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Switched Energy Management Strategy

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ABSTRACT: The rapid growth in energy consumption and the increasing focus on sustainable energy sources have compelled researchers and energy providers to explore new strategies for energy management. One such strategy is the Switched Energy Management Strategy (SEMS), which aims to optimize energy usage and minimize environmental impact.

SEMS is a dynamic approach that involves switching between different energy sources and modes of operation based on real-time conditions and constraints. It leverages advanced technologies, such as smart grids, energy storage systems, and intelligent algorithms, to intelligently manage energy generation, distribution, and consumption.

KEYWORDS: Sensors, Model, Relay, Driver, Fan

1.INTRODUCTION

Smart Electric vehicles (S-EV) provides Large potential to save fuel consumption and reduce pollutant emission. An S-EV is a vehicle driven by Battery power source electric motor (EM). Some of the major players have announced their production of EV. According to the recent survey released by ministry of road and transport there are more than 250 million vehicles in India. All these vehicles contain mechanical powered IC engine and use fossil fuels for their operation. Because of these IC engines nearly 90% of the environment gets polluted drastically and to achieve a correct replacement to these engines the car manufacturers are shifting their attention towards the EV. Some of the major players have announced their production of EV. In recent times the EV are manufactured with the help of the DC motors Due to the rapid improvement in the batteries and the highly efficient inverting technologies we use DC motors, we can achieve significant increase in the efficiency of the car. Now days more manufacturing company research on li-ion battery because its high energy density property.in inIndian gov. provide some policy for EV consumer. This project will be one of the irccesolutions for reduce the Greenhouse gas. In New Delhi, government has banned diesel cars more than 2000cc because of the pollution. By introducing this technology, this can be prevented.

II. PROBLEM STATEMENT

The traditional methods of energy management face numerous challenges in meeting the increasing energy demands while ensuring sustainability and efficiency. The problem lies in the limitations of relying on a single energy source or a fixed mode of operation, which often leads to inefficiencies, increased costs, and environmental impacts. To address these challenges, there is a need for a more dynamic and adaptable approach to energy management, which is where the Switched Energy Management Strategy (SEMS) comes into play.

The primary problem that SEMS aims to solve is the suboptimal utilization of energy resources. In traditional energy management systems, the focus is often on maximizing the usage of a primary energy source, typically fossil fuels, without effectively considering the availability of alternative and renewable energy sources. This leads to an over-reliance on non-renewable resources, resulting in increased carbon emissions and a lack of resilience in the face of potential supply disruptions.

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III. SYSTEM ARCHITECTURE

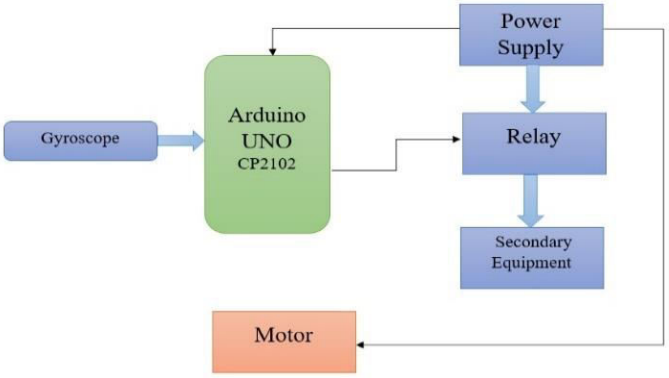
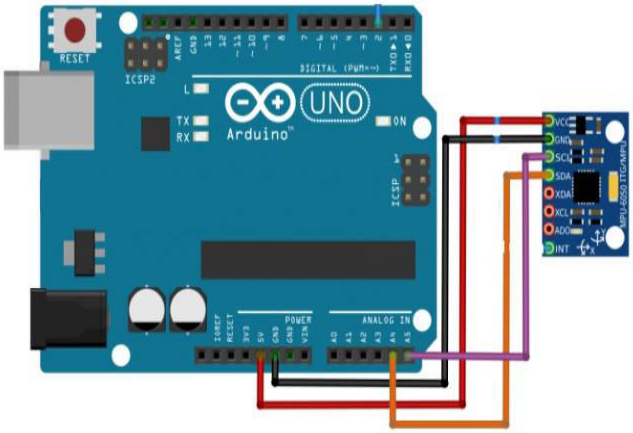


Fig 1- system Architecture

5V DC power voltage supply given to Arduino. The gyroscope senses the angle and gives a single to Arduino. The program is already set in the Arduino for various angles of inclination case.
On the plane surface, the condition Gyroscope senses the angle and gives the signal to Arduino. Arduino gives a command to relay 1, all secondary equipment is on. Vehicle motor drive runs on battery.
On inclined surface condition, the Gyroscope senses the angle and give the signal to Arduino. Arduino gives the command to relay 1. It will cut off power to secondary equipment. Arduino also gives asignal to relay 2, to take power from battery. The vehicle motor drive runs on battery power and gives it to the motordrive.On the declined surface, the gyroscope senses the angle and gives a signal to Arduino. Arduino gives the command to relay 1. All secondary equipment is ON

IV. INTERFACING OF ARDUINO WITH GYROSCOPE



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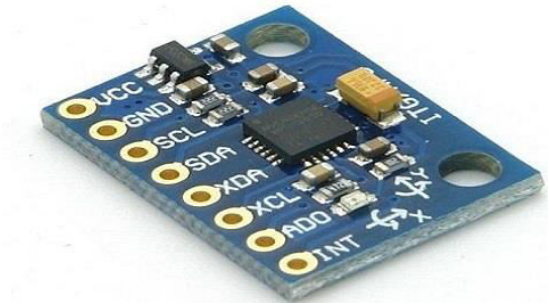
V. COMPONENTS

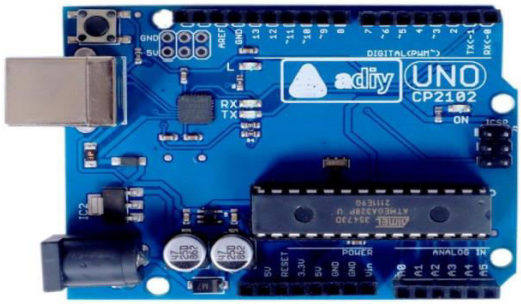
5.1 GYROSCOPE (ADXL345)



Technical Specification about the ADXL345 Gyroscope sensor:

- Operating Voltage: The recommended operating voltage for the ADXL345 is in the range of 4V to 6V. It can be powered from a typical power supply within this voltage range.
- I/O Voltage Range: The I/O voltage range for the ADXL345 is specified to be between 1.7V and 3.6V. This allows compatibility with different microcontrollers and communication interfaces.
- Communication: The ADXL345 supports two common communication interfaces: Serial Peripheral Interface (SPI) and Inter-Integrated Circuit (I2C). These interfaces allow the sensor to communicate with microcontrollers or other devices for data acquisition and control.
- Operating Temperature: The ADXL345 has an extended operating temperature range of -40ºC to 85ºC. This wide temperature range enables its use in various environmental conditions.
- Size: The physical dimensions of the ADXL345 sensor are 3 mm × 5 mm × 1 mm. It is a compact sensor that can be easily integrated into different electronic devices or embedded systems.

5.2 ARDUINO:



- Microcontroller: ATmega328P
- Clock Speed: 16 MHz
- Flash Memory: 32 KB (of which 0.5 KB used by bootloader)
- SRAM: 2 KB
- EEPROM: 1 KB
- GPIO Pins: 14 (6 PWM outputs)
- Analog Input Pins: 6
- USB-to-Serial Converter Chip: CP 2102
- Provides USB connectivity to the Arduino board.
  - Converts USB signals to UART signals for communication with the ATmega328P microcontroller.
  - Operating Voltage: 5V
  - The Arduino ADIY UNO R3 CP 2102 operates at 5 volts.
  - Input Voltage: 7-12V (recommended) or 6-20V (limits)
  - The recommended input voltage range for the Arduino board is 7-12 volts. However, it can accept a maximum input voltage of 20 volts.
  - Digital I/O Pins: 14

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- The board has 14 digital input/output pins that can be used for interfacing with various electronic components and peripherals.

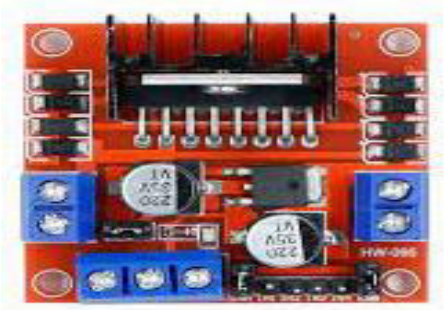
5.3 RELAY

- Coil Voltage: 5V DC

The relay operates at a coil voltage of 5 volts DC.

- Contact Rating: The contact rating indicates the maximum voltage and current the relay can handle.
- Voltage Rating: This can vary, but common voltage ratings include 120V AC or 30V DC.
- Current Rating: This can also vary, but common current ratings range from a few amperes to tens of amperes.

5.4 l298N Driver



- The L298N is a popular dual H-bridge motor driver module commonly used for controlling DC motors and stepper motors. Here are the typical technical specifications of the L298N
- Operating Voltage: The L298N operates within a voltage range of 5V to 46V. This allows it to control motors with different voltage requirements.
- Maximum Current: The L298N can handle a maximum continuous output current of 2A per channel (with proper heat sinking) and a peak current of 3A per channel.
- H-Bridge Configuration: The L298N has two H-bridge circuits, which allow it to control the direction and speed of two motors independently.
- Logic Voltage Levels: The L298N is compatible with TTL and CMOS logic voltage levels.
- High-Level Input Voltage (Logic 1): Typically, 2.3V to Vcc (operating voltage).
- Low-Level Input Voltage (Logic 0): 0V to 1.5V.

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5.5 DC Motors

DC motor is any of a class of rotary electrical machines that converts direct current Electrical energy into Mechanical energy

- The XD-37GB520 motor usually provides a reasonably high torque output, suitable for driving small to medium-sized loads.
- Torque is typically specified in units like kg.cm or N.m (kilogram-centimeter or Newton-meter).
- Gearbox: The XD-37GB520 motor often includes an integrated gearbox, which helps increase torque output and reduce the motor's speed.
- Common shaft diameters for this motor are around 6mm.
- Operating Current: The motor has a rated operating current, indicating the current it draws under normal operating conditions.
- For example, a typical operating current might be around 0.5A.
- Dimensions: The physical dimensions of the XD-37GB520 motor can vary, but it is commonly a compact motor suitable for small-scale applications.
- The dimensions are usually specified in millimeters (mm) and include the motor body and gearbox dimensions.
- Voltage Rating: The XD-37GB520 motor operates within a specific voltage range, commonly around 12V.
- The XD-37GB520 motor typically has a speed range of several hundred to a few thousand RPM.
- The actual speed can be controlled using external motor control circuitry or pulse width modulation (PWM) techniques.
- Torque: Torque refers to the rotational force generated by the motor. It determines the motor's ability to move or exert force on an object.

5.6 Fan

- Operating Voltage: 12V DC
- Type: DC
- Operating Current: 0.2Amp±10%
- Rated speed: 2600RPM ±10%

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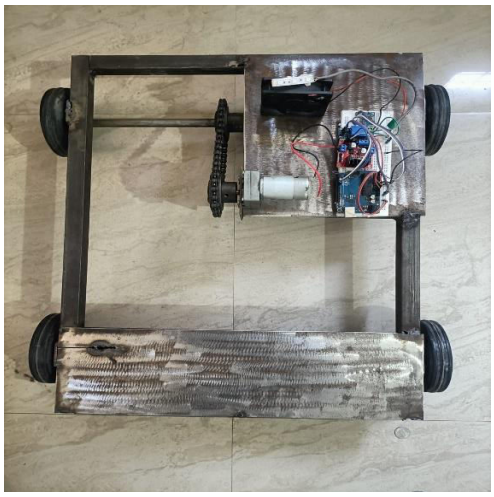
- Air Flow: 30.7CFM

VI. RESULT AND ANALYSIS

Gyroscope Sensor Reading	Secondary Equipment	Relay Operation
$<0\text{-}40^0$	ON	OFF
$>40^0$	OFF	ON
Less than 0^0	ON	OFF

Table 1: Relay Operating depends on Gyroscope operation

VII. MODEL OF CAR



VIII. CONCLUSIONS

A fully mechanical car easily runs on the road but EV has a problem EV does not generate the torque to run on an inclined road as compared to a fully mechanical car so car manufacturers come up with a solution to this problem when the inclined rod is started alarm is buzzing there is one switch in the car given by company when we pressed the switch all secondary device of a car is turn off and all the power goes to transmission to increase its performance so this operation is manually so In this project, we will design and build a model that will determine the angle of the road. With the assistance of a Gyroscope. Arduino can control the power supply of a car when an inclined road starts all secondary components automatically turn off and all power goes to the transmission so we drive our car easily on the inclined road or mounted area which was our goal.

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