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Agricultural Based Multifunction's E-Vehicles

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Abstract **- The agricultural sector in undergoing a transformative shift towards sustainability and efficiency, driven by the urgent need to address environmental concerns and food security challenges. Agricultural based multifunction E-vehicle have emerged as a pioneering solution, integrating cutting edge electric vehicle technology with versatile agricultural applications. This abstract provides an overview of the kay aspects and implication of these vehicle are powered by electricity, reducing greenhouse gas emissions and reliance on fossil fuels, making them an environmentally friendly choice. The integration of E-Vehicles in agriculture promises reduced operational costs, increased productivity, and a decreased carbon footprint. The E-Vehicle For Agriculture Remote operated In order to avoid various problems which affect agricultural fields, agricultural electrical vehicle is needed, to fulfill the objectives like weed detection, irrigation, crop protection and Bug Spray. This the design aspects of electric vehicle which is eco-friendly in nature and automated. The various technologies used are sensor technology . The designed EV not only uses battery power but also uses renewable**

Energy in order to perform all its operations. The proposed model is cost effective and reliable, also suitable for linear agricultural applications. The electrical vehicle plays a major role in precision farming, which is to improve the efficiency of crop production without influencing the different agriculture variables and reducing production costs. The proposed EV model is intended to cater the needs of agricultural requirements such as crop protection, irrigation, bug spray (i.e. spraying pesticides) with obstacle detecting feature. The model is of self-power for checking soil moisture to start the watering of the field or Motor turn off function. The delta robot incorporated to pluck the weed in the field, it has a clearance of 10 cm from ground level does the activity.

Keywords - Agriculture vehicle, Seed sowing machine, Sprayer, Photo voltaic cell, Electrical vehicle (EV).

Introduction

The E-Vehicle for Agriculture Remote operated in order to avoid various problems which affect agricultural fields, agricultural electrical vehicle is needed, to fulfil the objectives like weed detection, irrigation, crop protection and Bug Spray. The design aspects of electric vehicle which is eco-friendly in nature and automated. The various technologies usually based on sensor. Sensors used are temperature, humidity, LDR, Ultrasonic, Soil moisture, IR, and Rainfall The designed EV not only uses battery power but also

uses renewable energy in order to perform all its operations. The proposed model is cost effective and reliable, also suitable for linear agricultural applications. The electrical vehicle plays a major role in precision farming, which is to improve the efficiency of crop production without influencing the different agriculture variables and reducing production costs. The proposed EV model is intended to cater the needs of agricultural requirements such as crop protection, irrigation,

bug spray (i.e. spraying pesticides) with obstacle detecting feature. The model is of self-power via 10W, 12V for checking soil moisture to start the watering of the field or Motor turn off function. The delta robot incorporated to pluck the weed in the field, it has a clearance of 10 cm from ground level does the activity of weed plucking.

Literature survey

1. P. V. Prasad Reddy Department of Mechanical Engineering Mahatma Gandhi Institute of Technology Hyderabad, India. M. Yadi Reddy Department of Mechanical Engineering Mahatma Gandhi Institute of Technology (April 2021) proposed a paper that point out Development of Multi-Purpose Agricultural Vehicle by using Solar Power . The motor converts electrical energy to mechanical energy and this energy is used to perform different operations like water spraying, ploughing, seed sowing with the help of switch control mechanism.

2. Dr. Smita Joshi, Vinit Joshi and Shah Kalp (2017) proposed A paper that points out the disadvantages of a Conventional tractor that can perform one function at time. A prototype was designed which uses solar energy to perform the task and it also favored the use of Lead Acid Battery pack over Lithium ion battery pack which had the Capability of functioning 3 farming processes in a single Run.

3. Aditya Sharma and Dr. Puja Tripathi proposed a paper (August 2021) multipurpose agricultural robots are researched and developed mainly for harvesting, fertilizer spraying, picking fruits, sowing, and monitoring crops. Robots like these are brilliant replacements for manpower to a far better extent as they deploy unmanned sensors and machinery systems.

4. Shaikh Ajaharuddin G, Prof. P.G. Tathe (2018) proposed a paper that point out the multitasking of the multipurpose vehicle, that is the two operation are multitasked in a single assembly. The vehicle

5.

6. was adopt with the scientific and precision forming technology and variable dimensions and farming specifications.

7. David D. Wilson and john H. Lumkes (2015) proposed a paper about the agricultural attachments such as maize grinder, two-row planter and 3-point hitch caddy which was designed and tested with practical utility platform.

8. Prof. P. V. Bute, Shailesh Deshmukh and Vishal Deshmukh (2018) proposed a paper to develop the need mechanism that is capable of doing the specification farming operation automatically with the help of RF module for wireless communication.

Methodology

A methodology for agricultural based multifunction E-Vehicles involves a structured approach to designing, building, testing and implementing electric vehicle that serve various function within the agricultural sector. Here a comprehensive outline of the methodology.

1. **Problem Definition and scope :-** Clearly define the objectives of the project, including the type of objectives of the project, including the types of agricultural tasks the E-vehicles will perform (e.g. plowing, planting, harvesting, transportation), the scope as reduced emission, improved efficiency, and cost saving.

2. **Literature Review :-** Conduct a through review of existing literature, patents, and research related to agricultural machinery and electric vehicles. Identify successful case studies, technological advancements, and challenges faced in both fields.

3. **Requirement Analysis :-** Identify and prioritize the specific requirement for the agricultural based multifunction E-Vehicles. This includes understanding the terrain, copy type, load capacity, power requirements, range, battery technology, charging infrastructure, and user

interface.

4. **Conceptual Design :-** Brainstorm and develop

conceptual designs for the E-Vehicles that

5. integrate the identified requirements. Consider factor such as vehicle structure, energy sources, power distribution, control system, ergonomics and safety features.
6. **Technical Design and Engineering**:- Develop detailed technical design and engineering plans based on the selected concepts. This involves creating 2D/3D models, selecting appropriate materials, determining powertrain specification, designing battery storage, and integration necessary sensors and control system.
7. **Battery Technology and Energy Management** :- Research and choose suitable battery technology considering factors like energy density, charge discharge cycles, and compatibility with the vehicle's power needs. Develop an energy managements system to optimize battery usage, extending vehicle range and battery life.
8. **Charging Infrastructure** :- Design a charging infrastructure plan for the E-vehicle. Consider both on-farm charging stations and external charging option, taking into account power requirements, charging speed, compatibility, and safety.
9. **Prototype and testing** :- Building prototypes of the E-Vehicle based on the technical designs. Rigorously test the prototypes under different agricultural scenarios to ensure they meet performance, efficiency, and safety standards. Iterate and refine designs based on test results.
10. **Data Collection and Analysis** :- During testing, gather data on vehicle performance, energy consumption ,operational efficiency, and user feedback. Analyze this data to identify areas for improvement and optimization.
11. **Regulatory and Compliance Consideration** :- Ensure that the E-Vehicle adhere to relevant agricultural and vehicles regulation safety standards, and emissions requirements. Obtain necessary certification and approvals.
12. **User training and acceptance** :- Develop training materials and conduct training sessions for farmers and operators to effectively and safely use the multifunctional E-Vehicle. Gather user feedback and make any necessary adjustments.
13. **Scaling and Deployment** :- Once the prototype has been thoroughly tested and refined, initiate the process of scaling up production and deploying the E-Vehicle to agricultural settings. Collaborate with distributors, dealers, and end users to facilitate a smooth deployment process.

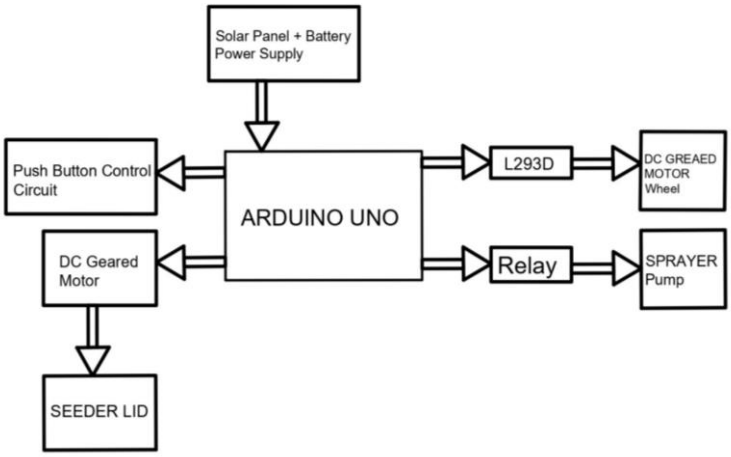

Fig. Block diagram of Agriculture based multifunction's E-vehicle

- **For Sprinkling Purpose**

Sprinkling purpose in agriculture refers to incorporating a sense of meaning and sustainability into the practice of farming. This concept emphasizes the importance of not just producing food but doing so in a way that aligns with broader societal and environmental goals.

1. **Sustainable Farming Practices:** Implementing sustainable farming methods such as organic farming, permaculture and regenerative agriculture to reduce the environmental impact of agriculture.

2. **Biodiversity Conservation;** Promoting biodiversity on farms by planting covers, preserving natural habitats, and reducing the use of chemical pesticides and herbicides.

3**. Local Food Systems:** Supporting local food systems and reducing the carbon footprint of agriculture by sourcing and consuming locally produced food.

4. **Water Management:** Efficiently managing water resources through methods like drip irrigation and rainwater harvesting to reduce water waste and pollution.

5. **Arduino Uno:** The Arduino Uno is the brain of the system. It receives data from the flow sensor, specifically the flow rate and volume. Based on this information, it decides whether to open or close the solenoid valve. It opens the valve when the water tank is not full and it closed the valve when the tank is full.
6.**Ductile wire:** inside the bendable tubes, there's a ductile wire. This wire likely helps maintain the shape and direction of the tubes when bent.

- **For Seeding Purpose**

1. **Water Detection System:** This system detects the presence of water, likely as an input trigger for the rest of the system.
2. **Solenoid Valve:** The solenoid valve controls the flow of water. It can open and close to allow or stop the flow of water.
3. **Flow Sensor:** A flow sensor is placed after the solenoid valve to monitor the flow rate and volume of water passing through it.
4. **Arduino UNO:** The Arduino UNO is used as the controller for the system. It receives data from the flow sensor and makes decisions based on this data. Specifically, it opens the solenoid valve when the water tank is not full, and it closes the valve when the tank is full. The criteria for these actions are based on "disturbance," although the nature of this disturbance isn't specified.

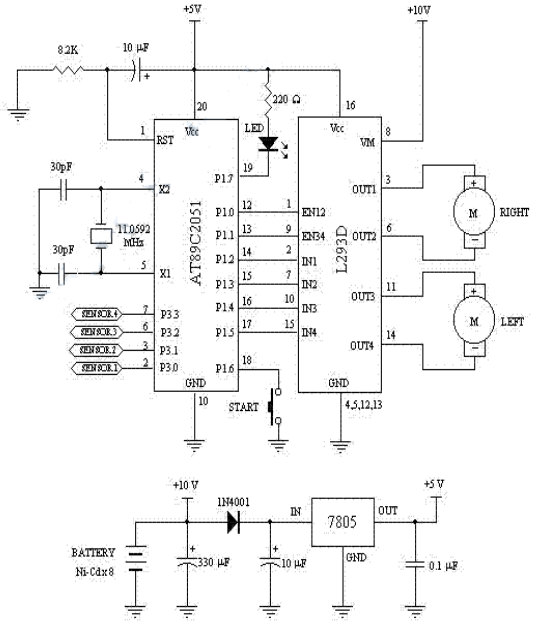

Fig. Circuit diagram of Agriculture based multifunction's E-vehicle

- Using the L293D motor driver, makes controlling a motor as simple as operating a buffer gate IC. It totally isolates the TTL logic inputs from the high current outputs.
- Putting a logic 1 on the pin In1 will make Out1 pin go to V power (36 Volts MAX.), while a logic 0 will make it go to 0V Each couple of channels can be enabled and disabled using E1 and E2 pins.
- When disabled a channel provide a very high impedance (resistance) to the motor, exactly as if the motor wasn't connected to the driver IC at all, which makes this feature very useful for PWM speed control

Advantages :-

1) It can be sent to another planet to study their environmental conditions.
2) The machines could easily work around trees, rocks, ponds and other obstacles.
3) The robot will be able to exposed in different weather conditions.

Application

Robots have also found some applications in agriculture.
1. In Australia a robotic system has been developed for sheepshearing
2. Robots for field sowing
3. Raisin and apple gathering
4. Mobile robots can be envisioned performing such work as irrigation, harvesting, cultivating, planting, spraying and field inspection, and as guardians of animal welfare.

Reference

[1] 'Design of an Autonomous Vehicle for Precision Agriculture using Sensor Technology*',*

wseas Transactions On Environment And Development (E-ISSN: 2224-3496,2018)
[2] 'Development of a Prototype of Autonomous Vehicle for Agriculture Applications', *Smart Wireless* Communication Ecosystem Research Group
[3] 'Automatic Sensor Correction of Autonomous Vehicles by Human-Vehicle Teaching-and-Learning', IEEE Transactions On Vehicular Technology, Vol. 67, No. 9, September 2018

[4] 'Flow based valve position control using NI my DAQ', K Dusarlapudi, KU Kiran, MV Narayana, MV Suman, International Journal of Engineering & Technology,2017, 7 (2.7), 955-957

[5] Kalyan Dusarlapudi, K Narasimha Raju, Preeti M, ASCS Sastry, "Genesis of MEMS Accelerometers for Select the Optimal Accelerometer for Bio Applications", International Journal of Innovative Technology and Exploring Engineering (IJITEE), ISSN: 2278-3075, Volume-9 Issue-2, December 2019.

[6] Bade, R., Ramana, B.V., Dusarlapudi, K., A six servo six DOF position-controlled platform for sorting application,2019, International Journal of Engineering and Advanced Technology, 8(4), pp. 1215-1219

[7] Eldo, Cerin, Riya k, Mohazmed Anees s, and Rajiniganth e. "Treatment Of Textile Plant Effluent By Using A Heat Exchanger." international journal of communication and computer technologies 7.supplement 1 (2019), 27-29. Print. Doi:10.31838/IJCCTS/07.sp01.06

[8] Z ZAIN, "High Speed And Lowpower Gdi Based Full Adder", Journal of VLSI Circuits And Systems, 1 (01), 59,2019

[9] Nadir hakem "a compact dual frequency stacked patch antenna for IRNSS applications", National journal of antennas and propagation, volume 1, issue 1, 2019

[10] Lamia medouni-haroune, Farid Zaidi, Sonia Medouni-adrar, Mouloud Kecha (2018) olive pomace: from an olive mill waste to a resource, an overview of the new treatments. Journal of Critical Reviews, 5 (6), 16. doi:10.22159/jcr.2018v5i5.28840