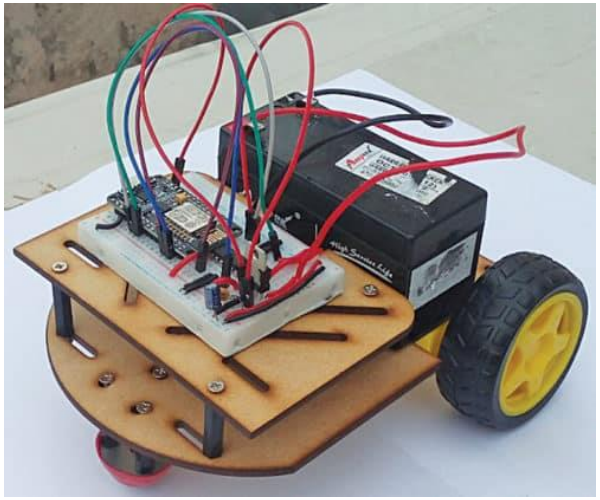
IoT-Based Remote Land Monitoring Vehicle

Class Group:
2310990309 – Ayush Kumar
2310990340 – Gurmukh Singh
2310991404 – Kunwar Parth Rana

Project Guide Name (ES & IOT Faculty Name):
Dr. Danvir Mandal
Designation: Assistant Professor-DICE
Department of Interdisciplinary Courses in Engineering

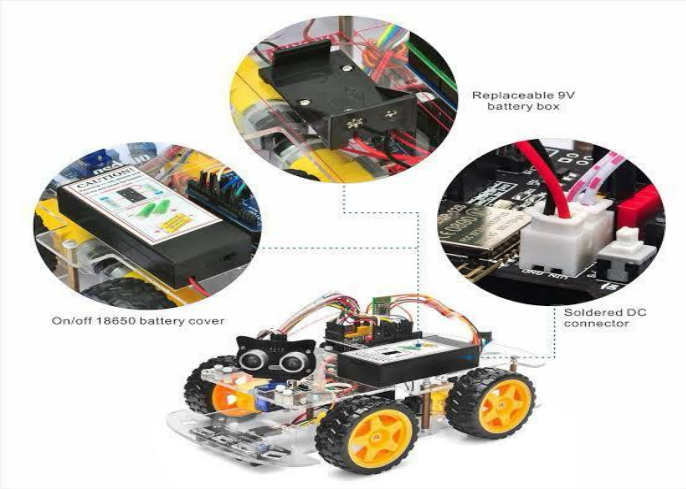
Problem Statement

- • Limited Remote Accessibility & Control: Traditional robot cars often lack efficient remote control capabilities, making real-time monitoring and navigation difficult, especially in hazardous or inaccessible environments.
- • Inefficient Data Collection & Processing: Conventional robot cars do not effectively utilize IoT for real-time data collection, processing, and decision-making, limiting their adaptability for smart automation tasks.
- • Safety & Navigation Challenges: Many existing robotic vehicles struggle with obstacle detection, collision avoidance, and autonomous path planning, making them unreliable for practical applications like surveillance, rescue operations, and smart transportation.



Proposed Solution

- • 1. Automated Cleaning Mechanism: An IoT-controlled system using rotating brushes, air blowers, or water jets to automatically clean solar panels, maintaining efficiency without manual effort.
- • 2. Smart Water and Energy Management: Integrating sensors and AI to optimize cleaning schedules, conserving water and energy, and utilizing a small solar panel to power the system.
- • 3. IoT-Based Remote Monitoring and Control: A cloud-connected dashboard or mobile app that allows users to monitor panel cleanliness, schedule cleanings, and get alerts for maintenance.



SDG's Covered

- • SDG 9 – Industry, Innovation, and Infrastructure: Promotes innovation in automation, robotics, and IoT-based smart systems. Enhances infrastructure with intelligent mobility solutions.
- • SDG 11 – Sustainable Cities and Communities: Supports smart transportation and surveillance, contributing to safer and more efficient urban environments. Can assist in emergency response and disaster management.
- • SDG 3 – Good Health and Well-Being: Can be used for medical deliveries, patient monitoring, or rescue missions in hazardous environments. Reduces risks for human operators in unsafe conditions.
- • SDG 13 – Climate Action: Promotes eco-friendly automation by reducing manual vehicle emissions and improving energy efficiency. Can be used for environmental monitoring, such as detecting air quality or hazardous conditions.

Technology and Tools

- **IOT Components:**

  Hardware:

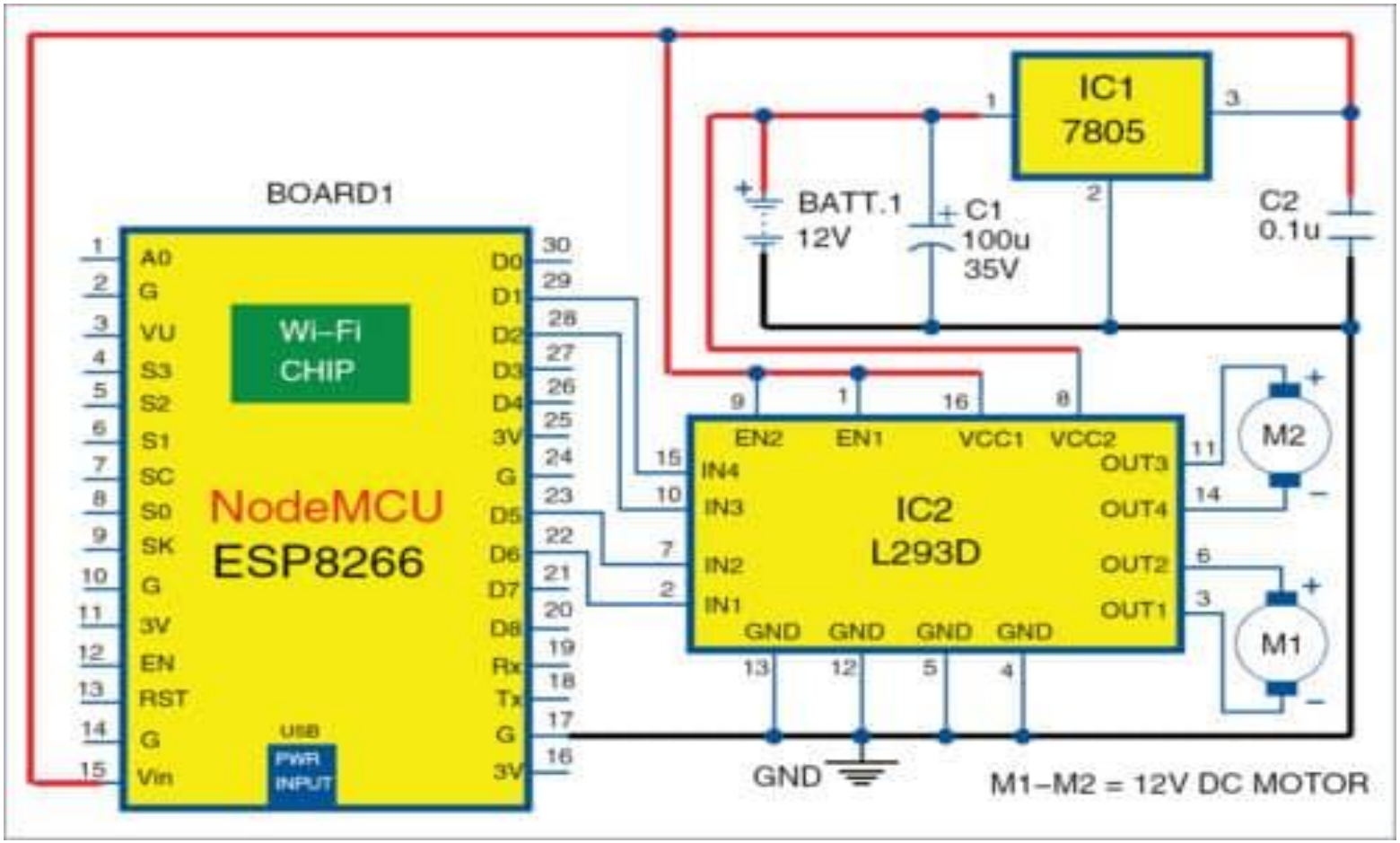
  - NodeMCU ESP8266 – 7805 Voltage Regulator
  - – L293D Motor Driver
  - – Capacitors (100µF, 35V & 0.1µF Ceramic)
  - – 12V Battery
  - – 12V DC Geared Motors
  - – Chassis – Wheels & Castor Wheel Software:
  - – Arduino IDE
  - – MicroPython or C++ (Arduino Language)
  - – Blynk/MIT App Inventor/Firebase
  - – MQTT or HTTP Protocols
  - – ESP8266Wifi Library
  - – Motor Control Libraries (AFMotor, L293D.h)

Implementation Plan

- • Research and planning.
- • Hardware components.
- • IoT integration and software development.
- • Testing and optimization.
- • Deployment and maintenance.

CIRCUIT DIAGRAM

CHITKARA UNIVERSITY



Impact and Benefits

- • Remote Monitoring & Control – IoT integration allows users to operate the robot car from anywhere using a mobile app or web interface.
- • Enhanced Safety & Risk Reduction – Can navigate hazardous environments (e.g., disaster zones, factories) without endangering human lives.
- • Real-Time Data Collection & Analytics – Sensors gather and process data for smart automation, predictive maintenance, and decision-making.
- • Energy Efficiency & Sustainability – Optimized power management reduces energy consumption, with potential for renewable energy integration.
- • Versatile Applications – Useful in security, agriculture, smart transportation, and logistics, improving automation in multiple sectors.
- • Cost-Effective & Scalable – Uses affordable, open-source components, making it ideal for students, researchers, and industry applications.
- • Autonomous Navigation & Obstacle Avoidance – AI and sensor-based path planning enhance mobility in dynamic environments.

Budget

Components	Estimated cost (in Rs.)
NodeMCU ESP8266	1500
7805 Voltage Regulator	200
L293D Motor Driver	500
100µF, 35V Capacitor	150
0.1µF Ceramic Capacitor	50
12V Battery	1200
12V DC Geared Motors	1200
Chassis	600
Wheels for Rear Motors	400
Castor Wheel for Front	200
Miscellaneous	300
DHT11/DHT22 Humidity Sensor	250
TOTAL	6550

Thank You