ROBOT AS HEAVY VEHICLE DRIVER AND ELECTRIC TRANSPORT HIGHWAY USING PANTOGRAPH MECHANISM

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Abstract –

The project "Arduino based Robot as a Heavy Vehicle Electric Transport Highway with Pantograph Mechanism" aims to design and implement an autonomous electric vehicle that can transport heavy loads on highways. The vehicle will use a pantograph mechanism to charge its battery from overhead electric lines while in motion. The vehicle's movements will be controlled using an Arduino microcontroller, which will be programmed to follow predefined paths and avoid obstacles. The system will also include sensors for monitoring the vehicle's speed, battery charge level, and the presence of obstacles. The proposed solution has the potential to reduce greenhouse gas emissions and increase energy efficiency, making it a promising alternative to traditional fossil fuel-based transportation systems.

***Key Words*:** E-Highway, Electric vehicles

1.INTRODUCTION

Transportation of goods is a vital aspect of modern society, and with the increasing demand for eco-friendly and sustainable solutions, there is a growing need for innovative transportation solutions. One such solution is the use of electric-powered vehicles that reduce carbon emissions and offer efficient and cost-effective transportation. The proposed project is an Arduino-based robot designed to serve as a heavy vehicle electric transport highway with a pantograph mechanism. The robot is designed to operate on electric power, utilizing a rechargeable battery pack, and will be capable of carrying heavy loads. The pantograph mechanism will allow the robot to connect to overhead electric lines, drawing power from them, making it an efficient and eco-friendly transportation solution. The robot will be controlled through an Arduino microcontroller, which will govern its movement and ensure safe operation on the highways.

The primary aim of this project is to provide a sustainable transportation solution for the future, with the potential to reduce carbon emissions and improve the efficiency of goods transportation. Additionally, the project aims to provide a cost-effective solution that can be easily implemented in existing transportation systems.

The project is designed to promote the use of eco-friendly and sustainable transportation solutions, contributing towards a better and cleaner environment for future generations. In recent years, the transportation industry has seen a significant shift towards sustainable and eco-friendly solutions. Electric vehicles are rapidly gaining popularity, and governments around the world are encouraging their adoption to reduce carbon emissions and combat climate change.

2. LITERATURE SURVEY:

1) K. Adam; M. Müller-Mienack; M. Paun; G. Sanchis; K. Strunz et al., e-highway 2050 project is aimed at overcoming the uncertainties of the planning horizon through a modular approach of five-year periods and comprises the topics, stakeholder acceptance, social welfare and the environment are given particular consideration. Thirdly, it was described how work packages are

structured and interact to support an efficient study project that integrates the interests of the involved stakeholders.

2) Zhang Bin; Fang Pin; Xu Guoqing et al., In the 1980's - 1990's hybrid development, the focus primarily was on low emissions. Then simulations are carried out for the two different trucks respectively with the new modules. Analysis of the simulations shows that the plug-in hybrid electric truck is a better choice for some special condition. In shipside cycle, the fuel consumption of plug-in hybrid electric truck is even less than hybrid electric truck by 52.3%.

3) T. H. Pham; J. T. B. A. Kessels; P. P. J. van den Bosch; R. G. M. Huisman et al., In the considered hybrid truck, the energy management strategy utilizes the battery to reduce the fuel consumption and the associated emissions. This paper develops a quasi-static battery cycle-life model and formulates a model-based integrated energy management (IEM) strategy. This IEM strategy optimizes the power split (between the ICE and the MG) and the operation of the clutch system to minimize the hybrid truck fuel consumption while guaranteeing the requested battery life.

3. METHODOLOGY

The body of the paper consists of numbered sections that present the main findings. These sections should be organized to best present the material. The methodology for the project "Arduino based Robot as a Heavy Vehicle Electric

Transport Highway with Pantograph Mechanism" can be divided into several stages as

follows:

1.Literature review: Conduct a comprehensive review of the existing literature on electric highways, pantograph mechanisms, and Arduino-based electric vehicles. This will provide valuable insights into the design and development of the project.[5]

2.Design and prototyping: Based on the literature review, develop a preliminary design for the robot, including the pantograph mechanism, motor control system, battery system, and other components. Then, build a prototype to test the design and identify any issues or areas for improvement.

3.Testing and evaluation: Test the prototype in a controlled environment to evaluate its performance, efficiency, and safety. Use the results to make necessary modifications and improvements to the design.[4]

4.Optimization and finalization: Based on the testing and evaluation results, optimize the design and finalize the robot's components and systems. Conduct final tests to ensure that the robot meets the project's objectives and requirements.[5]

5.Deployment and demonstration: Deploy the robot on a highway or a suitable testing ground to demonstrate its functionality and efficiency in heavy vehicle electric transport.

6.Documentation and dissemination: Document the design, development, testing, and deployment of the robot, including any challenges and lessons learned. Disseminate the findings through publications, presentations, and other means to promote the project's outcomes and potential impact.[8]

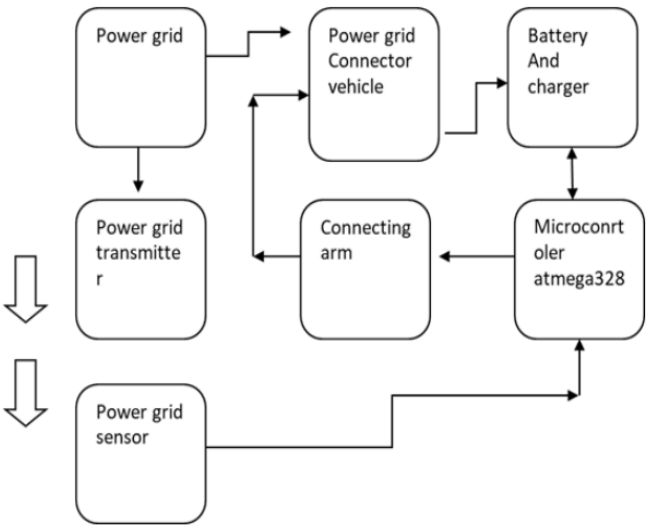

Fig -1: Block Diagram

4. CONCLUSION

The "Robot as heavy vehicle driver and electric transport highway using pantograph mechanism" project has the potential to revolutionize the transportation and logistics industry by providing a more efficient, sustainable, and autonomous option for heavy vehicle transport and delivery. The use of electric-powered robots with autonomous capabilities can significantly reduce fuel consumption, carbon emissions, and labor costs while improving safety and flexibility. However, there are also potential limitations and disadvantages to consider, including initial costs, technology limitations, safety concerns, job losses, battery life, and maintenance and repair requirements. Overall, the benefits of this project appear to outweigh the potential drawbacks, and with further development and research, this technology could have a significant impact on the future of heavy vehicle transportation. The "Arduino based Robot as a Heavy Vehicle Electric Transport Highway with Pantograph Mechanism" project is an exciting and promising development in the field of transportation and logistics, and it will be interesting to see how it evolves and grows in the future.

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