

TREADMILL BASED HUMAN POWER ELECTRICITY GENERATOR

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ABSTRACT

The current world is facing the challenge with global energy. Scenario of rising energy demand and strong dependency on a untenable fossil fuels. Parallel issue is the hostile health and demographic indication of adult corpulent. We can check some features in our observation to conserve energy. In this Project the tread mill is based on a manual flatbed tread mill which uses the Dynamo motor to a front axle flywheel. The rechargeable battery was used to store the produced energy and extra components to estimate the produced power were comprised. The LED's were runned and various electrical instruments were used in the project. The practicable implementation of this concept comprises of energy conserving instruments in gym, inexpensive, easy to operate and user friendly solution for developing nations and as a tool to educate energy conservation. In this project we use proteus tool to simulate the circuit. It is simple to use because of the GUI interface that is almost similar to the real prototype board. This paper gives an overview of the simulation and the features achieved.

Keywords: Energy Consumption, Treadmill, Dynamo Motor, Battery, Electrical Instruments, Proteus.

I. INTRODUCTION

The world's energy consumption is an all time excessive with the demand continuously increasing. this example brings up numerous challenges that want to be addressed, Depletion due to finite availability of non-renewable energy assets, e.g. fossil fuels Environmental pollutants, e.g. with coal use in electricity plants increasing populace, especially in developing countries which lack sources for easy energy international warming with the related climate changes and destructive implications Powering new technological programs, e.g. ultra portable electronics, Wi-Fi sensor nodes, and many others. Those challenges were reason for a lot controversy in the evolved global; but, latest investigations have also shown a much more fundamental venture of availability within the less developed components of the area. most people do exercise worldwide. Exceptional sorts of machines are used for workout. Many exercising machines are operated manually. In manual exercise machines muscle strength is going waste at some stage in exercise. The energy which otherwise is going waste throughout exercising can be used by converting it into every other shape of power. With the technological advancement worldwide, call for of power is constantly increasing. The energy era is also increasing and maximum of the power generation plants are the use of fossil fuels which carry up many negative consequences that are as beneath:

- (i) The available amount of fossil gas is constant and there depletion of their to be had quantity and they'll be exhausted at someday or other.
- (ii) The fossil fuels are burnt to produce strength resulting environmental pollutants and climate trade.
- (iii) Worldwide warming is going on due to weather alternate.

In view of the above records there's a want of alternative methods of power era. Inventions are taking place global for generating power through opportunity techniques. The majority do exercise international. The power may be produced through the usage of guide workout machines included with power generators. On this manner manual energy may be used to generate energy throughout exercising and we can overcome the above stated issues up to some extent. Exclusive forms of workout machines are used for exercising. In traditional manual treadmill human effort is going waste at some point of the workout. It has designed a treadmill incorporated with a power Generator wherein Generator is coupled with curler flywheel through a v-belt force machine. The leg strength is used in this system to generate the power for the duration of exercising and this generated strength can be used to price the battery.

II. METHODOLOGY

The block diagram comprising of the different components of the presented system for Tread mill based human power electricity generator represented as shown in Fig.1

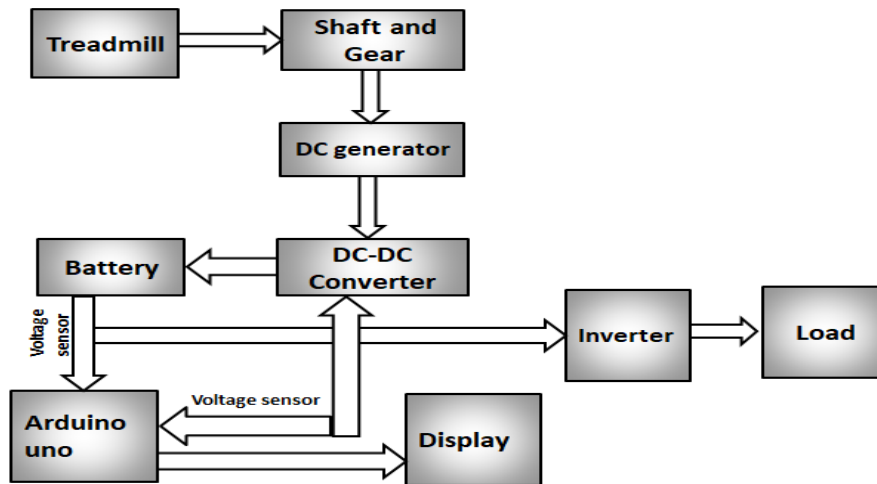


Fig. 2.1: Proposed block diagram

The bicycle generator is small and a low torque is needed to rotate its rotor. Here with inside the treadmill, in preference to the use of one unmarried huge generator some of small mills is used, that are electrically parallel related and routinely curler coupled. In a treadmill, the belt actions on a few cylindrical forms of rollers and people rollers are surrounded with the aid of using the belt in each top and decrease sides. Each be part of side (left and right) of the curler is routinely coupled with the rotor of a small DC generator such that because the curler rotates, the rotor additionally begins off evolved to rotate.

III. MODELING AND ANALYSIS

To meet all the objectives, Major tools this project make use of are:

- a) Arduino Uno
- b) LCD
- c) LED
- d) DC Motor
- e) Current Sensor
- f) Voltage Divider
- g) Series Battery Wiring

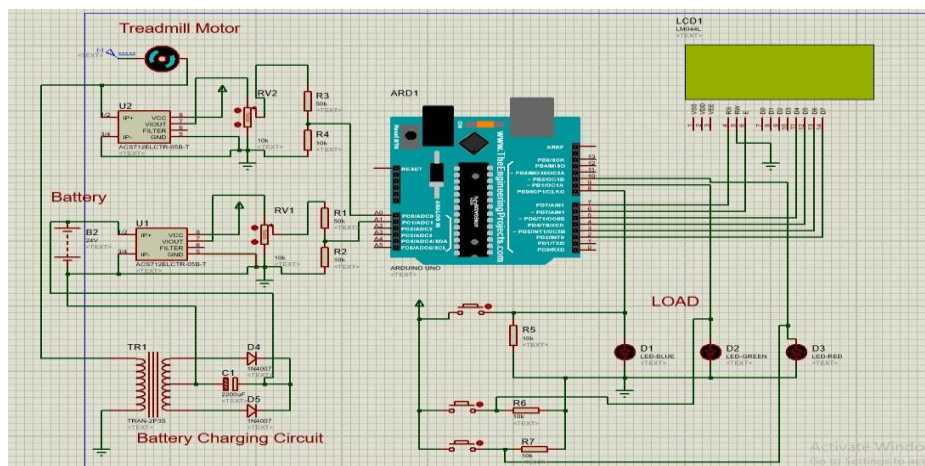


Figure. 3.1 Circuit Diagram

Arduino Uno

Arduino Uno is a microcontroller board primarily based totally on 8-bit ATmega328P microcontroller. Along with ATmega328P, it is composed different additives together with crystal oscillator, serial communication, voltage regulator, etc. to help the microcontroller. Arduino Uno has 14 virtual enter/output pins (out of which 6 may be used as PWM outputs), 6 analog enter pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

LCD

LCD modules are very usually utilized in maximum embedded projects, the motive being its reasonably-priced price, availability and programmer friendly. Most folks could have come upon those presentations in our each day life, both at PCO's or calculators. The look and the pin outs have already been visualized above now allow us to get a piece technical. 20x4 LCD is called so because; it has 20 Columns and four Rows. There are a whole lot of combos to be had like, eightx1, eightx2, 10x2, sixteenx1, 16x2, etc.. So, it'll have (20xfour=eighty) eighty characters in general and every man or woman might be product of 5x7 Pixel Dots. We recognize that every man or woman has (5x7=35) 35 Pixels and for 32 Characters we can have (eightyx35) 2800 Pixels. Further, the LCD ought to additionally be advised approximately the Position of the Pixels. Hence it'll be a busy venture to deal with the entirety with the assist of MCU, for this reason an Interface IC like HD44780 is used, that's set up at the bottom of the LCD Module itself. A unmarried HD44780 is capable of show strains of eight characters every. If we need greater, the HD44780 needs to be extended with one or greater enlargement chips, just like the HD44100 (2 x eight characters enlargement) or the HD66100 (2 x sixteen characters enlargement). The characteristic of this IC is to get the Commands and Data from the MCU and procedure them to show significant statistics onto our LCD Screen. If you're a sophisticated programmer and would love to create your very own library for interfacing your Microcontroller with this LCD module then you need to recognize the HD44780 IC is working.

LED

An LED is a two-lead semiconductor mild source, which emits lighting while activated. When the perfect voltage is implemented to the LED terminal, then the electrons are capable of recombine with the electron holes in the tool and launch electricity with inside the shape of photons. This impact is called electroluminescence. The shadeation of the LED is decided with the aid of using the electricity band hole of the semiconductor.

DC Motor

DC Motors convert electric energy (voltage or strength source) to mechanical energy (produce rotational motion). They run on direct contemporary. The Dc motor works at the precept of Lorentz pressure which states that once a twine sporting contemporary is located in a location having magnetic field, than the twine reports a pressure. This Lorentz pressure affords a torque to the coil to rotate a direct contemporary, or DC, motor is the maximum not unusual place kind of motor. DC automobiles typically have simply leads, one wonderful and one negative. If you join those leads immediately to a battery, the motor will rotate. If you turn the leads, the motor will rotate with inside the contrary path. To manage the path of the spin of DC motor, without converting the manner that the leads are linked, you could use a circuit known as an H-Bridge. An H bridge is an digital circuit that could power the motor in each directions. H-bridges are used in lots of specific applications, one of the maximum not unusual places being to govern automobiles in robots. It is known as an H-bridge as it makes use of 4 transistors linked in any such manner that the schematic diagram looks as if an "H."

Current Sensor

The ACS712 Module makes use of the well-known ACS712 IC to degree modern-day the use of the Hall Effect principle. The module receives its call from the IC (ACS712) used with inside the module, so for you very last merchandise use the IC at once rather than the module. These ACS712 module can degree modern-day AC or DC modern-day ranging from +5A to -5A, +20A to -20A and +30A to -30A. You ought to pick out the proper variety on your undertaking because you need to change off accuracy for better variety modules. This modules outputs Analog voltage (0-5V) primarily based totally at the modern-day flowing thru the wire; subsequently it's far very smooth to interface this module with any microcontroller.

Voltage Divider

Voltage Divider is a easy and really beneficial module that makes use of a capacity divider to lessen any enter voltage through a component of 5. This permits us to apply the Analog enter pin of a microcontroller to reveal voltages better than it able to sensing.

Series Battery Wiring

To raise the voltage, you have to join batteries in collection even as keeping the equal amperage rating (recognized popularly as amp hours). For instance, you may be part of 12-volt batteries in collection to create 24 volts; however the normal amp hours continue to be the equal. Jumper twine is wanted to attach batteries in

a collection. Take the poor terminal and the high-quality terminal of the primary and 2d batteries respectively and join them through a jumper twine. Now, hyperlink the poor and high-quality terminals through any other cable set on your application. When connecting the batteries, don't move the alternative open terminals with each. This can reason a short-circuit, causing harm and damage to the ones gift on the scene. Ensure that the related batteries are identical, having the equal capability and voltage rating. Or else, you could run into charging troubles or lessen your battery lifestyles permanently.

IV. RESULTS AND DISCUSSION

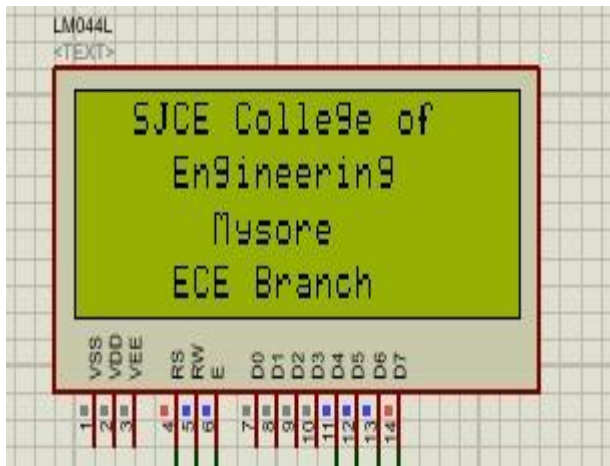


Fig. 4.1(a)

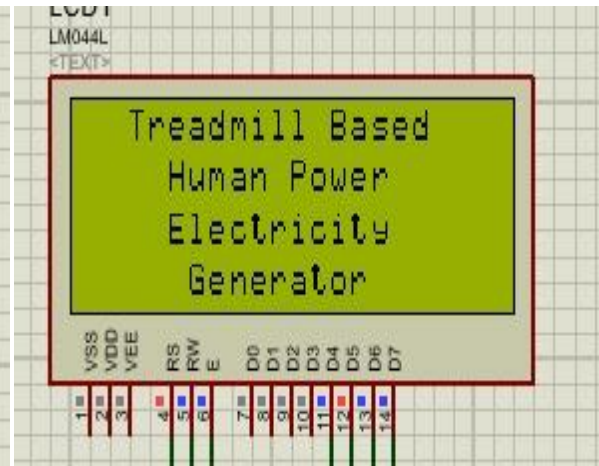


Fig. 4.1(b)

1) Fig 4.1 (a), (b) shows the initial display on LCD screen for few seconds.

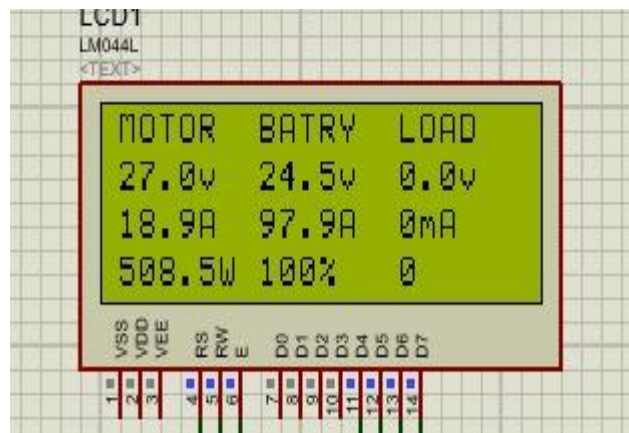


Fig. 4.2(a)

2) Fig 4.2(a) shows the values of voltage, current, power , battery percentage and load connection in motor, battery and load.

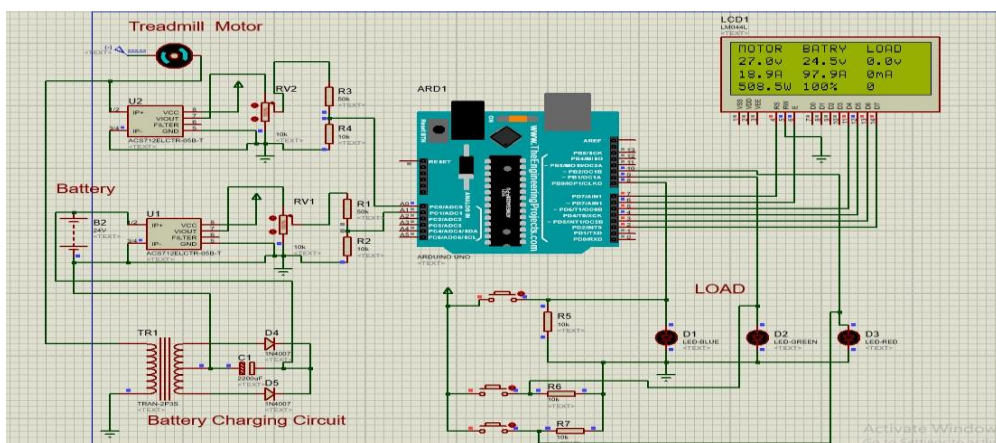


Fig. 4.3(a)

3) Fig 4.3(a) displays the motor output, Battery percentage level 100%, Number of Load connections is zero.

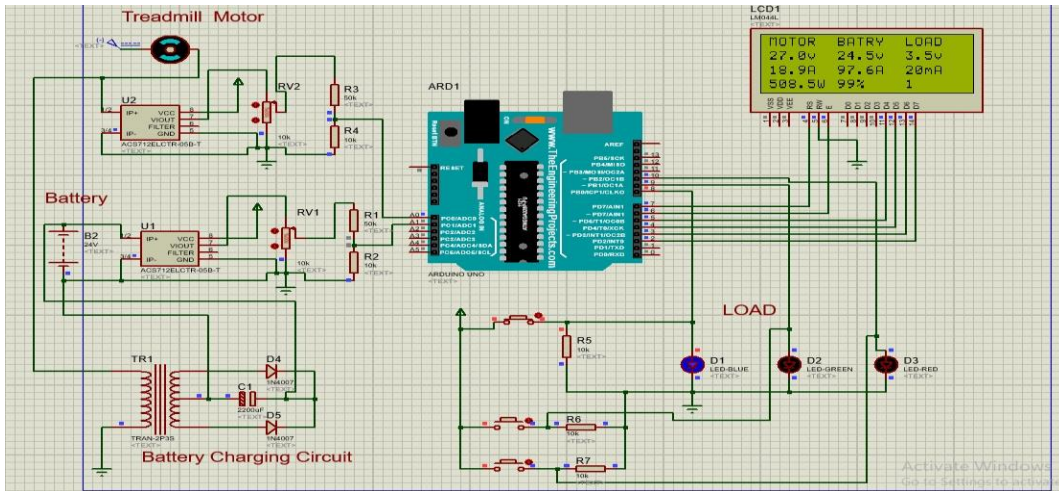


Fig. 4.3(b)

3) Fig 4.3(b) displays the motor output, Battery percentage level 99%, Number of Load connections is one.

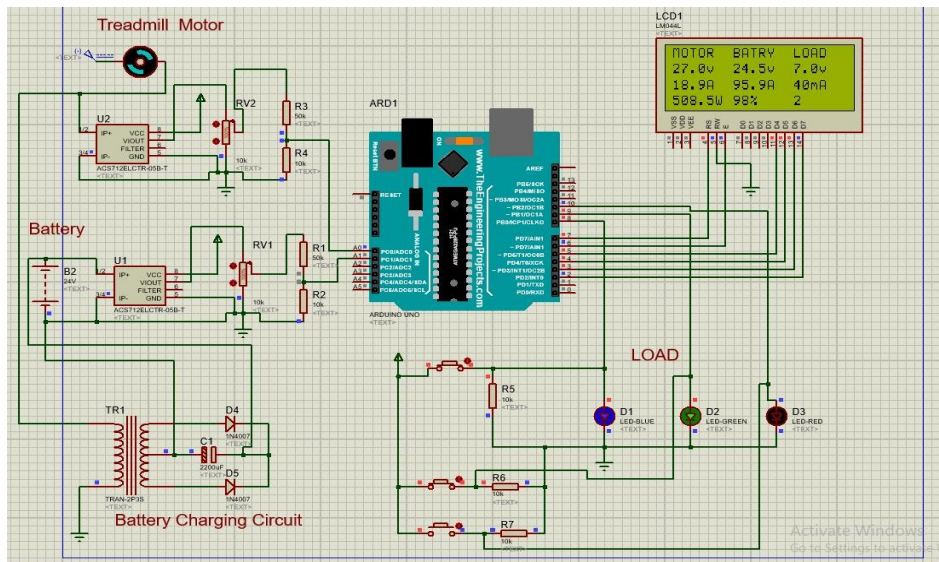


Fig. 4.3(c)

3) Fig 4.3(c) displays the motor output, Battery percentage level 98%, Number of Load connections is two.

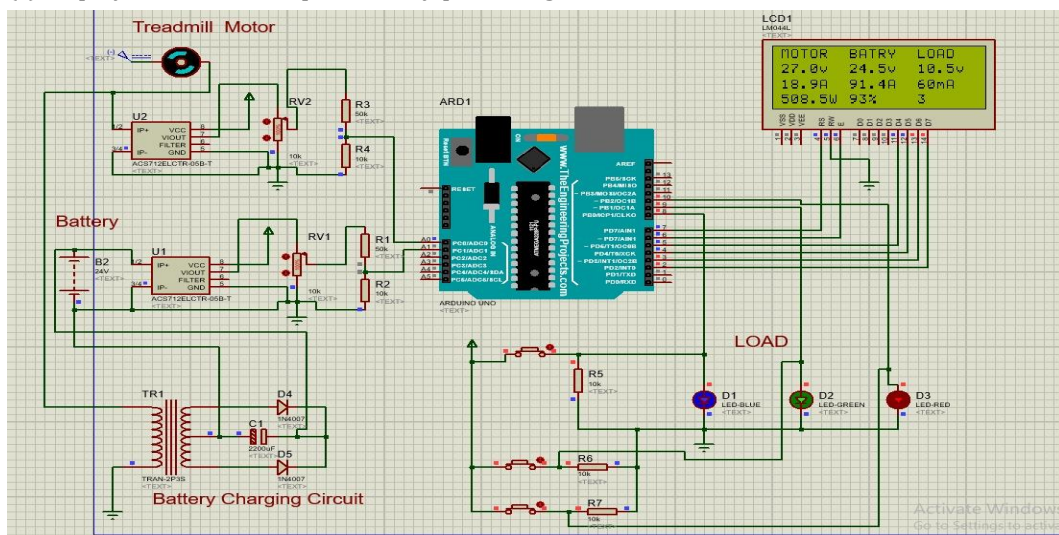


Fig. 4.3(d)

3) Fig 4.3(d) displays the motor output, Battery percentage level 93%, Number of Load connections is three.

V. CONCLUSION

A treadmill based human power generator is developed which utilizes a battery charging circuit to convert ac power to dc power which can be stored and used. LCD indicator gives us a accurate display of the power readings. Overall, Treadmill based power generators are highly useful in various areas. The help reduce overall consumption of electricity and also encourages mankind to stay healthy. In gymnasium environments where most of the equipments run on electricity, human power treadmill generator could be used to drastically reduce the consumption of electricity. This can also be implemented in rural areas to produce electricity. Moreover, installation of the system is low cost, easy to implement, simple to operate and low maintenance. This method of human power generation also helps mitigate the issue of obesity and overweight as it encourages people to stay more physically active by exercising on the treadmill. It also emphasizes on the importance of energy conservation and reuse.

VI. REFERENCES

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