Review of Robots in Agriculture

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Abstract

The art of growing plants, which is a part of agriculture has seen enormous change in modern day. In olden days’ technology was not developed that much. Operations like seeding, plowing, weed cutting etc. were done by hand. Then technology emerged and human operated machines were discovered. In modern days’ robotic technology has been introduced in order to perform the regular agricultural chores. The introduction of robotics has made the operations autonomous and semi-autonomous. This article provides a brief survey on various kind of robotic technology used in farming, and an idea of multi-talented robot has been presented.

Keywords: Agriculture, Agricultural Chores, Autonomous, Multitalented Robots, Robotic Technology

I. INTRODUCTION

In most of the countries, current generation the number of proficient people depending on agriculture is very less. But more than 60% of Indian population is reliant on agriculture. Hence it is necessary to do research in the field of agriculture. Most of the operation in the field of agriculture requires lot of human energy. Farmer has to toil hard in hot sun. In 19th century machine like lawnmower, tractors were introduced to carry out agricultural operations but it had to be operated by human. Farmer face a lot of problems like

- Shortage of water.
- Not able to test the type of soil.
- Time consumption in seed sowing, ploughing etc.
- Damage of crops due to weeds, insects etc.

II. NEED OF A ROBOT IN AGRICULTURE

When a mechanical or implied artificial agent, usually an electromechanical apparatus that is led by a computer program or electronic circuitry, and thus a type of an embedded system. Robots can be autonomous or semi-autonomous. The same robotic technology can be used in agriculture, so that the laborer involvement can also be reduced and time spent on the field can be reduced.

The idea of robots in agriculture is not new, many robots have been introduced in agricultural field, which are autonomous or semi-autonomous. A small comparison between various types of equipment used in agricultural is shown below. In the next section a brief survey of various robots used in agriculture is shown.

Table - 1

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Type of work</th>
<th>Human power</th>
<th>Machine</th>
<th>Robot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Laborer</td>
<td>More</td>
<td>Moderate</td>
<td>Less</td>
</tr>
<tr>
<td>2</td>
<td>Time</td>
<td>More</td>
<td>Moderate</td>
<td>Less</td>
</tr>
<tr>
<td>3</td>
<td>Wastage</td>
<td>Moderate</td>
<td>More</td>
<td>Less</td>
</tr>
<tr>
<td>4</td>
<td>Pollution</td>
<td>No</td>
<td>More</td>
<td>No</td>
</tr>
</tbody>
</table>

We can come to a conclusion that usage of robots in the field of agriculture would reduce the problems faced by farmer to some extent.

III. VARIOUS ROBOTS IN AGRICULTURE

Robots are used in various fields like
1) Harvesting.
2) Weed cutting.
3) Seed Sowing.
4) Ploughing.
5) Irrigation.

Due to this various applications of robots, they are mainly used in big farm, nursery, plantations etc. Here are few robots which are used in various fields of agriculture.
A. Robots in Harvesting

Harvesting is one of the major tasks which involves a lot of manual effort. Utilizing robots in this field reduces the work pressure of the farmer. Two robots used in harvesting are shown below:

The fruit picking robots, the driver-less tractor / the sprayer, and the sheep shearing robots are designed to replace the human labor, a lot of factors have to be considered such as the size and color of the fruit to be picked, before the commencement of the task.

1) Agrobot SW6010
This robot is used to check whether the berries are ripe and pluck the ripen berries.

![Fig. 1: Agrobot SW6010](image)

2) Cucumber Harvester
This robot is used to pluck ripen cucumbers.

![Fig. 2: Cucumber Harvester](image)

B. Robots used in weed Controlling

The major problem faced by farmers during cultivation is unwanted plants or weeds that grow along with crops that are cultivated by farmers. Robots are now used to detect the weeds and help the farmer. Two robots used in weed controlling are shown below.

1) Hortibot
This robot is used in controlling weeds. It is both farmer and eco-friendly. It can detect and remove about 25 different kind of weeds.
2) AgBot II
This robot is used mainly in weed controlling. It mainly helps farmer in taking decision about the type of pesticide, insecticide and various fertilizers.

C. Robots in Seed Sowing
Seed sowing is tiring task and time consuming. Seed sowing is where the seeds need to be put in ground at regular intervals and these needs to be controlled automatically. Limiting the flow of seeds from the seeds chamber is typically doing this. In modern days robots are used for seed sowing purpose. Two robots used for this purpose are shown below:

1) LettuceBot
This robot is mainly used to sow seeds.
D. Robots in Ploughing

Ploughing is one of the first steps in farming. During this process we till the land and make it ready for the seed sowing. By tilling we mean that a plough will be used which will have teeth’s like structure at the end and will be able to turn the top layer of soil down and vice-versa. Automatic tractors are used in ploughing.

Fig. 6: Autonomous Tractors

There are many more examples of robots in various fields like pollination, wine making. Robot are even used in surveillance, detecting the type of soil, package system etc. The robots discussed so far mainly concentrate on single application. As a result, in-order to perform different kinds of work, we require different robots. Purchasing robot for each and every single operation is not feasible and not cost worthy.

IV. MULTI-TALENTED ROBOT

The robots discussed so far single robot to perform one operation, we can build a robot which performs multiple operations. A robot can be programmed in such a way that it performs seed sowing, weed cutting, soil quality checking, ploughing. If a multi-talented robot is developed, then it would be very useful in the field of agriculture.

Fig. 7: Model for Multitalented Robot

The system includes sensors; motor and whole parts are controlled by microcontroller. The heart of the system is microcontroller. It is the main control block and other control blocks are interfaced with the controller. The battery power supply goes to the microcontroller with the help of voltage regulator by convert the constant power. A basic model of multitalented robot is shown in Fig.6.

V. CONCLUSION

Different robots used in agriculture are discussed in this paper. A brief model of multi-talented robot is shown. Utilizing robots in field of agriculture reduces a lot of human power and things can be done at a faster pace. If a multi-talented robot is developed things can be done in a single unit, rather using different units for different purpose. Agriculture is a back bone of a country like
India. If robots are used in agriculture things can be done faster and get good yield and good profit and cumbersome jobs for farmer will also be not there.

REFERENCES