

# Generation & Harvesting Energy From Multiple Low-Cost Energy Generators for low Energy Consumers using Piezoelectric Technique

Manjula K, G Harshitha Reddy, Chandini S, JeevithaP, Banuprathap Reddy

**Abstract:** *In this work we are producing electrical power in a non-traditional manner through just on foot or running. Non-conventional power scheme is tremendously vital by this instance in our land. Non-traditional energy by means of walking desires no key power to produce electrical power as output which is generated with piezoelectric sensors. Man has needs and has old energy at a growing rate for his provisions and comfort ever from the time when he existed on top of the terrain a only some million years past. Owing to this a bunch of power possessions include tired and shattered. Suggestion intended for the exploitation of throw away power of foot energy with human being movement is incredibly appropriate and significant for densely peopled nations like India and China which consist mostly of transportation by means of roads, railway stations and bus stand, temples, etc. be all in excess of packed out and millions of group of people move just about the timepiece.*

**Keywords –** *Low cost energy, Light Dependant Resistor (LDR), Piezoelectric Effect, Radio Frequency Identification (RFID).*

## I INTRODUCTION

Man has desired and worn power at an upward speed intended for his nourishment and comfort increasingly while he came on the terrain a few million living past. Ancient man requisite power first and foremost in the form of food. He resulting this by consumption of plants otherwise animals, which he sought. Later he exposed flames and power requirements enlarged since he on track to compose employ of timber and supplementary bio mass to afford the energy necessities for cuisine as well as for charge he tepid. By means of the route of instance, man in progress to develop territory for cultivation. He supplementary a original aspect to the exploit of energy through domesticate and preparation natural world to labor for him. With added demand for energy, man began to utilize the wind for marine ships and for driving windmills, and the power of falling water to revolve water for sailing ships and for driving windmills, and the force of falling water to turn water wheels.

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**Manjula K,** Assistant Professor, Dept of TCE, SJCIT, Chickaballapur, India.

**G Harshitha Reddy,** UG Student, Dept of TCE, SJCIT, Chickaballapur, India.

**Chandini S,** U G Student, Dept of TCE, SJCIT, Chickaballapur, India.

**Jeevitha P,** U G Student, Dept of TCE, SJCIT, Chickaballapur, India.

**Banuprathap Reddy,** Assistant Professor, Dept of TCE, SJCIT, Chickaballapur, India.

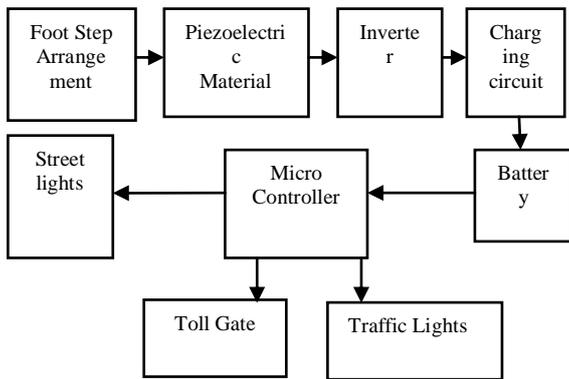
Till this time, it would not be wrong to say that the sun was supplying all the energy needs of man either in a straight line or ultimately in addition to it man be by means of simply renewable inputs of power. Piezoelectric consequence is revealed by precise resources having the capability to construct an electrical arraign as of force and pull functional to them. Numerous investigators are tiresome to expand scheme to produce energy as of diverse piezoelectric resources. Yun et al. proved the likelihood of power generation from pressure as of lead complimentary substance LiNbO<sub>3</sub> crystalline [3]. Piezoelectric BaTiO<sub>3</sub> lean layer has to be practical to change motorized power to electric liveliness [2]. A arrangement was well thought-out regarding occurrence adaptation in KNbO<sub>3</sub> by Hohlaet .al [4]. Dakualet. al planned a scheme to create piezo control production by means of ZnO. Gupta et. al projected electrical energy production owing to quivering of affecting motor vehicles by means of pressure to electric outcome [7]. Investigators are presently demanding to build up routine road luminosity arrangement with non predictable inputs of power. A manage arrangement considered for Auto lane luminosity by means of LDR. RohaidaHusinet. al proposed routine street illumination arrangement located on low down price microcontroller [6].

In this employment, the deployed arrangement is competent while the stipulation to get better the effectiveness. By rising the numeral of piezo palates, competence and generation of power together augmented that symbolizes the elasticity to expand street light scheme without man interference by means of nontraditional inputs of energy.

## II. METHODOLOGY

The electricity by pressure effect has particular chattels that present in a lot of solitary crystalline resources. Sugar cane, Quartz, Rochelle salt, topaz, tourmaline, AIPO<sub>4</sub>, tendon, silk, enamel, bone, dentin, BaTiO<sub>3</sub>, PbTiO<sub>3</sub>, KNbO<sub>3</sub>, LiNbO<sub>3</sub>, PZT. When force is practical on piezoelectric materials that strength is rehabilitated to Electrical power is worn to force Direct Current loads. An inverter converts the DC current into AC at known voltage. The AC power is stored in the battery. The power which is generated is used in applications such as street lights, toll gates, traffic lights

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**Fig 1:** Block Diagram for generation of power and its applications

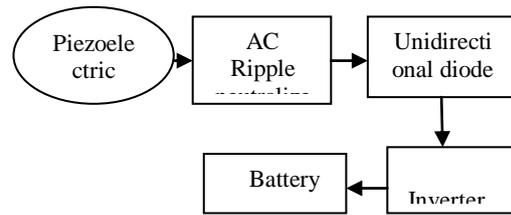
### III. SYSTEM DESIGN

The piezoelectric substance transforms the weight functional to this keen on electrical liveliness. Foundation of weight be capable of be whichever starting the pressure of poignant vehicles otherwise starting the heaviness of the populace on foot above it. The production of the piezoelectric substance is not stable. Hence a overpass path is worn to adapt this uneven potential addicted to a linear one. Yet again an Alternating current flow pass through a filter is worn to strain out any additional fluctuations in the output. The output dc potential is afterward saved in a recreate battery. As the power output from a single piezoelectric sensor is tremendously low, blend of few piezoelectric sensor is situate together. Two possible connections were experienced - parallel and series connections.



**Figure 2:** Arrangement of Piezoelectric sensors

The parallel association do not show noteworthy enlarge in the electrical energy output. With series connection, supplementary piezo-electric sensors resulted in augment of output voltage but not in linear proportion. As a result at this juncture is a arrangement of together parallel and cascade connection as shown in figure 2 which is in use for producing stable output voltage with high current density.



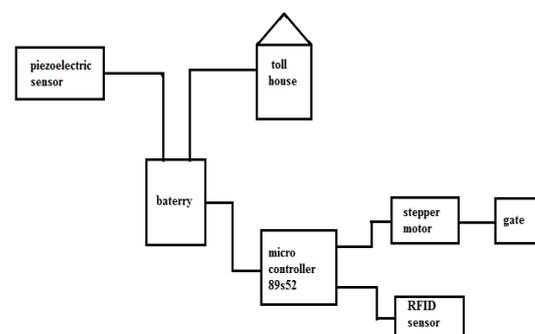
**Fig3:** Functioning and storage of power using piezoelectric sensors

The above block diagram shows the adaptation of mechanical stress keen on electrical energy in the most important step. AC ripple neutralizer basis the ac voltage and is as well used to defend high rating components like AC from spoil. Unidirectional diode facilitates the current flow in one direction. The voltage which is originating from the diode is sent to the inverter. An inverter converts the DC current into AC at specified voltage. The AC power is stored within the battery.

### IV. APPLICATIONS OF POWER GENERATED VIA PIEZOELECTRIC SENSORS

#### A. Automated toll collection system by means of RFID

Automatic toll Collection System is one of the applications that employ power that is stored in battery which is generated by piezoelectric sensors as shown in figure 4. As shortly as power is functional to the system, Micro controller I/O pins, Timer and UART get initialized. Each vehicle is supposed to contain RFID card with pre loaded balance. Once vehicle passes the toll, RFID reader reads the data from the Tag and deducts the balance. In a few cases when card does not have adequate balance LCD will display low balance, at this time emergency switch is provided for physical operation of gate following collecting money. The power required for all the applications will be generated by piezoelectric materials placed in respective places of applications areas.



**Figure 4:** Toll Collector Booth Architecture

In each RFID organization, the electrical device badges enclose data. This database capable of as modest as a solo binary bit or subsist a huge collection of bits on behalf of such effects at the same time as an individuality cipher, individual medicinal information, or accurately whichever kind of information with the aim of be able to be saved in digital data binary set-up.

### B. Smart involuntary street light manage system by high sensitivity LDR

This Application works on the foundation of LDR sensor Input to the controller as shown in fig 5. To turn ON the light we are using power supply from battery that is charged using piezoelectric sensors. The main essential of LDR is needy on photoconductivity. When light cataract on LDR, then the resistance decreases where street lights are twisted off. It is conflicting during the night, the controller turns on light as resistance increases.

### C. Design of intelligent traffic light controller

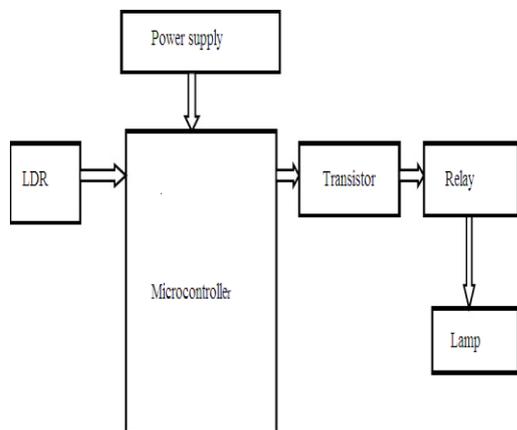


Fig 5: Automatic Street Light

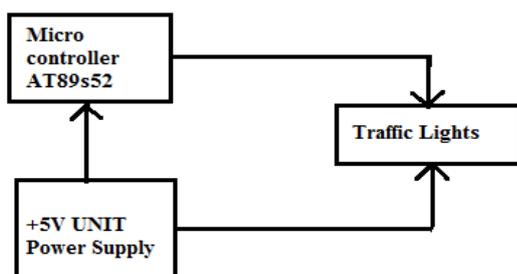


Fig 6: Automatic Traffic Lights

The power generated by piezoelectric sensor is furthermore used in traffic lights. As soon as we connect power supply to the system, controller starts timer. As for every pre defined time, controller changes to RED, GREEN or YELLOW signals. In this work the passage lights at a street intersection are positioned to function by means of a red stage of length 30 second, green stage of distance end to end 30 seconds and yellow phase of length 5 seconds using micro controller. Let us consider 2 roads as A and B. While the illumination turns to green at road A the vehicles in line up depart at a speed of one each subsequent second. While that time the light turns on red at road B, during that time the vehicle in the queue will not make a move. For next 30 seconds the working of traffic

lights at road A and B will be reversed, previous to that the yellow lights turn on for a 5 seconds at both roads during that time the vehicles at road A will be stop moving and vehicles at road B will be start moving. This process goes on for next seconds. Micro controller automatically controls the working of lights by means of power generated by foot step which is stored in a battery.

## IV. RESULTS AND DISCUSSION

In the carried out work a new source for generating of electricity is explored with the following results.

- The power produced all the way through piezoelectricity is relative to the mass applied on the piezoelectric sheet.
- For producing 0.325Ahr power, practically 1000 steps are essential.
- To charge a 12V battery entirely, 4 to 5 days are required.
- Expenditures to implement and maintain this electricity generation way is negligible because there is no special fuel is necessary like other power generating stations.
- There is no pollution with this power generating method as compared to other power generating technologies; hence it is eco- friendly in nature.
- Unexploited Mechanical energy related with footsteps is worn for production of electricity.

## V. CONCLUSION

The work carried out is a supply of recreated energy and power creation, by means of this skill which is not merely ecological gracious but in addition hygienic, price effectual and secure. Sustainable progress is probable by utilizing this knowledge. It evidently deals two harms that earth is in front of these days, reduction of energy and clearance of luminous lights can be dealed extremely competently by this arrangement. This method can be adapted for supplying power to street lights, traffic signals, tollgates and various other places by making use of foot movement of people and vehicles as well to reduce the use of external energy like carbon emission produced by coal to produce energy.

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### AUTHORS PROFILE



**Manjula K** working asAssistant Professor in the Dept of TCE, SJCIT, Chickaballapur, completed M.Tech in VLSI and doing research in the field of signal processing at VTU.



**G. Harshitha Reddy**, 4<sup>th</sup> year UG Student, Dept of TCE, SJCIT, Chickaballapur, India.



**Chandini S**,4<sup>th</sup> year UG Student, Dept of TCE, SJCIT, Chickaballapur, India.



**Jeevitha P**, 4<sup>th</sup> year UG Student, Dept of TCE, SJCIT, Chickaballapur, India.



**Banuprathap Reddy**, Assistant Professor, Dept of TCE, SJCIT, Chickaballapur, India.