

Foot Steps based Energy System for Street Lights

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ABSTRACT

In this paper the design and development of footsteps based energy for street lights. The main aim of this paper is to generate the energy through the pressure generated by footsteps. This micro controller setup is placed at foot path when a person walking along the foot path the footsteps of the person generates some pressure and that pressure generated by the person is noted down by the pressure transducer connected to the micro controller the pressure generated at the transducer is converted into the electrical energy and that energy is stored into the battery connected to it. This energy can be used to the street light to turn it on during night times the street light can be switch on automatically without any human effort by simply setting on and off time in RTC. By using this we can develop extra energy without wasting the other resources. Lot of energy is wasted for the street lights as they don't switch off at the right time and if this project is implemented in areas where there is lot of pedestrian floating in busy areas and railway stations, power is cost effectively saved as there will be no need of separate power supply from the power stations to the street

Keywords

Pressure transducer, Relay, Comparator, Battery, Real Time Clock (RTC), Micro controller, Street light.

1. INTRODUCTION

Walking is that the commonest activity in day to day life. Once an individual walks, he loses energy to the paved surface within the sort of impact, vibration, sound etc, as a result of the transfer of his weight on to the paved surface, through foot falls on the bottom throughout each step. This energy may be tapped and regenerate within the usable type like in electrical type. The utilization of waste energy of foot power with human locomotion is implausibly abounding relevant and necessary. Man has needed and used energy at degree increasing rate for his sustenance and well-being ever since he came on the world several million years gone. With any demand for energy, man started victimization the wind for sailing ships and for driving windmills, and so the force of falling water to show water for sailing ships and for driving windmills, and also the force of falling water to indicate water wheels[1-3].

Till now, it might not be wrong to say that the sun was provision all the energy desires of man either directly or indirectly that man was exploitation alone renewable sources of energy. This technique involves variety of simple setup that place in below the walking platform. Once people walk on this platform their weight compresses the setup that rotates a generator and current created is keep in voltaic battery. To chop back the external compression, a responsive sub-flooring system is put in. And whereas the ability producing platform is over huddled with moving population, energy is created at larger levels. Larger movement of individuals will generate

further energy. This whole human energy being wasted if reaching to beware} created potential for utilization it'll be nice invention and power manufacturing platform square measure going to be really useful energy sources in huddled countries[4].

2. ARCHITECTURE

Mainly the block diagram consists of following parts:

1. Power supply circuit
2. ARM controller
3. Comparator
4. Pressure Transducer
5. RTC
6. Relay
7. LCD

Generally we tend to get 230v of power provide however we'd like solely three.3v to get the microcontroller thus before giving the ability provide on to it we'll use electrical device, electrical phenomenon filters, generators to convert 230v of power provide to the specified| quantity to provide required supply to the small controller. Here we tend to square measure the adjusting the output voltage to our needed quantity [6-7]. Here we tend to square measure mistreatment ARM7 small controller thus it needs solely three.3v thus we tend to use another module to urge three.3v provide to the ARM7.

The pressure generated by the footsteps is hold on within the pressure electrical device. The electrical device converts it into signal before it's send to the interior ADC gift within the small controller. The ADC converts signal into digital format and send to the small controller. The small controller receives the signal and stores into the battery connected to that. This hold on energy is employed at the hours of darkness times to change on the road lights. The RTC connected to the small controller will be wont to put on and off mechanically by merely setting on and off time within it.

A variable regulated power provide, conjointly known as a variable bench power provide, is one wherever you'll unendingly change the output voltage to your necessities. variable the output of the ability provide is that the suggested thanks to take a look at a project once having double checked components placement against circuit drawings and therefore the components placement guide. This sort of regulation is right for having an easy variable bench power provide. truly this can be quite necessary as a result of one in all the primary comes a amateur ought to undertake is that the construction of a variable regulated power provide. Whereas a frenzied provide is kind of handy, it's a lot of handier to possess a variable provide existing, particularly for testing. In the main

the ARM controller desires three.3 potential unit power provide. To use these components we'd like to make a regulated three.3 potential unit supply. Sometimes you begin with associate unregulated power to create a three.3 potential unit power provide, we tend to use a LM317 transformer IC (Integrated Circuit).

The hardware came upon is as shown in figure one. The voltage generated across a piezo tile is provided to a battery for it to recharge and provide the dc hundreds. Voltage generated is additionally given to associate electrical converter, from wherever it's provided to all or any the ac hundreds. A liquid crystal LCD is interfaced to the tile employing a 8051 microcontroller to display the voltage generated across the piezo tile.

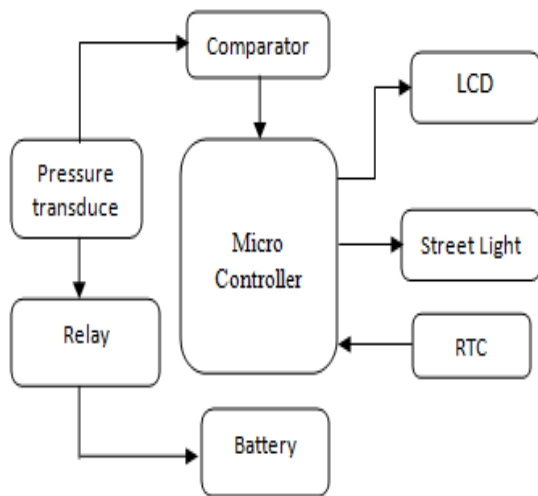


Fig 1: Architecture

Whenever the proper quantity of pressure is applied on the electricity detector plate, the fabric gets compressed i.e., the changes in dimension of the sensors produces the equivalent quantity of voltage. The voltage is hold on within the battery and it equipped to the road lights and conjointly displayed on the digital display as shown within the Fig.1.

An electricity detector could be a device that uses the piezoelectricity to live pressure, acceleration, strain or force by changing them to associate degree electrical signal. Electricity sensors are accustomed sense movement or vibrations in several applications. An electricity detector contains a crystal that is often automatically coupled to associate degree object that produces a mechanical movement. In electricity materials, associate degree applied force field leads to elongations or contractions of the fabric. Piezo ceramic actuators are so ready to convert electrical energy directly into energy and provide many blessings, like high causative resolution, high causative power and really short response times, whereas their size is little. Electricity sensors for changing slight vibrations and stress of objects underneath activity into electrical signals with the piezoelectricity of their materials realize applications in numerous fields. Electricity detectors are used as transducers as a result of a possible distinction is generated once the sensor is subject to a pressure modification. A detection system is electrically coupled to the electricity detector and senses, as an example that a vehicle has missed out the detector.

The power provide to the circuit is given through a step down electrical device that reduces the 230 Volts AC provide to 12V AC, that's reborn into rhythmical DC provide through the bridge rectifier utilized in the circuit. Currently the rhythmical DC is gone through a filter this filtered output is pure DC, this filtered output is then given to a transformer and a five Volts DC provide is obtained and accustomed power the assorted parts utilized in the circuit. This five Volts DC provide is given to fortieth pin of the Microcontroller that is VCC, ninth pin of the Microcontroller for the button, digital display section, Comparator Chip (LM 324N), Real Time Clock(DS1307). The port zero of the microcontroller is connected a pull-up electrical device and interfaced with digital display. The output from the electricity detector plate is given to the comparator chip LM 324N), this chip converts it into digital knowledge whereas it amplifies the information conjointly.

The output from the comparator is fed into the microcontroller through port a pair of.0, wherever the pin one relay is connected to VCC, pin a pair of to ground, pin three to the High intensity LED, and therefore the fourth pin to the microcontroller for change mechanism purpose, whenever the proper quantity of pressure is applied onto the detector plate, the comparator receives the signal amplifies and converts it feeds it into the microcontroller as shortly as microcontroller offers the indication the contacts in relay bit one another creating the LED to glow. The comparator is connected to the battery therefore whenever the energy is generated that's hold on within the battery. The important clock is interfaced to port2.4, 2.5 for temporal arrangement in order that the reckoning is finished in keeping with real time.

3. IMPLEMENTATION AND RESULTS

The Fig.2shows the arrangement of the “Footsteps based energy System for street lights” kit. It consists of a AT89S52 Microcontroller, LM 324N comparator chip, 7 Segment LCD Display, Piezoelectric sensors, Step down transformer, L7805 Voltage regulator, Relay, High intensity LED, Battery, and a Real Time Clock Chip(DS1307).

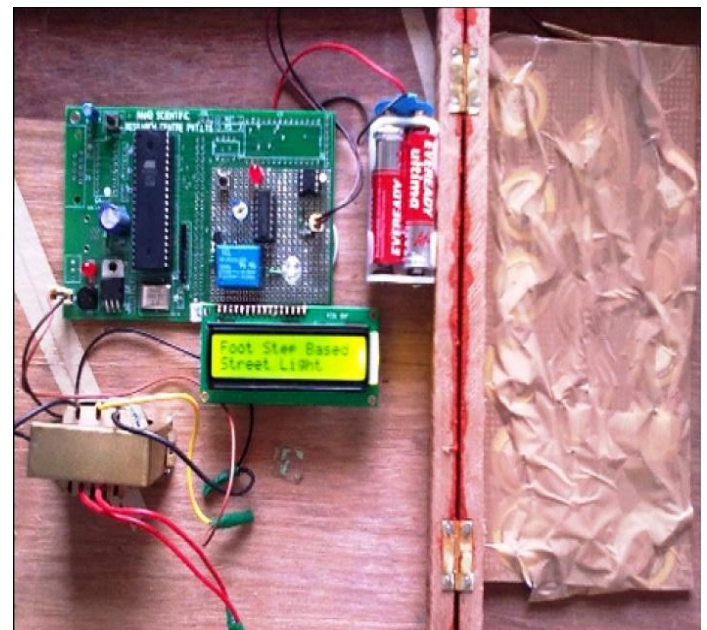


Fig.2: Project Kit

The Fig.2 shows the microcontroller and various other major parts like LCD, comparator, Relay, High intensity LED, Battery and Real Time Clock Chip(DS1307).

PIEZOELECTRIC SENSORS:

The Fig.4 shows the arrangement of the piezoelectric sensors, these are arranged six sensors in series of three sets, and these three sets in turn are connected in parallel manner.



Fig.3: Functional Kit



Fig.4: Piezoelectric Sensor Arrangement

APPLYING PRESSURE ON SENSOR PLATE:

The Fig.5 represents the person walking on the sensor plate, here we have demonstrated by the applying some amount of pressure with the palm of our hand. When the applied pressure does not generate the required energy the LED doesn't glow and it is displayed on the LCD as "STEP ENERGY INSUFFICIENT".

Whenever the right amount of pressure is applied on the piezoelectric sensor plate, the material gets compressed i.e., the changes in dimension of the sensors produces the equivalent amount of voltage.

This developed voltage is in the analog form, the microcontroller is used as switch to ON and OFF the street light hence this analog voltage is compared with comparator and amplified, converted to digital form for the microcontroller to function. Whenever required amount of energy is developed across the sensors then the contacts inside the relay gets closed and the light is switched ON and this is displayed on the LCD as "Stepped ENERGY= 4.65V".

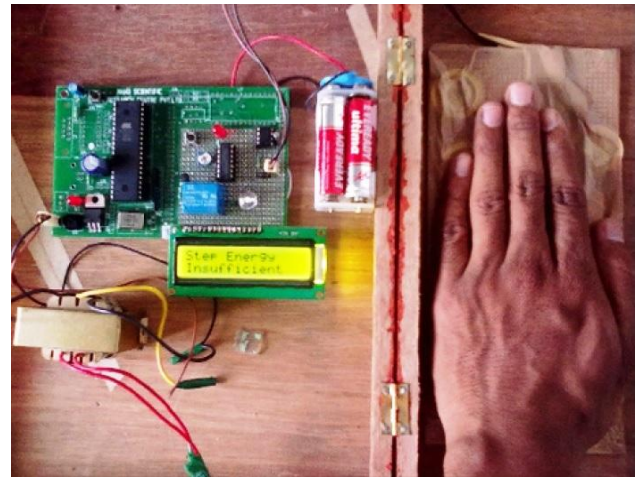


Fig.5: Applying pressure and setting time



Fig.6: Output of the project

4. CONCLUSION

The "FOOT STEPS based mostly ENERGY SYSTEM FOR STREET LIGHTS." has been with success designed and tested. It's been developed by desegregation options of all the hardware elements used. Presence of each module has been reasoned out and placed rigorously therefore contributory to the simplest operating of the unit. Secondly, mistreatment extremely advanced IC's and with the assistance of growing technology the project has been with success enforced. By using this in future we can implement a Fully Automated system, i.e. by using GPRS we can send the data to the website by real time data transmission.

5. REFERENCES

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