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FABRICATION OF PROXY SOLDIER FOR ELIMINATION AND SURVEILLANCE PURPOSE

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Abstract: In today's world where technology is increasing at a drastic rate, many countries are investing in developing the war-field military robots where they are working on the advancement of robots so that they can develop a robot which can help the soldiers in missions, wars, surveillance, and many other tight situations. With time the demands are increasing and countries like Russia, United Kingdom, United States, China, Israel, Brazil, Australia, South Korea and Iran are investing a lot in these military robots. In this robot, a rocker-bogie system will be used so that while moving, the robot can easily move through the uneven path. A 12V rechargeable battery will be used that will help the motors in rotating so that the robot can move. There will be two more pieces of equipment attached to it, like a camera for surveillance and helping the soldier in controlling the robot and an automatic gun that can rotate about its axis and can eliminate the enemies easily.

For this topic, we have taken the help of IOT for controlling and commanding the proxy soldier for performing the tasks.

1. INTRODUCTION

India is a developing country and with an increasing rate of development, India is now investing in various branding projects in India. In recent times many cases have been seen where terrorists enter the country and try to disrupt the peaceful environment of our nation. To neutralize those enemies, our soldiers have to put their life at risk and many times they lose their lives fighting with them for the country. The loss of those soldiers is not only the loss of their families but also of the whole country.

Therefore, we are developing this robot in order to safeguard our soldiers. This is a remote-controlled robot which can be operated from far away by the soldiers with the help of the camera and can take the desired actions according to the situation. The robot works on a rechargeable battery which will rotate and allow the robot to move. The robot is based on the rocker-bogie mechanism which will help the robot move on uneven surfaces. The camera and the gun attached to the robot can rotate freely on their axis which will help the soldiers in moving the robot accordingly. The main work of the robot is to help the soldiers in surveillance and to eliminate the enemies without actually going there and risking their lives.

2. OBJECTIVES

- To fabricate the PROXY SOLDIER.
- To target and locate enemies.
- To move easily across the obstacles with the help of a rocker-bogie mechanism.
- To operate the PROXY SOLDIER with the help of a wireless controller.
- To share the view of the area.

3. LITERATURE REVIEW

3.1 Rocker Bogie Mechanism

Over the decades, cell robots had been extensively used to perform manifold duties which comprise military or commercial enterprise applications, planetary exploration, rescue operations and domestic or scientific services. Therefore, it isn't always surprising that excessive mobility in diverse environments has been a number one element amongst others at the same time as comparing the overall universal overall performance of the cell robotic.

While the leg-kind cell robotic guarantees the maximum advanced adaptability to all types of environments, its mechanism is pretty complex due to the fact energetic management algorithms ready with extra actuators and sensors are required to regularly preserve its stability, which necessarily ends in gradual motion and bad strength performance. The track-kind cell robotic gives ideal mobility in off-avenue surroundings through the distinctive feature of its inherently solid mechanism however immoderate friction loss for the duration of converting a path additionally affects bad strength performance. Compared to different alternatives, the wheel-kind cell robotic may be built within the best configuration in order that rapid motion in addition to precise strength performance is assured with no complex management strategy. However, its adaptability to surroundings does now no longer appear to be sufficiently precise and its mobility is restrained relying on each the sort and the dimensions of encountered obstacle.

Recently, hybrid-kind cell robots had been advised in diverse configurations by combining locomotive mechanisms together. However, their mechanisms nevertheless appear to be complex in evaluation with the wheel-kind one and from the view factor of management, the cooperation among locomotion mechanisms emerges as any other vital issue. On the opposite hand, numerous wheel-kind locomotive mechanisms ready with passive linkages have efficiently established their cell performances in actual applications, for example, Mars Exploration Rovers like Sojourner, Spirit and Opportunity, SHRIMP, etc. Among the one's passive linkages, the rocker-bogie is properly known, which includes structural factors known as "rocker" and "bogie". The -wheeled bogie is attached to the rocker thru a pivot and rockers on each facet are coupled to every different thru a differential joint. Since all wheels of the rocker-bogie mechanism can preserve in touch with the floor below diverse environments, it's far viable now no longer most effective to equilibrate the strain of every wheel at the floor but additionally to efficiently flow ahead or backward. Also, this mechanism permits a cell robotic to preserve its stability on the common pitch perspective of each rocker in order that the opportunity of tip-over may be reduced.

2.2 Landmine Detection

Despite the overall focus on the number of land mines laid down across the globe, end-users wishes for brand new technology have to be nicely assessed that allows you to keep away from the waste of monetary funds, which will be higher carried out in different crucial components of the method, consisting of guide demining. Hence R&D in Humanitarian Demining should be focused on sustainable demining which means it must take into account the socio-economic impact of its results. Bringing previously mined land returned to their land-lords entails tons extra than landmines elimination activities. This is the purpose why this worldwide method is called Mine Action instead of Humanitarian Demining. Metal-cased land mines are comfortably detected with a metal detector. While the metal used in land mine casing is typically ferrous and thus would be detected by a magnetometer, which is a passive sensor, typically an active pulsed induction-type metal detector is employed instead.

Pulsed Induction sensors use a coil to transmit an electromagnetic pulse and then receive and detect any current induced by the pulse in subsurface metallic objects, hence the term “pulsed induction.” Essentially the same technology as coin detectors used by hobbyists on the beach, the these PI detectors are commercially available and lightweight.

2.3 Night Vision Technology

Humans reap cap potential to look at night-time situations through the usage of numerous exclusive imaging structures: night-time imaginative and prescient gadgets (picture graph intensifier structures), thermal imagers, SWIR imagers, and a few greater touchy seen or NIR cameras. However, because of historic reasons, night time imaginative and prescient generation is generally understood as night-time imaginative and prescient gadget.

Night imaginative and prescient gadgets are reputedly easy structures constructed from 3 major blocks: optical goal, picture-graph intensifier tube, and optical ocular.

The mission of the optical goal is to create low intensity, invisible picture-graph of the determined surroundings at entering the aircraft of the picture-graph intensifier tube. The latter tube together with an image cathode, and an anode informs of a phosphor screen, and different components intensify and enter low luminance picture graph right into a brighter picture graph created at the anode. The latter picture graph is visible through the human observer through the usage of the optical ocular. The design of NVDs is outwardly clean due to the fact critical modules like picture-graph intensifier tubes, optical objectives; optical oculars (eyepieces) are to be available in the marketplace from dozen or greater sources. However, notwithstanding this obvious layout simplicity, the technique of making output picture-graph through those imaging structures is pretty sophisticated.

4. APPLICATIONS:

The application of the system is as follows:

- It can be used for eliminating enemies using laser-guided weapon.
- It can be used for surveillance purposes providing a view of the area.
- It can be used for detecting the landmines.

5. WORKING

- 6-Macnet Helical Geared Motors of 100 rpm, 12V are being used for the motion of the wheels.
- 2-L298 motor drivers are used in which one is for driving the motor on which the gun is mounted and one is for the motion of the motors to which tyres are being attached.
- A 3rpm, 12V brushless motor is being used to rotate the gun and can bear a load up to 50kg.
- Node MCU Hotspot module is used to connect the proxy soldier with the mobile or devices.
- Jumper wires are being used to connect the system.
- 24-gauge copper winding is being used having 24 turns for the landmine detection.
- 12V 2.5amp battery is required for the system to work and 9V battery is required for the landmine sensor.
- Ada-fruit library is being used for the programming of the commands with the help of which we can move the proxy soldier.

6. SOFTWARE INTERFACE:

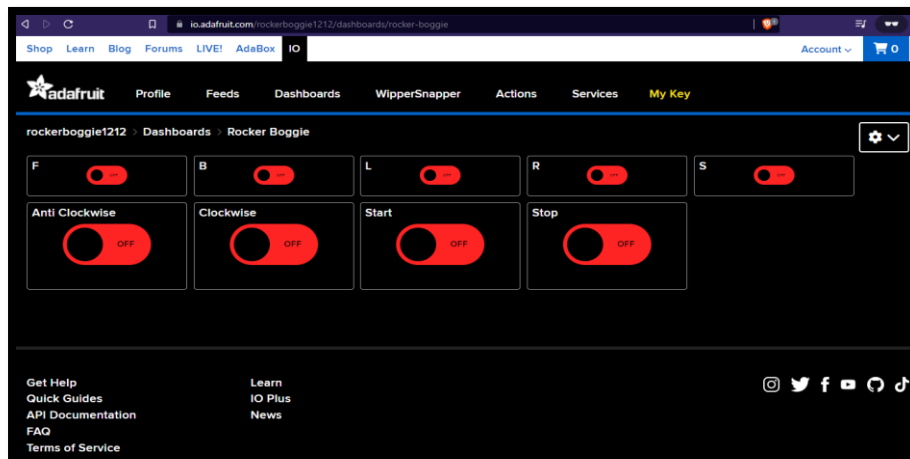


Figure 1. IOT Dashboard for controlling the robot

The above picture provides a view of the dashboard. As we can see we have made simple markings for various motions. By pressing the Forward button (F in the dashboard) one can move the system in the forward direction. Similarly, we can press 'B' for moving back, 'L' for turning left, 'R' for turning right and ultimately, we can press 'S' to stop the system immediately. It can be seen as a kind of emergency braking system.

In the other part of the dashboard, we have provided buttons like anticlockwise, clockwise start and stop to turn the mounted gun in the desired direction.

This project could have been controlled through the wired controller but that would hamper the range of this project. Another advantage of using the IoT dashboard is its ability to collect data.

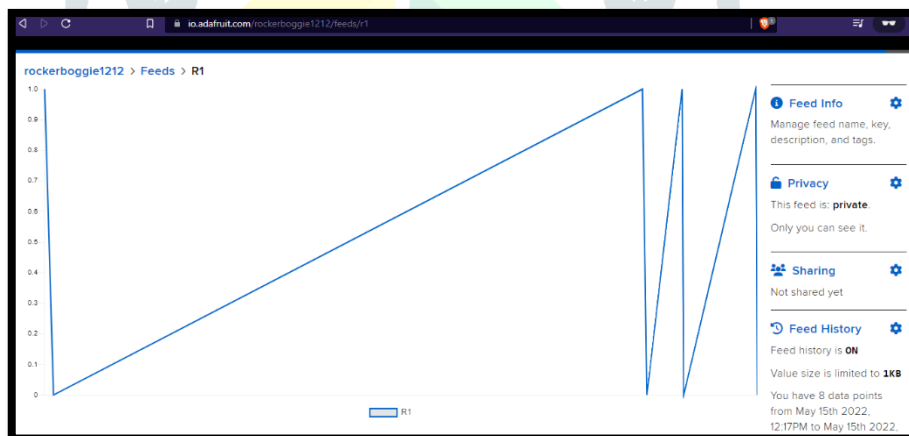


Figure 2. Feeds of Rocker Bogie

	A	B	C	D
1	id	value	feed_id	created_at
2	0F0Z0B9S35JNZK65BERAGRBOQFM	1	1821080	2022-05-15 06:47:06 UTC
3	0F0Z0BBJDWX22555CXDVT0MVHY	0	1821080	2022-05-15 06:47:12 UTC
4	0F0Z0F5MZH6RHHV5FHW0XVV60Y	1	1821080	2022-05-15 06:53:52 UTC
5	0F0Z0F6BWM32QXAZFHATS1CDF5	0	1821080	2022-05-15 06:53:55 UTC
6	0F0Z0FDQAD2KYQ0TRSCZFGHZB8	1	1821080	2022-05-15 06:54:19 UTC
7	0F0Z0FE4GRSBMMP7ZENHP4QB4M	0	1821080	2022-05-15 06:54:20 UTC
8	0F0Z0FX1W4WS7MSN3FWAR40EKT	1	1821080	2022-05-15 06:55:09 UTC
9	0F0Z0FXES31YR7C5NVCMMYPCYM	0	1821080	2022-05-15 06:55:10 UTC

Figure 3. Detailed Feed Information about the motion of the robot

In this figure, we can see how the forward motion has been tabulated in the form of a graph. This data can also be downloaded in the form of an excel file for research purposes and it appears in the following form.

This is a very advantageous part of our project as we have the ability to tabulate the data. This can be effectively used in machine learning algorithms. For example; if our project is being used in a specific area frequently then the various motions can be tabulated and can be fed into the machine learning algorithms. By processing a large amount of data, we will arrive at a situation where the algorithm will be able to predict the direction of the project. In this manner, the project can be controlled with the help of an algorithm thereby reducing the dependency on humans for controlling the system.

7. FEATURES:

- It uses rocker-bogie mechanism as compared to the caterpillar moving mechanism, the rocker-bogie mechanism provides more versatility.
- The project can be controlled through any mobile device.
- The project provides live video and audio feeding.
- It can be used at night too as it supports night vision.
- It may be utilized by the squaddies for the detection of the landmines
- Soldiers can send these robots to a warzone, instead of putting their life at risk.

8. CONCLUSIONS:

We would like to conclude that, in this project, we have created a robot that utilises the rocker-bogie mechanism for movement, a camera for surveillance and a copper winding for detecting landmines.

We have utilised PVC pipes for providing the base to the rocker-bogie system so as to reduce the overall weight of the project.

Initially, we decided to use an RF module in order to control the movement of the rocker bogies system. But the RF module was not able to interact properly with the motors. Apart from this, the reach of the RF Module was also limited. Keeping in mind these limitations, we switched towards using the hotspot module so as to control the project with the help of an IoT device. This not only made the connections with the motors hassle-free but also enhanced the reach of the project.

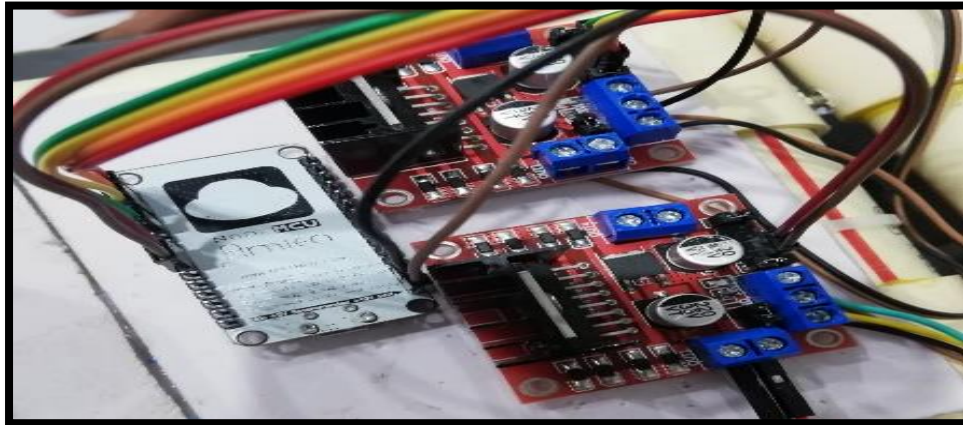


Figure 4. L298 Motor Driver and Node MCU

In the above picture, we can see that we have used a Node MCU that is connected to the L298 driver module. The IC device present in the driver module converts the 12volt supply into 5volt and sends it to the Node MCU device (as Node MCU doesn't work at 12volt supply).

9. FUTURE SCOPE:

- It has an awesome scope withinside the destiny because it can be a brilliant assist to the squaddies at some point in the fight conditions.
- It is a multi-motive robotic because of which it is able to be utilized in conditions apart from battles like for the surveillance motive or for detecting the landmines.
- It may be used as an undercover agent robotic and may be used for amassing statistics approximately the region wherein it's far deployed.
- It may be utilized by the squaddies for the detection of the landmines.
- It may be used for surveillance withinside the border regions in particular withinside the regions wherein there are severe climatic situations and is hard for a person to survive

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