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WIRELESS CONTROLLED MULTIPURPOSE AGRICULTURAL MACHINE

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ABSTRACT

Design development and fabrication of machine which comprises of digger to put the soil seeds sower to put the seeds, leveller to close the muds and sprayer to spray the water, this whole system works on automation with the help of battery. Agriculture is primary occupation chosen by about 40% of World population. in recent year the development of automatic vehicle in the agriculture has experience increase interest the vehicle is controlled by arduino and relay with the help off Wi-Fi technology. The idea of applying automation technology in agricultural field is very new. In agriculture, the opportunities for machine enhanced productivity are immense and the machine is appearing on farms in various guises and in increasing numbers. We can expect the machine performing agricultural operations autonomously such as digging, seed sowing, mud closing and water spraying.

KEYWORDS: Arduino UNO, Relay, Motor, seed sprayer, leveler.

I. INRODUCTION

The main aim of agricultural robotics is apply robotics technologies on the field of agriculture as well as the agricultural challenges to develop new techniques. Now days, no one can end up the day without using any kind of embedded system products. It makes our human life very robust and makes work comfortable [2]. Agriculture is the process of producing food, fiber, feed and many more other desire product by cultivation of certain plants. The history of agriculture began million of years ago. Agriculture is termed as both science as well as art. it may be defined as the practice of cultivating soil, production of crops, and raising the livestock and in varying degrees of preparation and the marketing of resulting products. The word agriculture comes from Greek and Latin words ager means field and culture means cultivation. In India, agriculture is the backbone of the country and it is the world's second highest crop producing country in 2018, (according to IMF and CIA world fact book) [3]. Rice, wheat, Pulses and vegetables are the main crops which the farmers are used to cultivate. The farmers are facing too much problem during the farming because of lack of the modern agro equipments. The farmers are using the conventional methods of the farming but by using modern form they not only save money, time and energy but can also increase in the rate of the production. In this order the robots are developed to concentrate an efficient manner and also it is expected to perform the operations autonomously. The proposed idea implements the vehicle to perform the functions such as digging, seed sowing, leveling and water spraying. These functions can be integrated into a single vehicle and then performed. Automation of agricultural operations is demand of the time to improve the productivity with the help of tools and technology. In recent years, the development of autonomous vehicles in agriculture has experienced increased interest [1].

This development has led many researchers to start developing more rational and adaptable vehicles. In the field of agricultural autonomous vehicles, a concept is being developed to investigate if multiple small autonomous machines would be more efficient than traditional large tractors and human force [4].

II. ROLE OF ROBOTICS IN AGRICULTURE

The technology in this field is developing rapidly not only increasing the production capacity of farmers but also in helping the automation technology. This is the need for significantly increased production yields. According to United Nations the world's population will increase from 7.3 billion to 9.7 billion in 2050, increases the need of more food and the farmer will face the serious pressure to keep up with demand. Agricultural robotic vehicles are increasing production yields for farmers in various ways [3].

From drones to automatic and semi automatic tractors of robotic arms the technologies are being deployed in creative and innovative applications of articles on Google scholar 1982 2012 that match the search query on agricultural or agriculture and robot for robotics the graph reveals the increase interest from the robotic and automation community to apply sensing mobility manipulation and management technology to meet agricultural needs.

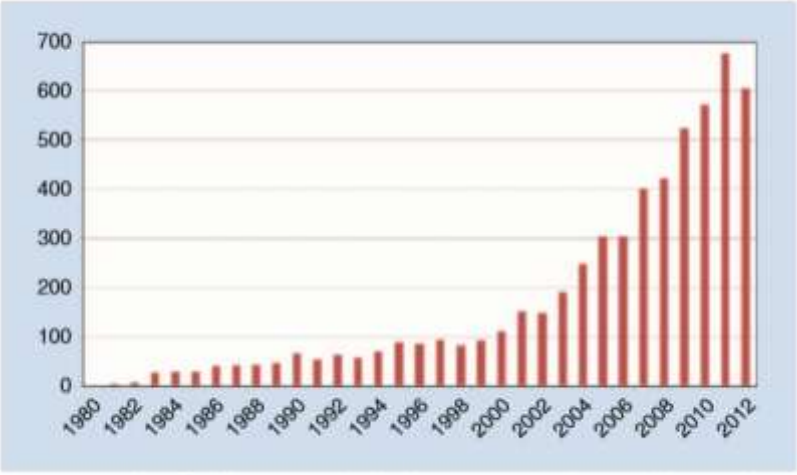

Fig-1: Number of articles on Google Scholar (1980–2012) that match the search query on "agricultural or agriculture" and "robot or robotics." The graph reveals the increased interest from the robotics and automation community to apply sensing, mobility, manipulation, and management technologies to meet agricultural needs [7]

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Fig-2: The Intelligent Autonomous Weeder[7] **Fig-3:** A cucumber harvesting robo [7] **Fig-4:** Workers in a commercial orchard [7]

III. LITERATURE REVIEW

Ms. Aditi D. Kokate [2] this paper is about to build out a robot, competent of carrying out several operations regarding agriculture with automation for example seed sowing, spraying water. This machine can be operated via automation as well as manual. Arduino is an exclusive member that drives all the automatic processes. In current scenario robots are progressively being united to perform repetitive task by replacing labour. In a cultivation, seed sowing process comes in first step, in this process seeds are put inside the soil in a regular fashion in each row of field, sensor are used in this machine to sense and observe the environmental conditions of farming and there irrigation process takes place. Sensors are used for provide this data. So that prevention of excess water can be done to the plants in each and every single row of farming field.

In the process of fertilizing, seeds receive minerals to germinate and plants receive nutrition to grow up quite similar to irrigation process.

Prof. A. K. Pathak [5] this paper sharing the interpretation of use of robotics in the fields of agriculture. The main occupation of about 60% rural population of India is agriculture to earn their income. Aimed to design and

fabricate a multipurpose automatic farming robotic machine is to increase the productivity and reduce the labour involved, the robot is designed to increase the productivity and reducing the basic functions required to implement in farms. This reduces the man obstruction and also able to proper use of resources..

Prof. P.V. Bute [8] For several agricultural operations in agricultural mechanism can be installed. The huge application of robots in agricultural field to seed sowing and it is designed such as, it can be exchangeable with human labour. This machine employing efforts to build a mechanism competent to perform various operation regarding cultivation for example seed sowing and digging automatically.

B S Balaji [9] this paper concern with a device which perform several observation simultaneously, for example digging, seed sowing, leveling and water spraying, powered by battery and solar power. In a survey results that 40% of human over the world chooses farming as occupation. In past some years the use of automation efficiently increases the interested in agricultural field. The system, controlled and navigated by easily switch via IR sensors. The input language of the system is quite simple, so that Proper communication can achieve in between machine and human. The avail about this protect that it is fast operating machine. It accomplished that in agricultural field, small automatic machines are more efficient that the traditional machine used in agriculture.

IV. PROBLEMS AND STATEMENT

1. The method and technology of cultivation.
2. The business of farming goods.
3. The agricultural loan of the farmers.

V. SCOPE AND OBJECTIVE

5.1 Scope Of The Project

- The multipurpose farming device is designed for farmer, who has done farmering with mobile technology.
- The project will become an example for future works, which is controlled by android mobile through Wi-Fi.

5.2 Objective Of The Project

- To construct a robotic vehicle, this is controlled by Android Mobile for various agricultural purposes.

VI. PROPOSED SYSTEM

In agricultural field, robots are efficiently increasing the fertility of soil and yield of crops. Investment is one of the vital difficulties for small-scale Indian farmers. To overcome these problems, the automation technologies with robots were used in agriculture. The automation in the agriculture could help farmers to reduce their efforts [5].

VII. DESIGN METHODOLOGY

This System Fascinated With Design, Manufacturing and installation of multipurpose agriculture robot accomplished by [6].

A. Auto / Manual Switch: This switch is used to operate our farm boat in either Automatic Mode or Manual Mode.
B. M- Seed Control: This switch is used for manual Seed Control. If you press this switch then only seeding operation is done automatically.
C. M-Leveling: After seeding operation, leveling used for soil recover on the seed before watering on their same position.
D. M-Water Control: This switch is used for manual water feed Control. If you press this switch then only watering operation is done automatically**.**
E. Start / Stop Control: This key/ feature is employ to start or stop the project operation.
F. Solar Panel: 24V solar panel is used recharge the battery.

G. ARDUINO Board: This circuit use for controlling whole machine through android mobile using Wi-Fi network.

H. Relay Driver: A low-voltage control signal from the Arduino to control a relay, which is capable of handling and switching high-voltage or high-power circuits. A relay consists of an electromagnet that, when energized, causes a switch to close or open.

I. Motor Driver: A 24V motor is used to get the high torque which help to run easily on the land. This motor is connected to the battery power.

J. Digger: Digger is placed on the front of the vehicle and it is adjustable to up and down. It is used to make cavities for the seed.

K. Seed sower: seed sower is connected with the chain mechanism. When the vehicle moves the seed container starts rotating and the seed falls into the cavity made by the digger.

L. Leveler: leveler is placed after the seed sower. It is used for the leveling of the soil and covers the seeds under the soil.

M. Watering: After leveling, moisture is provided to the seeds by watering them. A water tank is provided for watering the soil by drop by drop method.

Calculations:

For Motor Selection

Radius of wheel shaft- 1cm

Total torque $T = F \times r$

= m*g*r

= 10×9.81×10-2

= 1.962 Nm

For one motor

T = 1.962/4

=0.4905 Nm

1Nm =10.197 kg-cm

Hence,

T = 0.4905×10.197

T = 5.001 Kg-cm

For 200rpm

= (200×2π×7×10^-2)/60

= 1.466 $\frac{m}{s}$

Speed test-

Length = 16*59.2

= 947 cm in 30 sec

W =14cm

a =1.328 m2

1R = 33ft^2 in 38.14 minutes

Total power requirement = 24Watt

Energy consumed = 0.01525 KWh

VIII. WORKING PRINCIPLE

In India we all very well know the fact that farming is main occupation of the peoples and only depends on the farming but the major drawback of Indian farming is inefficient production of crop. The peoples works very hard but due to unavailability of proper resources they cannot produce much more to fulfill their needs. So we have decided to design a agricultural vehicle which can satisfies the basic need of farming. The cost of agricultural vehicle should be very less as compared to other agricultural vehicle. The objective of this multipurpose agricultural vehicle is digging, seed sowing, leveling and watering.

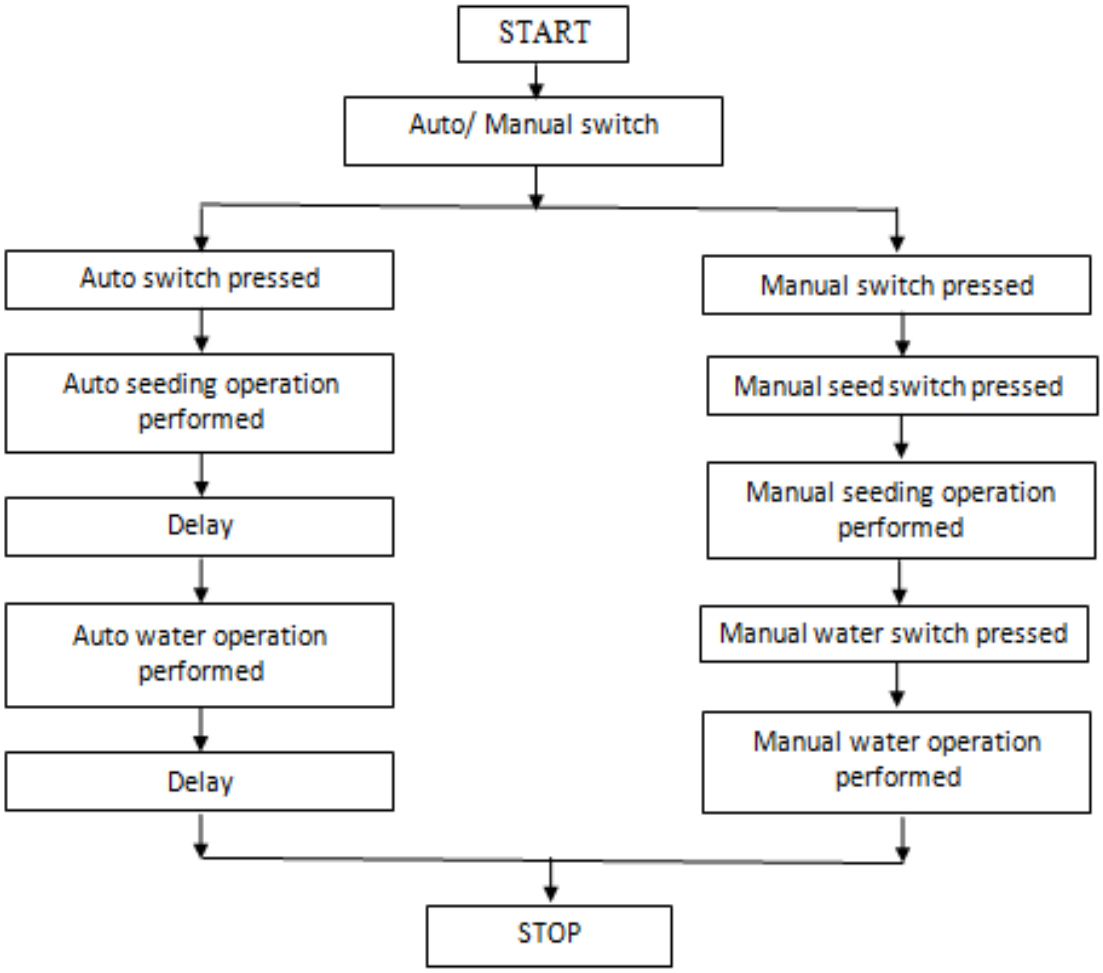

Fig-5: Flow chart

IX. CONCLUSION

This machine for agricultural purpose and machine is a concept for the near performance and cost of the product once optimized will prove to be work through in the agricultural operations. We have a successful in the fabricating a multitasking robot having enough potential to face the challenges in agricultural field. We can assure that this idea will definitely work to the Indian market and decreases the molality rate found in Indian farmers associated with the agricultural spraying machine.

FUTURE SCOPE

This vehicle is consists of various functions such as digging, seed sowing, leveling and watering at a time. This is an automatic and wireless controllable vehicle working on the arduino. This can be market at large scale as it cuts down the total cost and increasing the efficiency of the of the farming.

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