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AGRICULTURE MULTI FUNCTION MACHINE

[1] Anchit Sakhare,[2] Soumya Ramteke,[3] Gautam Meshram,[4] Rahul Dabane,[5] Vibhanshu Borkar,[6] Prof. Aamir Sayyed

[1]Student ,[2] Student,[3] Student, [4] Student, [5] Student,[6] Prof,
[1] Department of Mechanical Engineering,
[1] J D College of Engineering & Management, Nagpur, Maharashtra, India

Abstract : This paper explores the role of agricultural robots in modern farming and the integration of Arduino as an open-source microcontroller platform in these systems. The paper highlights various applications such as, irrigation, Seeding , drilling and harvesting. It further discusses the technological advantages Arduino offers, along with challenges faced in field applications, and concludes with future prospects of agricultural robots powered by Arduino. 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.

IndexTerms **- : Agricultural, farming microcontroller, Arduino, robots .**

I. INTRODUCTION

This system is based on the implementation of an, advancements in technology have significantly transformed the agricultural landscape. Automation and robotics are paving the way for more efficient farming practices. Agriculture robots perform tasks such as planting, monitoring, and harvesting crops, thus helping farmers increase productivity while reducing labor costs. Arduino, an open-source electronics platform based on simple software and hardware, has emerged as a powerful tool for developing affordable agricultural robots. It enables farmers, hobbyists, and researchers to build customized robotic systems that can automate tasks like seeding, irrigation, and crop health monitoring at a fraction of the cost of commercially available systems. The structural part involves use of frames, beams, linkages, axles, etc. the mechanical parts/ accessories comprise various types of gears (spurs, crowns, bevels, worms and differential gear systems), pulleys and belts, drive systems(differentials, castors, wheels and steering) etc. The pneumatics plays a vital role in generating specific pushing and pulling movements such as those simulating arms or leg movement. Pneumatic grippers are also used with advantage in robotics because of their simplicity and cost effectiveness. The electrical items include DC and Stepper motors, actuators, electrical grips, clutches and their control. The electronic parts involves remote control, sensors (touch sensors, light sensor, collision sensor, etc), there interface circuitry and a microcontroller for overall control functions. This review focuses on the intersection of Arduino technology and agricultural robotics, presenting an overview of key applications, case studies, challenges, and future directions.

II. RESEARCH METHODOLOGY

2.1 Precision Seeding Robots

Arduino-based seeding robots equipped can plant seeds at precise intervals and depths, optimizing crop spacing and growth potential. These robots are particularly useful for small-scale farmers who need to maximize their land's productivity.

2.2 Autonomous Weeding Robots

One notable example is the use of Arduino-controlled robots that detect weeds using image processing techniques and remove them mechanically or with targeted chemical sprays. These robots reduce the reliance on herbicides, promoting eco-friendly farming.

2.3 Harvesting Robots

Several fruit-picking robots use Arduino microcontrollers to automate harvesting. For example, robotic arms equipped with cameras and actuators can identify ripe fruits and pluck them without damaging the plant, reducing labor costs and post-harvest losses.

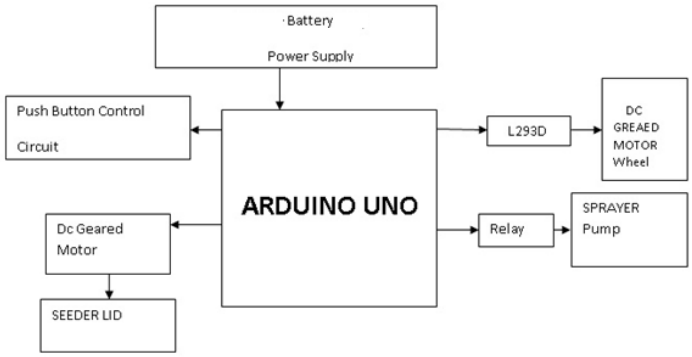

Figure 1. System flow

III. Research Analysis

Autonomous In modern farming applications so many differenttypes of automation techniques are used for easy and man less operation which includes the importantfun ctions like seeding and spraying fertilisers. The system uses so many automatic methods which reallyrequire very less man power. The drilling and seeding mechanism is so arranged that the farmer can be controlled from the microntroller control. To navigate the robot the motor is used which rotates at angle of around degrees. The system has been The microcontroller used here is aurdino uno which isflash based memory is so programmed that on receiving the particular data the particular action will execute. The controller is sensing the data and always in the polling mode which poles the I/p. if the data send from thetransmitter is for the action of front movement of the robot the particular binary data has been send in the formof RF waves as when it is interact with receiver further the sane data is available to the controller and it send thesignal to the motor driving unit so that motors has to rotate in the forward direction and moves.

- Innovation has been fruitful in utilizing electric vehicles for putting away overabundance vitality from the matrix
- During off-top burden request time and giving vitality during pinnacle request time. The proposed framework uses both the matrix just as the vitality from photovoltaic boards. The vehicles have their own PV boards. The batteries are charged utilizing both sun powered power and the vitality from the network which is used if all else fails and during off-top occasions.
- The framework likewise encourages power move between vehicles without other vitality sources**.**

It improve the efficiency of crop production without influencing the different agriculture variable and reducing production cost. The vitality from the network which used if all else fails and during off top occasions. For farming vehicles an electric vehicles. Electric vehicles give easy way to replace the old vehicle with less maintenance. Reducing environmental impacts and the dependency on fossil fuels are considered as important issues in energy policies globally. The researchers developed autonomous technologies to help with working in an agricultural field. This results in a higher amount of energy that is produced. Charging circuit is used for the charging the battery. It is a micro controller based charging circuit with will show the status of charging. Battery (electricity), an array of electrochemical cells for electricity storage, either individually linked or individually linked and housed in a single unit. An electrical battery is a combination of one or more electrochemical. What we present here is an elementary robotic land rover that can be control remotely using primarily the RF mode. The RF remote control has the advantage of adequate range (up to 200m with proper antenna) besides being omni directional. On the other hand, an IR remote.

would function over a limited range of about 5m and the remote transmitter has to be oriented towards the receiver module quite precisely. However, the cost involve in using RF modules is much higher than that of IR components and as such, we have included the replacement alternative of RF modules with their IR counterparts for using the IR remote control. The proposed land rover can move in forward and reverse direction. You will also be able to steer it towards left and right directions. While being turn to left and right, the corresponding blinking LEDs would blink to indicate the direction of its turning. Similarly, during reverse movement, reversing LEDs would be lit. Front and rear bumpers are provided using long operating lever of micro switches to switch off the drive motors during any collision. The decoder being used for the project has latch outputs and as such you don't have to keep the buttons on remote control pressed for more than a few milliseconds. This helps prolong the battery life for remote. The entire project is split up into sections and each section is explain in the sufficient detail to enable you not only to fabricate the present design but also exploit this principles for evolving your own design with added functions.

3.1 Forward and reverse movement:

To keep your design as simple as possible, we have coupled a 30rpm geared 6v DC motor to the left front wheel and another identical motor to the right front wheel. Both these front motors are mounted side by side by facing in opposite direction.

Wheel rims (5cm diameter) along with rubber wheels are directly coupled to each of the motor shafts. This arrangement does not require separate axles.

During forward (or reverse) movement of the vehicle, the two wheel shafts, as viewed from the motor ends, would move in opposite directions (one clockwise and the other anticlockwise). For reversing the direction, you simply have to reverse the DC supply polarity of the two motors driving the respective wheels.

Steering control:

There are different methods available for steering a robotic vehicle. The commonly used ones are:

1. Front wheels are used for steering, while rear wheels are used for driving eg. Tractors.

2. Front wheels are used for steering as well as driving eg, in most light vehicles. In these vehicles (such as cars), the front wheels are coupled using a differential gear arrangement. It comes into play only when one wheel needs to rotate differentially with respect to their axes.

Here is a typical circuit for driving one of the motors, in forward or reverse direction, coupled to, say the left hand front wheel. Simultaneously, the right direction for the moving the vehicle in the same direction. It means that input terminals of the motor drive circuit for the right hand motor have to be fed with reverse polarity control signals compared to those of the left hand motor drive circuit.

IV. RESULTS AND DISCUSSION

Electric vehicles give easy way to replace the old vehicle with less maintenance. Reducing environmental impacts and the dependency on fossil fuels are considered as important issues in energy policies globally. The researchers developed autonomous technologies to help with working in an agricultural field. Being powered from a 7.2V battery, the regulator U3 provides regulated 5V for the microcontroller and for the logic gates of the motor driver. You can add a capacitor between the output of the regulator and the ground to absorb the noise caused by the presence of motors in the system, but I didn't use any, and didn't face. When the switch SW1 is switched OFF, the battery can be charged using the jack J2.The line sensor is composed of 4 cells, and is based on the IR emission/reception technique described. D1 to D4 are IR LEDs used as receivers, D9 to D12 are also IR LEDs, but used as emitters this time. The output of the line sensor is directly fed from the Op Amps to the microcontroller. Only two outputs are connected to the LEDs D7 and D4, giving a direct indication of the output of the sensor, making the calibration process very easy through the shows the 4 emitter and 4 receiver LEDs at the front of the robot. Note that this is the optimal position of the line sensor, as you can see in the tutorial above about line sensors
It is also clear that they are mounted on the copper side of the board, even through they are regular LEDs (not SMT type). The Leads of the LEDs are used to adjust the height of the sensor from the ground. 10 to 20 millimeters proved to be a fair height for the sensor to function properly.

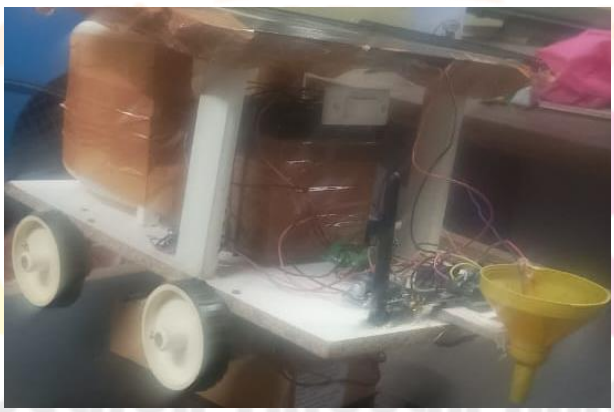

Figure 2 . Agriculture Multi Function Machine

Figure 3 . Remote Control

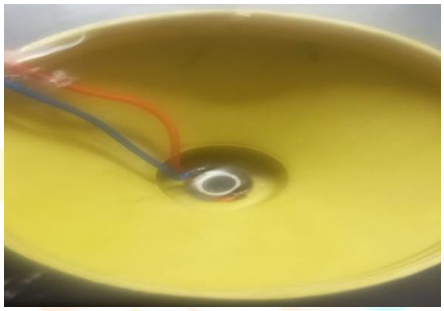

Figure 4. Seeding System

V. Conclusion

Multipurpose farming robot has effectively actualized and tried for operations like ploughing,. An underlying result of this examination shows that the greater part of these frameworks that work with self-governing, are more adaptable than customary frameworks. The upsides of multipurpose horticultural robots are lessening human intercession, guaranteeing appropriate water system and proficient use of assets. In future, It can be reached out by utilizing ultrasonic sensors and cameras for playing out similar activities without human administrator for estimating the different parameters like soil condition, region secured by the robot and leveling.

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