

Review on Smart Weed Cutter with Iot Application

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ABSTRACT: In agricultural fields, there grows unwanted plants. we have to get rid of those troublesome plants so we designed an agricultural IoT tool to cut down the weeds that affects cultivation. The tool we designed is a normal sized weed cutting device with rocker bogie mechanism to overcome rough terrains and to maintain stability while cutting weeds. The device can be controlled via mobile phones with some easy controls with the help of Internet of Things. It is easy to control you can also have visual support with the help of esp32cam. The idea is to design a remote controlled model that can run over the obstacles on the fields and can cut down the weed to the tolerable level. This paper shows the review on rocker-bogie suspension framework so as to ensure high mobile steadiness as well as excellent versatility of a prototype grass cutting vehicle while traversing through rough terrains.

I. INTRODUCTION

The major issue in farming or harvesting is because of the plants that grows beside some crops or saplings. Those are called weeds which compete for nutrients with other plants and some attract insects that may end up affecting the cultivation. There are lots of conventional weed cutters that are available in the market already for use but why we commit ourselves to design this model is because there are some drawbacks on the existing model. most of them are man powered, someone has to carry the whole thing in order to cut down the weeds. Our goal is to ease their work And on the other hand there are some remote controlled devices but are mainly focused to level the grass in smooth surfaces like cricket or football stadiums. They are compact in size so that they may find difficulties on running over the fields.

Our proposed system comes up with rocker bogie mechanism to get through the obstacles and rack & pinion mechanism which helps the cutter to move up and down so that we can trim the weed as of required size and we also installed a cam for monitoring. The rocker bogie suspension is proposed to take care the issue of vehicle not getting over unpleasant bumps or uneven fields. Rocker-bogie suspension deals with the locomotion and stability of the vehicle. Our model is designed such that it can traverse various difficult terrains and overcome obstacles in its path while maintaining proper durability and avoiding any unnecessary tumbling in any direction. The rocker-bogie configuration has no springs or stub axles for each wheel, enabling the model to move over obstructions like rocks that are up to double the wheels width in size while keeping every one of the six wheels on the ground.

II. LITERATURE SURVEY

2.1 Smart solar grass cutter

Firas B. Ismail, Nizar F.O. AL-Muhsen, Fazreen A. Fuzi, A. Zukiplierpresented a paper on 'Design and development of smart solar grass cutter' in the International Journal of Engineering and Advanced Technology(IJEAT) volume 9, issue 2, 2019. In this the author discussed about a device that can be fueled by solar energy and smartly controlled and it has three main systems such as smart control system, solar system, and the grass cutter.

2.2 Smart solar grass cutter with lawn coverage

Prof. S.M.Patil, Bhandirge Prajakta, Kumbharsnehal, patildhanashripresented a paper on 'Smart solar grass cutter with lawn coverage' in the International Research Journal of Engineering and Technology(IRJET) volume 5, issue 3, 2018. In

this the author propose a model of automatic grass cutting machine which performs the grass cutting on its own and is powered through solar energy.

2.3 Smart Autonomous Gardening Rover with Plant Recognition

Deepan Raj M, Gogul I, Pragadesh S.K, Sathiesh Kumar V, SarathkumarSebastin J presented a paper on “Smart Autonomous Gardening Rover with Plant Recognition using Neural Networks” in the 6th International Conference on Advances in Computing & Communications, ICACC 2016, September 2016. In this paper they discussed about the system with combination of new technologies involving an interdisciplinary approach to carry out precision gardening using Internet of Things (IoT).

2.4 Agricultural Robotics: Unmanned Robotic Service Units

Fernando Alfredo AuatCheein, Ricardo Carelli, presented a paper on “Agricultural Robotics: Unmanned Robotic Service Units in Agricultural Tasks” in the IEEE Industrial Electronics Magazine, 2013. In this paper the author present applications, challenges, and show a growing interest SLAM system integration.

2.5 Smart irrigation and field surveillance system

Baranidharan d, Sellaboyina Praveen, Sistla Venkata suryateja, Amit, presented a paper on ‘IOT based smart irrigation and field surveillance system’ in the International Research Journal of Engineering and Technology (IRJET) volume 8, issue 5, 2021. In this author describes, with the help of esp32cam how the crops should be watched frequently, and the fields should neither be over irrigated nor under irrigated with the help of an embedded system.

III. REVIEW ON SMART ROCKER BOGIE WEED CUTTER FOR AGRICULTURAL PURPOSE

3.1 Technology

3.1.1 Internet of things

The Internet of Things (IoT) describes the network of physical objects-“things”-that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. Generally, IoT is most abundant in manufacturing, transportation and utility organizations, making use of sensors and other IoT devices; however, it has also found use cases for organizations within the agriculture, infrastructure and home automation industries, leading some organizations toward digital transformation.

IoT Based Grass Cutter

Chandran, Mamtajalam, Virendra Vikram singh, Vivek Yadav presented a paper on “IoT Based Grass Cutter with Solar Pannel” in the International Journal of Scientific & Engineering Research. In this research paper they are describing latest features and technology used in newly hand made Grass Cutter which is totally based on IOT (INTERNET OF THINGS) and ROBOTICS.

Automated Grass Cutter Robot Based on IoT

Neha, SyedaAsrapresented a paper on “Automated Grass Cutter Robot Based on IoT” in the International journal of Trend in Scientific Research and Development (IJTSRD). In this paper they discussed about an automated battery powered grass cutter for the removal of unnecessary grass from the lawn hence by protecting the environmental pollution as it replaces fuel based grass cutters by battery powered automated ones.

3.2 Mechanism

3.2.1 Rocker Bogie mechanism

The rocker-bogie suspension system is a passive springless and symmetric mechanism. Each side of the rocker-bogie has a rocker and a bogie: the rocker is connected to the rear wheel, and the middle wheel and the front wheel are connected by the bogie. The two sides of rocker-bogie are connected by the differential bar attached to the main body, which ensures that the six wheels are in contact with the ground all the time providing a stable platform for the scientific instruments and sensors. The rocker-bogie suspension system is good at dealing with obstacles and excellent traversability. However, the rocker-bogie based robots must move at a very low average speed to ensure the stability of traveling.

Design of Rocker bogie mechanism

Abhiseka verma, Chandrajeetyadav, Bandana singh, Arpritu presented a paper on ‘Design of rocker bogie mechanism’ in the International Journal of Innovative Science and Research Technology(IJSRT) volume 2, issue 5, 2017. This paper describes how the MER rocker-bogie suspension subsystem was able to meet the conflicting design requirements while highlighting the variety of deployment and latch mechanisms employed in the design.

Rocker bogie suspension for a planetary rover prototype

Anmol singh, PK jain presented a paper on ‘A study on rocker bogie suspension for a planetary rover prototype’ in the International Journal of Advance Research and Innovation volume 8, issue3, 2020. In this the author explains how the rocker-bogie suspension deals with the locomotion and stability of the rover vehicle and how is designed such that it can traverse various difficult

terrains and overcome large obstacles in its path while maintaining proper durability and avoiding any unnecessary tumbling in any direction.

Rocker bogie mechanism for disaster relief

S. F. Toha and Zakariya zainolpresented a paper on 'System modeling of rocker bogie mechanism for disaster relief' in the journal IEEE International Symposium on Robotics and Intelligent Sensors, 2015. In this the author proposed a vehicle that should be able to transverse on an uneven road surface and at the same time be able to man oeuvre smoothly on a water surface. In this paper, they focus on the development and design of mechanical system on land that took consideration the features of water vehicle.

3.2.2 Rack and pinion mechanism

A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. A circular gear called "the pinion" engages teeth on a linear "gear" bar called "the rack". Rotational motion applied to the pinion causes the rack to move relative to the pinion, thereby translating the rotational motion of the pinion into linear motion Rack and pinion, mechanical device consisting of a bar of rectangular cross section (the rack), having teeth on one side that mesh with teeth on a small gear (the pinion). The pinion may have straight teeth, or helical (twisted) teeth that mesh with teeth on the rack that are inclined to the pinion-shaft axis. If the pinion rotates about a fixed axis, the rack will translate; i.e., move on a straight path. Some automobiles have rack and pinion drives on their steering mechanisms that operate in this way. If the rack is fixed and the pinion is carried in bearings on a table guided on tracks parallel to the rack, rotation of the pinion shaft will move the table parallel to the rack. On machine tools, rack and pinion mechanisms are used in this way to obtain rapid movements of worktables, the pinion shaft is usually rotated with a hand crank.

Design of Rack and Pinion Mechanism

Alla Sri Sai Reddy, Dr.Munish Mehta, Siva Sankar Vempati, presented a paper on "Design and analysis of Rack and Pinion Mechanism", Journal of Emerging Technologies and Innovative Research (JETIR), Volume-8, Issue 5, 2021. In this paper they have designed a rack and pinion mechanism and analyzed the rack and pinion mechanism to reduce the weight of the components.

IV. CONCLUSION

This project is proposed for reduce the human works on Agriculture sector and increase the flexibility in agriculture. It also exhibits a tiny

step towards automation in Agriculture across the world. We can use this project in rough terrains without any suspensions with the help of Rocker bogie mechanism and we can trim the weeds at different height with the rack and pinion mechanism .The weed cutter is suitable to be used for small application due to the shortest operating time, but it is not suitable for tall height grasses. For future work, there are few recommendations can be update this device. The motor for the blade have both high speed and torque. The proposed system was cost efficient with high reliability.

REFERENCES

- [1]. Abhisekverma, Chandrajeetyadav, Bandana singh, Arpritu Gupta, Jaya mishra, Abhishek saxena, "Design of Rocker bogie mechanism", (IJISRT) International Journal of Innovative Science and Research Technology, Volume-2, Issue-5 (2017).
- [2]. Abhaykantsinha and Reshma sinha, "Design of stair climbing Rocker bogie mechanism", (IJIRSET) International journal of Innovative Research in Science, Engineering and Technology, Volume-7, Issue-7 (2018).
- [3]. Anmol Singh, PK Jain "A study on rocker bogie suspension for a planetary rover prototype", International Journal of Advance Research and Innovation, Volume-9, Issue-3 (2019).
- [4]. Alla Sri Sai Reddy, Dr.Munish Mehta, Siva Sankar Vempati, "Design and analysis of Rack and Pinion Mechanism", Journal of Emerging Technologies and Innovative Research (JETIR), Volume-8, Issue 5, 2021.
- [5]. Baranidharan d, Sellaboyina Praveen, Sistla Venkata suryateja, Amit, "IOT based smart irrigation and field surveillance system", International Research Journal of Engineering and Technology (IRJET) Volume-8, Issue-5, 2021.
- [6]. B. Babu, N. Dhayanidhi, S. Dhamodharan, "Design and fabrication of Rocker bogie mechanism geosurvey rover", (IJSRD) International Journal of Scientific Development and Research, Volume-3, Issue-8 (2018).
- [7]. B. D. Harrington and C. Voorhees, "The Challenges of Designing the Rocker-Bogie Suspension for the Mars Exploration Rover", Proceedings of the 37th Aerospace Mechanisms Symposium, Johnson Space Center, May 19-21, 2004.
- [8]. B. P. Dilip, N. B. P. , V. S. U. , S. W. , and P. S. M. , "Design and Implementation of Automatic Solar Grass Cutter", International

- Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Volume-6, Issue-4, 2017.
- [9]. B. P. Prof. S.M.Patil, KumbharSnehal, Patil Dhanashri, "Smart Solar Grass Cutter With Lawn Coverage", International Research Journal of Engineering and Technology (IRJET), Volume-5, Issue-3, 2018.
- [10]. Chandran, Mamtajalam, Virendra Vikram singh, Vivek Yadav, "IoT Based Grass Cutter with Solar Pannel", International Journal of Scientific & Engineering Research Volume 10, Issue 4, April-2019.
- [11]. Deepan Raj M, Gogul I, Pragadesh S.K, Sathiesh Kumar V, SarathkumarSebastin J, "Smart Autonomous Gardening Rover with Plant Recognition using Neural Networks", 6th International Conference on Advances in Computing & Communications, ICACC, September 2016
- [12]. Fernando Alfredo AuatCheein, Ricardo Carelli, "Agricultural Robotics: Unmanned Robotic Service Units in Agricultural Tasks". IEEE Industrial Electronics Magazine, 2013
- [13]. Firas B. Ismail, Nizar F.O. Al-Muhsen, Fazreen A. Fuzi, A. Zukipli "Design and Development of Smart Solar Grass Cutter", (IJEAT) International Journal of Engineering and Advanced Technology, Volume-9, Issue-2, December, 2019.
- [14]. F. Ullrich, A. Haydar G., S. Sukkarieh, "Design Optimization of a Mars Rover's Rocker-Bogie Mechanism using Genetic Algorithms", Proceedings from 10th Australian Space Science Conference, 2010.
- [15]. M. D. Manik, A. S. Chauhan, S. Chakraborty, V. R. Tiwari, "Experimental Analysis of climbing stairs with the rocker-bogie mechanism", Volume-2, Issue-2, 2016.
- [16]. Neha, SyedaAsra, "Automated Grass Cutter Robot Based on IoT", International journal of Trend in Scientific Research and Development (IJTSRD), volume-2, Issue-5,2018.