DESIGN AND FABRICATION OF A MULTITASKING AGRICULTURAL ROBOT WITH STAIRS CLIMBING CAPACITY

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Abstract
This system is based on multiple sensors and sprayer filled with pesticides. The Sprayer movement is controlled by DC motor at low velocity, up & down direction according to plant height. The design deals with three modules image capturing, processing and automatic pesticide spraying the proposed system able to do almost all the necessary requirements of green house agriculture and can remotely operate through any electronic device like mobile, laptop etc. To deal with problems related to effective utilization of water, humidity control, diagnosis of crop disease and to reduce labour intensity are very essential. This project presents an engineering solution to tackle these kind of problems in which an automatic soil moister, air humidity and pesticide sprayer is involved to spray the pesticide to the localized area of the affected crops.

Keywords:
Agricultural Robot, Stair Climbing Capacity, Social Robot, Arduino.

I. INTRODUCTION

In spite of the emphasis on industrialization, farming remains an overwhelming area of the Indian economy both as far as commitment to total national output (GDP) and a wellspring of employment to millions the nation over. Agribusiness assumes a key part in the Indian economy. More than 70 for every penny of the rustic family units rely upon agribusiness as their important methods for livelihood. Be that as it may, absence of water assets, high mugginess, assault of bug in crops, less availability of works are the significant issues to lessen the creation development in horticulture field. To deal with this sort of issues successful use of water, stickiness control, analysis of cro p sickness and to lessen work force are exceptionally fundamental. This undertaking presents a building answer for handle these sort of issues in which a programmed soil moister, air stickiness a d pesticide sprayer is included to splash the pesticide to the limited territory of the influenced crops.

This framework depends on numerous sensors and sprayer loaded with pesticides. The Sprayer development is controlled by DC engine at low speed, up and down heading as prep subterranean insect tallness. The plan manages three modules picture catching, preparing and programmed pesticide showering

The proposed framework ready to do all the vital prerequisites of greenhouse farming and can remotely work through any electronic gadget like versatile, workstation and so on.

II. MATERIALS USED

The following are the vital hardware features used in the design of the robot:

A. Microcontroller:

The Arduino MEGA ADK is a microcontroller board based on the ATmega2560. It has a USB host interface to connect with Android based phones, based on the MAX3421e IC. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

B. Sensors

A typical Soil Moisture Sensor consist of two components. A two legged Lead, that goes into the soil or anywhere else where water content has to be measured. This has two header pins which connect to an Amplifier/ A-D circuit which is in turn connected to the Arduino. The Amplifier has a Vin, Gnd, Analog and Digital Data Pins. This means that you can get the values in both Analog and Digital forms. it. It has the Digital Motion Processing unit present on-board.

Flame sensor Utilization: These kinds of sensors are utilized for short range fire discovery and can be utilized to screen ventures or as a security safeguard to cut gadgets off/on. Range: I have discovered this unit is generally exact up to around 3 feet. How it functions: The fire sensor is extremely delicate to IR wavelength at 760 nm ~ 1100 nm light. Simple yield (A0): Real-time yield voltage motion on the warm protection. Advanced yield (D0): When the temperature achieves a specific edge, the yield high and low flag limit customizable by means of potentiometer.

Ultrasonic sensor:

A Ultrasonic sensor is a gadget that can quantify the separation to a question by utilizing sound waves. It allots separate by sending a sound wave at a particular recurrence and tuning in for that sound wave to bob back. Ultrasonic sensors are described by their unwavering quality. They have a level estimation with millimetre accuracy.

Understand that a few articles won't not be identified by ultrasonic sensors. This is on account of a few items are moulded or situated such that the sound wave skips off the protest, however are diverted far from the Ultrasonic sensor. It is additionally feasible for the protest be too little to reflect enough of the sound wave back to the sensor to be distinguished.

C. DC Motors:

Two 200RPM DC motors are used for locomotion purpose.

The advantage of these motors is that their speed can be controlled by varying the supply voltage or by varying the strength of the current in the field windings.

D. Motor Driver:

The Arduino Uno outputs a 5V on its digital output pins which is insufficient to drive the DC motors. Hence the need for an amplifier is fulfilled by the use of a L298N dual H-Bridge Motor Driver. These motor drivers can be used to drive motors that have a voltage range of 5 to 35V. These boards also have an on-board voltage regulator which provides a 5V output from the 12V input supply

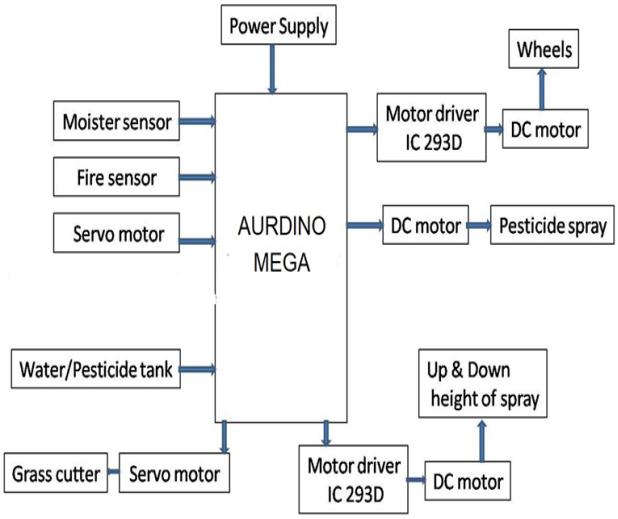
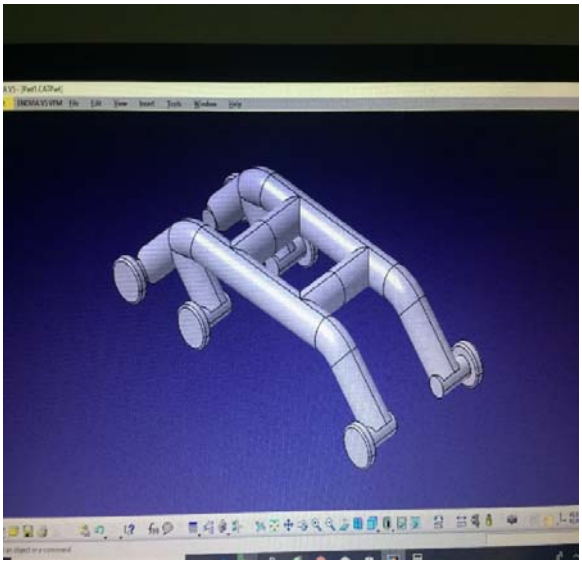


Fig: Block diagram Of Multitasking Agricultural Robot.

III. RESULTS

An experiment was conducted when the robot was balancing along with voice assistant kit mounted on it. The prototype model developed is shown in the fig 1.e.

An instance of the interaction with the robot in the experiment is described in the table shown below.



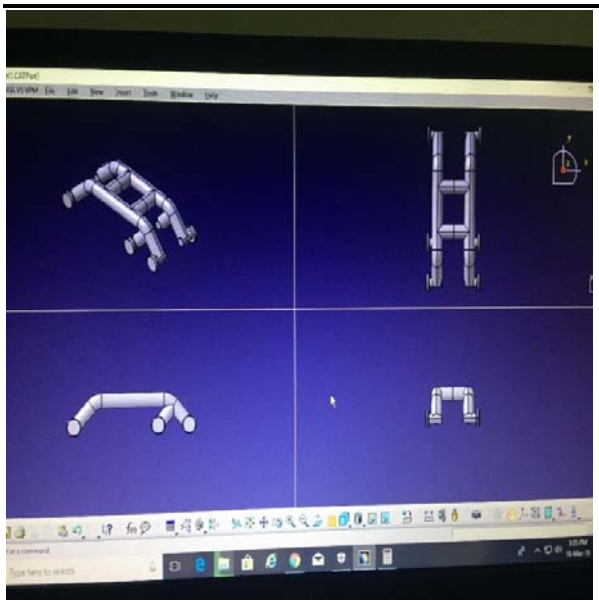


Fig : 3D Model of the proposed Agricultural robot.

IV. RELATED WORKS

Design and Fabrication of an Autonomous Fire Fighting Robot with Multisensory Fire Detection Using PID Controller[1]

Multisensor Fire Detection System (MSFDS) is one of the important research issues. Here, a fire fighter robot is fabricated providing extinguishment platform. There is about 1 litre water reserving capacity. An Arduino based simple algorithm is used for detection of fire and measurement of distance from fire source while the robot is on its way to extinguish fire. When the fire is detected and the robot is at a distance near to fire, a centrifugal pump is used to throw water for extinguishment purpose. A water spreader is used for effective extinguishing. It is s een that velocity of water is greatly reduced due to the use of water spreader. Two sensors: L M35 and Arduino Flame Sensors are used to detect the fire and distances on its way towards f ire. Sensitivity of these sensors at different day times and distances is tested through analog reading of the serial monitor

Multiple Sensors Based Fire Extinguisher Robot Based on DTMF, Bluetooth and GSM Technology with Multiple Mode of Operation [2]

In this paper, design and development of a multiple sensors based fire extinguisher robot is proposed and implementation is demonstrated with a brief discussion of construction and operation. The developed fire extinguisher robot can be operated in multiple modes using the DTM F and Bluetooth remote control as well as GSM and GPS technology. Basically, three different sensors of flame sensor, temperature sensor, and smoke sensor have been used to ensure proper detection of fire. The robot can be controlled using both DTMF remote control and Android smartphone and can be operated in three different modes. The first mode allows full autonomous operation of the robot which can be activated by the user or by the robot itself based on the situation. The second mode is a line following mode where robot follows a black drawn line to detect fire and the third mode is complete manual operation using remote control.

V. FUTURE SCOPE

Agriculture-proposed system can be used effectively in green house monitoring

Medical field-proposed system can be used as supply assistant and can reduce labour intensity

Military- capable of climbing can be used in surveillance

Industries- the development of industries has faced serious difficulties due to accidental situations like fire havoc. Prevention of and intervention in such scenarios are the most talked topics in the field of technology and science. Sometimes it is almost impossible to intervene in a these situations without the help of robot. Because robot has some size and sensing advantages that human lacks of. It is not feasible to appoint a person to patrol for accidental fire where a robot can do the patrolling [1]. So a robot is made to patrol for fire detection and early warning in domestic, industrial and environmental cases.

VI. CONCLUSION

This paper has given a thought on how parts of farming creation are robotized. Despite the fact that the existing traditional techniques can be gainful over extensive regions there is a potential for diminishing the misuse of assets with self-governing robots that will bring about considerably higher efficiencies. The advancement of this self-governing machine was effective in copying the essential horticultural exercises of a rancher like seeding, watering, and pesticide showering. The robot can test the dampness substance of the dirt and is prepared to do watering again if necessary. Wellbeing perils caused due to pesticide showering by ranchers.

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