Government Polytechnic Mujhana Hata Kushinagar

A

PROJECT REPORT

ON

CHANDRAYAN ROVER

Submitted in the partial fulfillment of the requirement for the degree of

Diploma in Mechanical Engineering (Production)

BY

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Title of Project

CHANDRAYAN ROVER

The Chandrayaan missions, led by the Indian Space Research Organisation (ISRO), have achieved significant milestones in lunar exploration. Chandrayaan-1 (2008) and Chandrayaan-2 (2019) included orbiter and lander components, with Chandrayaan-2 featuring the Pragyan rover. These missions have contributed valuable data on lunar geology, water ice presence, and surface composition.

ACKNOWLEDGEMENT

In the pursuit of our Rover Project, we extend our heartfelt gratitude to all individuals and organizations whose support and contributions have been instrumental in making this endeavor possible. Their encouragement, expertise, and resources have enriched our journey and propelled us towards our goals.

We would like to express our sincere appreciation to :-

- Our mentors and advisors, whose guidance and wisdom have been invaluable throughout every stage of the project. Their expertise has provided us with crucial insights and perspectives, shaping our approach and decisions.
- The [Organization/Institution Name], for providing us with the necessary resources, facilities, and funding to undertake this ambitious project. Their unwavering support has enabled us to pursue our passion for innovation and exploration.
- Our team members, whose dedication, creativity, and teamwork have been the driving force behind the success of this project. Each member has contributed their unique skills and expertise, enriching the collaborative process and fostering a spirit of camaraderie.
- Our families and friends, for their unwavering encouragement, understanding, and patience throughout our journey. Their support has been a constant source of motivation, sustaining us through challenges and triumphs alike.
- The broader community of enthusiasts, educators, and enthusiasts who have shown interest in our project and offered words of encouragement and feedback. Their enthusiasm has fueled our passion for exploration and innovation.

As we embark on the next phase of our journey, we carry with us the lessons learned, the bonds forged, and the memories cherished. Together, we celebrate the collaborative spirit and collective effort that have made this project a reality.

OBJECTIVE

The objective of this project is to develop a miniature rover model inspired by the design and functionality of the Chandrayaan rover. This rover will serve as a platform to showcase the integration of advanced sensor technologies, including moisture sensors, gas sensors, and light-dependent resistor (LDR) modules. The primary goal is to equip the rover with the capability to traverse various terrains and overcome obstacles efficiently. Additionally, the project aims to enable the rover to monitor environmental conditions such as moisture levels, gas concentrations, and light intensity, enhancing its utility for terrestrial exploration and environmental monitoring tasks. By incorporating a solar charging system and optimizing the orientation of solar panels using the LDR module, the rover will be self-sustaining, ensuring prolonged operation in remote environments. Through rigorous testing and evaluation, the project seeks to validate the functionality of the integrated sensor systems and identify opportunities for further improvements. Ultimately, this project aims to inspire interest in robotics, sensor technology, and space exploration by demonstrating practical applications in a terrestrial context.

ABSTRACT

This abstract presents a comprehensive overview of a project focused on designing and implementing a rover inspired by the Chandrayaan mission, equipped with advanced sensor technology for terrestrial exploration. The project aims to showcase the fusion of robust mechanical design with cutting-edge sensor integration, demonstrating the rover's capabilities in traversing diverse terrains and detecting environmental parameters.

The inspiration for this project stems from the remarkable achievements of space exploration missions such as Chandrayaan, which have spurred innovations in robotics and sensor technology.

The rover's design incorporates features for navigating rough terrain and overcoming obstacles with ease. Additionally, it is equipped with sensors capable of detecting moisture, gas, and light, enhancing its versatility and utility in various environments. These sensors enable the rover to gather valuable data about its surroundings, enabling researchers to better understand and explore remote or hazardous locations on Earth.

Through the construction and operation of this rover model, the project aims to demonstrate the seamless integration of advanced sensor technology with robust mechanical systems. Practical tests and simulations will be conducted to showcase the rover's capabilities and validate its effectiveness in real-world scenarios.

Overall, this project serves as a testament to human ingenuity and the continuous quest for knowledge and exploration, both on Earth and beyond. It represents a significant step forward in leveraging space exploration technologies for terrestrial applications, paving the way for future advancements in robotics, sensor technology, and exploration.

Keywords: Rover, Chandrayaan, Sensor Technology, Terrestrial Exploration, Robotics, Mechanical Design.

INTRODUCTION

The purpose of this project is to demonstrate the design and functionality of a rover inspired by the Chandrayaan rover. This rover is capable of traversing terrain and overcoming large obstacles with ease. Additionally, it is equipped with sensors to detect moisture, gas, and light, enhancing its versatility and utility in various environments. The inspiration for this project stems from the remarkable achievements of space exploration missions like Chandrayaan, which have inspired innovations in robotics and sensor technology. By emulating the capabilities of such rovers, this project aims to showcase the potential applications of advanced sensors and mobility systems in terrestrial contexts. Through the construction and operation of this rover model, we seek to highlight the possibilities of integrating cutting-edge sensor technology with robust mechanical systems. This project serves as a testament to human ingenuity and the continuous quest for knowledge and exploration, both on Earth and beyond.

Methodology: Design and Development of a Chandrayaan - Inspired Rover with Advanced Sensor Integration

1. **Research and Conceptualization :**
   - Conduct an in-depth of the Chandrayaan Rover and other space exploration missions to understand their design principles, functionalities, and technological advancements.
   - Identify key requirements and objectives for the terrestrial rover project based on the insights gained from research.
2. **Mechanical Design :**
   - Develop a detailed design plan outlining the rover's structure, chassis, wheels, suspension system, and mechanisms for obstacle traversal.
   - Utilize CAD software to create 3D models of the rover components, ensuring compatibility and functionality.
   - Iterate on the design based on feasibility studies, structural analysis, and feedback from team members and advisors.
3. **Sensor Selection and Integration :**
   - Identify and evaluate sensors suitable for detecting moisture, gas, and light in various environmental conditions.
   - Select sensors based on factors such as accuracy, sensitivity, power consumption, and integration compatibility with the rover's control system.
   - Integrate sensors into the rover's design, considering placement, wiring, and communication protocols to ensure seamless operation.
4. **Control System and Development :**
   - Develop a control system architecture incorporating microcontrollers motor drivers, sensor interfaces, and communication modules.
   - Write firmware/software for controlling the rover's movement, sensor data acquisition, processing, and communication with external devices.

5. **Prototype Construction :**
    - Procure materials, components, and equipment required for building the rover prototype according to the finalized design specifications.
    - Fabricate mechanical components using machining, 3D printing, or other manufacturing techniques, ensuring precision and durability.
    - Assemble the rover subsystems, including the chassis, wheels, suspension, sensors, and control electronics, following assembly instructions and safety guidelines.
6. **Testing and Validation :**
    - Conduct comprehensive functional tests to evaluate the rover's performance in simulated and real-world environments.
    - Collect data from sensor readings and analyze results to assess the rover's effectiveness in detecting environmental parameters and navigating terrain.
    - Test the rover's mobility, obstacle traversal capabilities, sensor accuracy, and communication reliability under varying conditions.
7. **Iterative Improvement :**
    - Identify areas for improvement based o test results, user feedback, and performance metrics.
    - Iterate on the design, software algorithms, and hardware components to address any deficiencies or limitations observed during testing.
    - Continuously refine and optimize the rover's functionality, reliability, and usability through iterative prototyping and validation cycles.

By following this methodology, we aim to design and develop a Chandrayaan-inspired rover equipped with advanced sensors, capable of traversing diverse terrains and conducting scientific exploration on Earth.

COMPONENT USE

1. One channel relay module :

A one-channel relay module is an electronic device used to control the switching of a single circuit using a low-voltage signal. It typically consists of a relay, which is an electromechanical switch, and supporting components such as a transistor, diode, and optocoupler.

2. Moisture sensor :

A moisture sensor, also known as a soil moisture sensor or hygrometer, is an electronic device designed to measure the moisture content in soil

or other materials. It helps in monitoring and managing soil moisture levels, which is essential for various applications including agriculture, gardening, and environmental monitoring

3. LDR Module :

An LDR (Light Dependent Resistor) module, also known as a photoresistor module, is an electronic component that varies its resistance based on the intensity of light falling on it. It is commonly used to detect light levels in various applications such as automatic lighting systems, brightness control, and light sensing circuits.

4. Gas Module :

A gas sensor module is an electronic device designed to detect the presence of specific gases in the surrounding environment. These sensors are widely used in various applications, including air quality monitoring, industrial safety, and gas leakage detection.

5. LED Light :

3V LED lights are light-emitting diode (LED) bulbs or modules that operate at a voltage of 3 volts. LED lights are energy-efficient, durable, and produce bright illumination, making them suitable for a wide range of applications.

6. 5 volt Solar Panel :

A 5V solar panel is a type of photovoltaic (PV) module that is designed to generate electrical energy from sunlight and provide a stable output voltage of 5 volts. These solar panels typically consist of multiple solar cells connected in series or parallel to achieve the desired voltage and power output.

7. 9 Volt Battery with Cap :

A 9V battery with a connector is a portable power source that provides a nominal voltage of 9 volts for various electronic devices and applications. These batteries typically come equipped with a connector attached to their terminals, allowing for easy connection and disconnection from compatible devices.

CONCLUSION

When We Completed our project after that we check our project working , it is very good ,he is full work without stop or any problem , So We can use our Project in real life like our industries or Field and he perfect work on there without any problem , This is our project idea and it is full work our project . So Our project idea is work in our prototype project ,so our conclusion is so good .

Overall, the Chandrayaan Rover School Project offers numerous advantages, ranging from hands-on learning and skill development to fostering innovation and inspiring the next generation of STEM professionals and space enthusiasts.

FUTURE DEVELOPMENT

Effectiveness of this project can be improved by following this :

Recommendation :

- ✓ We can make high quality heating penal for generate high electricity.
- ✓ We can make large level burning box with easily heating penal connecting system.
- ✓ We can make best storage system by generate electricity by waste materials.

THANK YOU