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E-BIKE TESTING STATION

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ABSTRACT

Quality check in industrial process is required in more and more fields. One of such field is electric bicycle. Electric bicycles become more popular for general public due comfortable and ecologic possibility to transport. Before the electric bike leaves the factory, it should be tested. This article proposes concept of testing station, which is available to test electric bikes. The main aim of this project is to present the idea of harnessing, the various energy and use it in today's existence of human life. For human being travelling has become vital. In order to sustain in this fast forward world he must travel from place to place. It is very important that time taking for travelling should be less; also it should be economical and easily available. With the fast depleting resources of petrol and diesel, there is need to find intermittent choice. Taking all this into account, a shift away from conventional based fuels to using renewable sources of energy is a must. Electric bike which will be driven with the help of battery and thus provide required voltage to the motor. The focus of this report is to perform power calculations and system design of this Electric Bike. This bike can be driven with the help of electricity or also with the help of PMDC motor

Keywords: PMDC Motor, Motor Driver Circuit or PWM generator, Sensors: Current Sensor, Temperature Sensor, IR Sensor, Microcontroller.

I. INTRODUCTION

The project consist of 2 section, one is testing rig/jig and second is the SCADA/ monitoring station. Testing jig will be consisting of PMDC Motor, Encoder, Driver circuit which will give us dynamic measurements of E-bike motors. We measure the following parameter with this testing jig: RPM of motor, Speed of e-bike in km/hr, Torque, Current consumption of motor, Battery voltage, Breaking, slope, gradient characteristics of motor. It has Drive units for rear powered drive, Free standing PMDC Motor for bicycles, Moderate working height with working platform, Protective device(Enclosure with safety switch), Height adjustable(Horizontal and Vertical)fixing of the bicycle,All results of the test can be saved as a file and therefore can be used for a letter documentation or analysis of test, Accurate read out of speed and torque and engine rating via power electronics, Variable automatic end of the test according to covered distance, time Technical design of the system: Adjustment of wheel or axle distances, Automatic calibration of the tire diameter, Adaption to the pedals Speed control, Integrated safety, Data recording, On measured values are typically stored in Xmel format, Communication, It is possible to evaluate the current measured values with by higher level measurement software. There is an Ethernet interface available, which can be executed in different high level language such as C,C++ or Python.

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Fig No.1 Testing station

II. GOAL OF THE PROJECT

The primary goal of this project, is to develop a system or testing station which can detect the fault of the e-bikes. we are detecting the fault of vehicles by using PMDC Motor system. In this project we will be implementing the machine which can measure the Power, torque and also we can do various road test of e-bike. As per the AEIR standard they also check, Is it is compile with the nominal value of particular bicycle?we will measure the important parameter of e-bike or vehicles from that before selling the bikes, we can firstly check our bicycles by using the testing station, is this all parameter perfect or not?. If any one problem is occurred in bicycle then we can easily detect the fault by using PMDC Motor.

III. DESCRIPTION OF E-BIKE

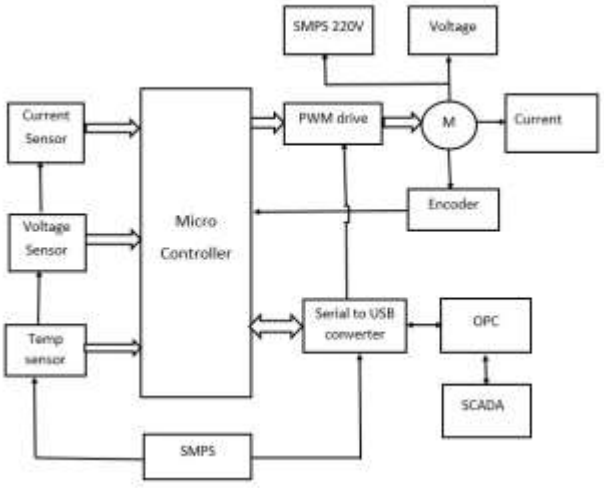

Fig No.2 Block Diagram

Microcontroller(AVR)

The AVR is a modified Harvard architecture 8-bit RISC single chip microcontroller which was developed by Atmel in 1996. The AVR was one of the first microcontroller families to use on chip flash memory for program storage, as opposed to one-time programmable ROM, EPROM, or EEPROM used by other microcontrollers at the time. The AVR is a modified Harvard architecture machine where program and data are stored in separate physical memory systems that appear in different address spaces, but having the ability to read data items from program memory using special instructions.

Sensors

1. Current sensor

Fully Integrated, Hall Effect-Based Linear Current Sensor

For current measurement, we are using current sensor(ACS 712).At input side we give 0-30 amp current and at output we get 66mv/A.A Hall effect sensor is a transducer that varies its output voltage in response to a magnetic

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field. Hall Effect sensors are used for proximity switching, positioning, speed detection, and current sensing applications. The allegro acs712 provides economical and precise solutions for ac or dc current sensing in industrial, Commercial, and communications systems.

2. Temperature sensor:DS18B20

The DS18B20 digital thermometer provides 9-bit to 12-bit Celsius temperature measurements and has an alarm function with nonvolatile user-programmable upper and lower trigger points. The DS18B20 communicates over a 1-Wire bus that by definition requires only one data line (and ground) for communication with a central microprocessor.Applications that can benefit from this feature include HVAC environmental controls, temperature monitoring systems inside buildings, equipment, or machinery, and process monitoring and control systems.

3. IR sensor(Encoder)

An **infrared sensor** is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting **infrared** radiation. **Infrared sensors** are also capable of measuring the heat being emitted by an object and detecting motion. A simple encoder or simply an encoder in digital electronics is a one-hot to binary converter. That is, if there are 2n input lines, and at most only one of them will ever be high, the binary code of this 'hot' line is produced on the n-bit output lines. For example, a 4-to-2 simple encoder takes input bits and produces 2 output bits. The illustrated gate level example implements the simple encoder defined by the truth table, but it must be understood that for all the no explicitly defined input combinations (i.e., inputs containing 0, 2, 3, or 4 high bits) the outputs are treated as don't cares.

Fig No.3 IR sensor

The wavelet based OFDM system can be perform different parameter by using 16 bit,64 bit,256 bit of DWT & IDWT.

Permanent Magnet DC Motor

Basic configuration of a permanent magnet DC motor is very similar to that of a normal DC motor. The working principle of any DC motor is same, i.e. when a current carrying conductor is placed in a magnetic field, it experiences a force. A permanent magnet DC motor also works on the same principle.

Fig No.4 PMDC motor

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Characteristics:

Characteristics of PMDC motors are similar to the characteristics of dc shunt motor in terms of torque, speed and armature current. However, speed-torque characteristics are more linear and predictable in PMDC motors.

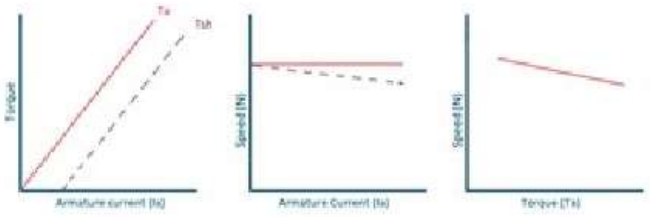

Fig No.5 Characteristics of PMDC Motor

SCADA

Supervisory control and data acquisition (SCADA) is a control system architecture that uses computers, networked data communications and graphical user interfaces for high-level process supervisory management, but uses other peripheral devices such as programmable logic controller interface to the process plant or machinery. The operator interfaces which enable monitoring and the issuing of process commands, such as controller set point changes, are handled through the SCADA supervisory computer system. However, the real-time control logic or controller calculations are performed by networked modules which connect to the field sensors and actuators.

PWM Drive

Pulse Width Modulation (PWM) is a commonly used technique for generally controlling DC power to an electrical device, made practical by modern electronic power switches. Digital controls also use PWM technique.PWM has also been used in certain communication systems where its duty cycle has been used to convey information over a communications channel

Purpose of a motor speed controller is to take a signal representing the required speed and to drive a motor at that speed. Pulse-width modulation (PWM), as it applies to motor control, is a way of delivering energy through a succession of pulses rather than a Continuously varying (analog) signal.

Open Platform Communications

OPC was designed to provide a common bridge for Windows-based software applications and process control hardware. Standards define consistent methods of accessing field data from plant floor devices. This method remains the same regardless of the type and source of data. An OPC Server for one hardware device provides the same methods for an OPC Client to access its data as any and every other OPC Server for that same and any other hardware device. The aim was to reduce the amount of duplicated effort required from hardware manufacturers and their software partners, and from the SCADA (Supervisory Control And Data Acquisition) and other HMI (Human-Machine Interface) producers in order to interface the two.

IV. RESULT AND DISCUSSION

In this project two sections first is hardware and second is software, By using software we displayed all parameter on PC.

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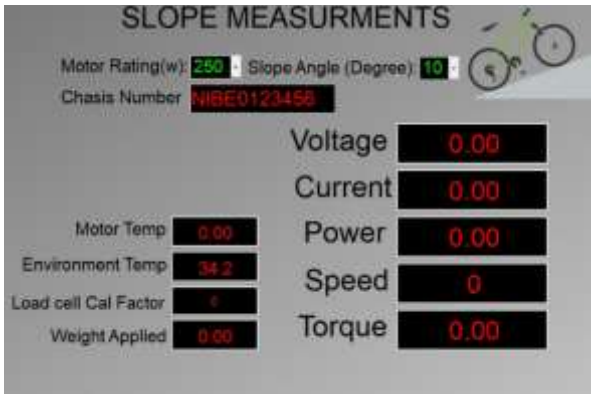
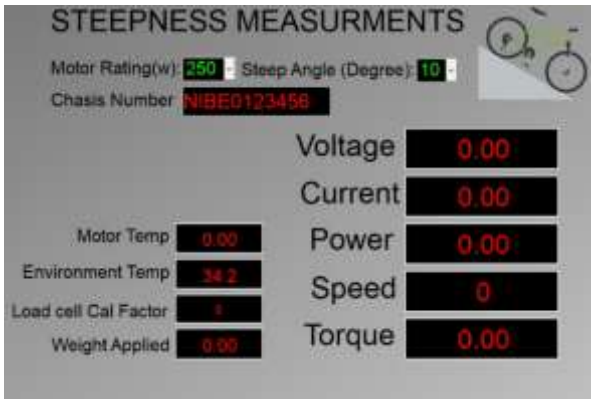
In first result enter the chasis number and choose the bicycle.



In second result we selected the bicycle rating and took slop measurement parameter.



In third result we took the steepness measurement parameter.

V. CONCLUSION

The results can be carried out by testing the system. Various papers are referred to implement the code for this project. The result will be based on the study of all these papers. PMDC motor use to measure above parameters can be achieved by hardware system and by using SCADA application we did the programming for detecting or testing the faults of the electric vehicles. in which its applications varies from industrial to commercial area. In proposed system, the switching action implemented through PMDC.The system implemented using AVR Studio,Arduino software. The system will be beneficial to customers because it detects the fault in short time. Also can be used in industrial area.

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