DESIGN OF ELECTRIC BICYCLE WITH SPEED CONTROLLING MECHANISM

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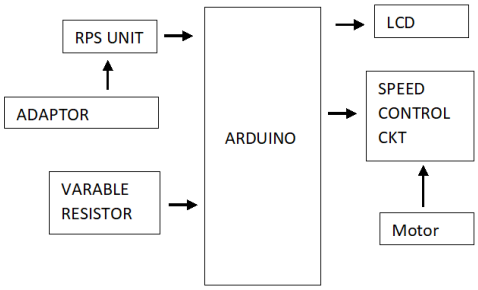
Abstract – The primary goal of this research is to provide an accurate picture by examining the many energy sources that are accessible to humans. For humans to survive in the sophisticated, developed society we live in today, travel is vital. And in order to do this, he has to go as quickly and as little as possible. This project describes an electric bike that operates on a battery, giving the motor electricity. The goal of this project is to design and build an electric bike that uses solar energy, if possible, by connecting solar panels, in addition to electric energy as its main source.It also emphasises the bike's design features. The option to connect the battery to a charger in order to charge it is included. The produced and used electrical power Riding a bike may result in improved performance, less pollution, and greater fuel efficiency than driving a conventional car. A bike may operate more smoothly and with less weight when the engine is removed. A bike can also become even lighter by having unneeded, superfluous pieces removed.It has a maximum speed of 15–25 km/h.according to the estimates.To improve the eco-friendly bike's performance, energy consumption, minimal maintenance, and battery chargeability.

Block Diagram:



I. INTRODUCTION

A bicycle having an inbuilt electric motor that may be utilised for propulsion is called an electric bicycle, often referred to as an e-bike or booster bike.E-bikes come in a broad range of styles and varieties, ranging from those with a little engine to support the rider's pedal force to more powerful models that behave more like mopeds.Rechargeable batteries power e-bikes, with lighter models reaching speeds of up to 25 to 32 km/h (16 to 20 mph) according to local regulations in the countries where they are marketed. Although the more powerful models may often reach speeds of above 45 km/h (28 mph).Because natural gas, diesel and petrol supplies are running out quickly, one of the biggest issues facing the globe today is the energy crisis. Together This is a worrying news since environmental degradation is another aspect that is leading to the depletion of resources. Our invention offers a solution to the dangerous issues mentioned above. The electric bike is the system that we invented.This initiative helps the team members as well as external parties, raising awareness of the advantages of adopting other forms of transportation.The typical form of transportation for a short journey inside the city is the electric bike, which runs on a battery that is generated by the motor.

The electric bike is a bicycle that is powered by an electric motor connected to a battery. The world's biggest worry nowadays is the energy problem since natural gas, diesel and petrol are running out so quickly. Furthermore, and this is a concerning announcement, environmental degradation is another element adding to the depletion of resources [1]. In India, the cost of fuel and diesel has been steadily increasing due to increased demand.

As a result, everyone in our society—especially in India—needs a solution. People began looking for alternative energy sources for transportation since it is important. The Indian society needed a way to meet its demands, and electric cars provided it. Electric bikes are two-wheeled vehicles that get their fuel from electricity. As a consequence, electric bikes have a large speed range, are electrically powered, and produce no noise or pollution. The speed and functioning are controlled by the battery. Fuel cells and gasoline-electric hybrids could be used to increase the range of electric bikes and boost production, but in some areas we should completely ban these gasoline-powered vehicles because they seriously damage the environment and are also in the process of developing, which will increase the effectiveness of the electric drive system. Using electric bikes has shown to be an effective way to significantly reduce pollution. Since the quality of e-bikes needs to be improved in order to increase sales, the current study's electric bikes are built with a frame that is lighter than that of traditional bikes.

OBJECTIVE

A bike that is powered by a battery connected to an electric motor is known as an electric bike. It operates on the idea that electrical energy from a D.C. battery is transferred to a D.C. motor's electromotive force.

PROPOSED SYSTEM

The shortcomings of the current approach, which is used to identify problematic tracks, are addressed by the suggested solution. Our suggested approach makes use of an Arduino UNO board. The open source Arduino integrated development environment made coding much simpler. The motor is controlled by the esc in the suggested arrangement. DC motors are driven by motor driver L293D.

II. LITERATURE SURVEY

Design and analysis of Hub Dynamo for Electric Vehicle, Manoj K. Jadhav, ICACCT 2018

The goal of this study is to construct a permanent magnet hub generator with variable speed. This dynamo may be used to power a drive hub while an e-bike is in motion. A hub dynamo has a rotating hub axel and a rotatable hub housing. The hub's axel is surrounded by bearings. With a coil fastened to the hub axel and output wires linked to the magnet, this hub dynamo may operate a generator. This dynamo gives us electricity by spinning at the same speed as the e-bike. We use the energy to charge the batteries on our e-bikes. Consequently, we will be able to make improvements.

Design of a Free Energy Generator using Gravity Wheel & Dynamo, M.Tanveer Riaz, and ICECE 2021

This study aims to give an analysis and design of a free software system. The configuration of the flywheel and gravity wheel energy generators. This study offers a way to generate energy. The reason it's termed "free" is because, if certain requirements are met, we are not required to pay anything. The dynamo is powered by the energy that is wasted due to friction. the production of free energy, which the system will run on. Additional electrical equipment includes a single-phase electric motor. It drives the belt and the mechanical components of the pulley drive, which turns the shaft around which the wheel is mounted. This design's amazing mechanism makes it possible to generate more significant electrical power. The use of a flywheel is employed to achieve this. To produce free energy, the rigging train is attached to the flywheel. The results of the design testing demonstrate that this vitality alternative is suitable and independent of the weather.

Design and implementation of an accurate real-time GPS tracking system, Abdallah Dafallah, IEEE-2014

This article discusses an accurate and reliable real-time tracking system that makes use of the global positioning system (GPS) and the worldwide system for mobile communication (GSM). The technology gets the position of a device and sends it to the website. The Google Maps API is used to display the map on the

website whenever the GPS data from the device is sent to a JavaScript file.

III. DESIGN OF HARDWARE

This chapter provides a quick explanation of the hardware. It goes into great depth about each module's circuit diagram.

ARDUINO UNO

A microcontroller board based on the ATmega328 is called the Arduino Uno (datasheet). It has a 16 MHz ceramic resonator, 6 analogue inputs, 14 digital input/output pins (six of which may be used as PWM outputs), a USB port, a power connector, an ICSP header, and a reset button. It comes with everything required to support the microcontroller; all you need to do is power it with a battery or an AC-to-DC converter or connect it to a computer via a USB connection to get going.The FTDI USB-to-serial driver chip is not used by the Uno, setting it apart from all previous boards. As an alternative, it has the Atmega16U2 (or Atmega8U2 up to version R2) configured as a serial-to-USB converter. The 8U2 HWB line on the Uno board is pulled to ground by a resistor, which facilitates DFU mode entry. The Arduino board now includes the following updates:

• 1.0 pin out: two further new pins, the IOREF, are positioned next to the RESET pin, the SDA and SCL pins that were introduced, and they enable the shields to adjust to the voltage supplied by the board. Shields will eventually work with both the Arduino Due, which runs on 3.3V, and the boards that utilise the AVR, which runs on 5V. The second pin is unconnected and set aside for future uses.

• A more robust RESET circuit.

• The 8U2 is replaced with an ATMega 16U2.

"Uno" is an Italian word for one, and it was chosen to commemorate the impending introduction of Arduino 1.0. Going future, the Arduino reference versions will be the Uno and version 1.0. The Uno is the most recent in a line of USB Arduino boards and the platform's standard model; see the index of Arduino boards for a comparison with earlier iterations.

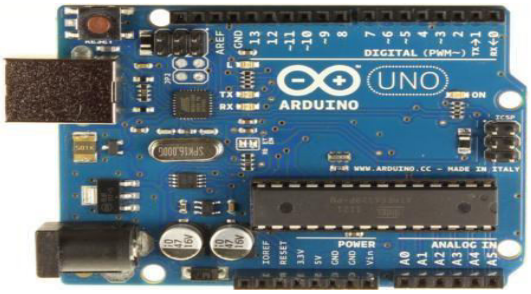


Fig: ARDUINO UNO

POWER SUPPLY:

The purpose of the power supplies is to convert the high voltage AC mains energy into a low voltage supply that is appropriate for use in electronic circuits and other devices. One may disassemble a power supply into a number of blocks, each of which carries out a specific task. "Regulated D.C. Power Supply" refers to a d.c. power supply that keeps the output voltage constant regardless of differences in the a.c. main or the load.

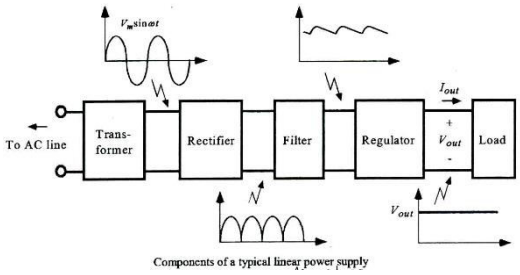


Fig: Block Diagram of Power Supply

LCD DISPLAY

The model shown here is the one that is most often utilised in practice due to its cheap cost and enormous potential. Its HD44780 microcontroller (Hitachi) platform allows it to display messages in two lines of sixteen characters each. All of the alphabets, Greek letters, punctuation, mathematical symbols, etc., are shown. Furthermore, it is possible to show custom symbols created by the user. Some important features are the

automatic changing of the message on the display (shift left and right), the presence of the pointer, the lighting, etc.

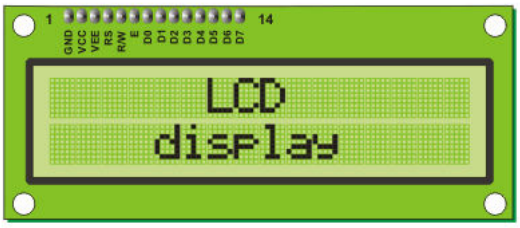
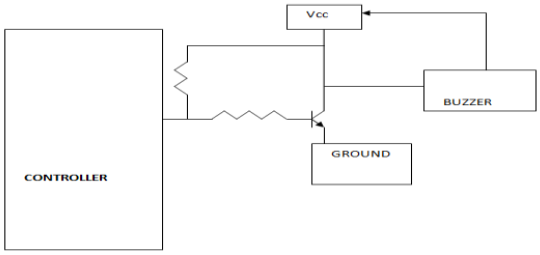


Fig: LCD

BUZZER

Relays, buzzer circuits, and other circuits cannot be driven by the current available on digital systems and microcontroller pins. The microcontroller pin can provide a maximum of 1-2 milliamps of current, even though these circuits need around 10 milliamps to work. Because of this, a driver—such as a power transistor—is positioned between the buzzer circuit and microcontroller.



BATTERY

Lithium-ion, or Li-ion, batteries are a kind of rechargeable battery that stores energy by the reversible reduction of lithium ions. It is the most common form of battery used in electric cars and portable consumer gadgets. In addition, it finds extensive use in military and aerospace applications as well as grid-scale energy storage. Li-ion batteries feature high energy densities, minimal self-discharge, and negligible memory effect as compared to other rechargeable battery technologies (however a minor memory effect claimed in LFP cells has been attributed to badly produced cells).[9]

There are differences in the chemistry, performance, cost, and safety of different kinds of lithium-ion batteries. Intercalation compounds are the active ingredients found in the majority of commercial Li-ion cells. Graphite is often used as the anode, or negative electrode, while silicon-carbon is now being utilised more and more. It is possible to produce cells with an emphasis on power density or energy density.[10] The most common battery types used in handheld devices are lithium polymer batteries (which employ polymer gel as the electrolyte), graphite anode, and lithium cobalt oxide (LiCoO2) cathode material. These materials provide a high energy density when combined.[11][12] Materials with longer half-lives and higher rate capabilities include lithium iron phosphate (LiFePO4), lithium manganese oxide (LiMn 2O4 spinel, or Li2MnO3-based lithium rich layered materials, LMR-NMC), and lithium nickel manganese cobalt oxide (LiNiMnCoO 2 or NMC). When paired with renewable energy, NMC and its derivatives are one of the primary technologies for lowering greenhouse gas emissions from transportation. They are also frequently utilised in electrification of transportation.[13][14] In the 1970s, M. Stanley Whittingham developed the first rechargeable lithium-ion battery using a titanium disulphide cathode and a lithium-aluminum anode. Despite its limitations in terms of safety, the battery was never put into production. Whittingham also discovered the notion of intercalation electrodes.[15] John Goodenough used lithium cobalt oxide as a cathode in 1980 to build on this work.[16] Akira Yoshino created the first prototype of the current Li-ion battery in 1985. Using a carbonaceous anode instead of lithium metal, the battery was eventually brought to market in 1991 by a team from Sony and Asahi Kasei under the direction of Yoshio Nishi.[17]

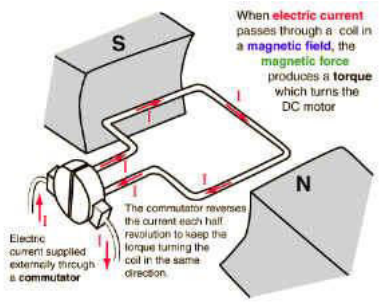
L293D:

Half-H drivers with triple high-current include the L293 and L293D. With voltages ranging from 4.5 V to 36 V, the L293 is intended to provide bidirectional driving currents of up to 1 A. Up to 600 mA of

bidirectional driving current may be achieved with the L293D at voltages ranging from 4.5 V to 36 V. In positive-supply applications, these devices are intended to drive inductive loads such solenoids, relays, dc, and bipolar stepping motors, in addition to other high-current/high-voltage loads. Every input is compatible with TTL. With a pseudo-Darlington source and a Darlington transistor sink, each output is a full totem-pole driving circuit. Drivers 1 and 2 are enabled by 1,2EN, while drivers 3 and 4 are enabled by 3,4EN. Drivers are enabled in pairs. The corresponding drivers are activated and their outputs are active and in phase with their inputs when an enable input is high. These drivers are disabled and their outputs are turned off and in the high-impedance condition when the enable input is low. Each pair of drivers creates a full-H (or bridge) reversible drive appropriate for solenoid or motor applications when the right data inputs are provided.

DC MOTOR

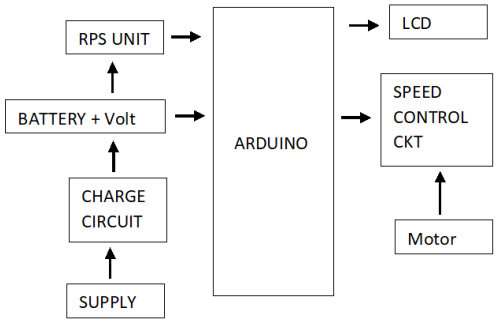
A DC motor is intended to operate with DC electricity. Michael Faraday's homopolar motor, which is rare, and the ball bearin motor, which is a recent invention, are two instances of pure DC designs. The two most popular forms of DC motors are brushed and brushless, which are not strictly speaking DC machines since they require internal and external commutation, respectively, to produce an oscillating AC current from the DC source.



IV. PROJECT DESCRIPTION

The operation and circuitry of the "DESIGN OF ELECTRIC BICYCLE WITH SPEED CONTROLLING MECHANISM" are covered in this chapter. Its block diagram and circuit diagram make it easily understandable.

Block Diagram:



Working:

A bike that is powered by a battery connected to an electric motor is known as an electric bike. It operates on the idea that electrical energy from a D.C. battery is transferred to a D.C. motor's electromotive force. The electric bike uses the battery to start running when the ignition switch is turned on and throttle is applied. The controller, which draws current and monitors battery voltage to cut off drawn current if the battery is not charged, is powered by current flowing through it. Overheating is prevented when the battery voltage is too low. In this manner, the motor draws power from a battery and turns on. The motor is a DC motor without a brush. Thus, without the need of a dynamo, the current is taken straight from the battery in DC form, and the car then begins to operate.

V. CONCLUSION

The earth's ability for human life to survive is seriously threatened by the rate of global warming, hence it is imperative that any activities that have a detrimental impact on environmental health be fully avoided. This essay seeks to identify a reliable substitute for internal combustion engines and explores their practical applications in day-to-day living.

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