)
6	Increment cursor (shift cursor to right)
80	Force cursor to the beginning of first line
C0	Force cursor to the beginning of second line
38	2 lines and 5x7 matrix

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