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SURVEY ON MULTIFUNCTIONAL ROBOTIC VEHICLE FOR AGRICULTURE APPLICATION

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ABSTRACT

This paper proposes Multifunctional robotic vehicle for agriculture application. Historically agriculture was carried out using hand held tools and as the civilization progressed people started using animal driven tools. After that autonomous ag robots for agriculture. In the developed countries the mechanized agriculture has reached to a matured state but in the developing countries like India is still evolving. The mechanized agriculture autonomous agri robots for improving agriculture productivity must increases to meet the future demand of the ever grooving human population to overcome it we will developing robotic vehicle. Agriculture robotic are machines programmed to do agricultural task and form assignments. Such as: Harvesting or picking, weeding, spraying, cutting. The challenge is designing and developing robots to work in harmony with the nature

KEYWORDS: Multifunctional Robotic, Harvesting or Picking, Weeding, Spraying, Cutting

INTRODUCTION

In this age of industrialization robotic agriculture (agricultural environments serviced by smart machines) is developed to need of fast shrinking human assist machinery for that we will developed multifunctional robotic vehicle For agriculture application driverless tractors have been developed by many researchers in the past but they lack in abilities to handle real world complexities most of the engineers relied on industrial and mechanical way of farming. where machines could work entirely in predefined ways as everything was programmed in system much like a manufacture line. The task to address is to design an intelligent system that can perform in an original or semi natural conditions. This system should not have to be as intelligent as human being but must show sensible behavior in context of recognition.

Figure 1: (Left) Portal Crop Scouting Platform (Madsen and Jakobsen 2001), (Right) Sub Canopy Robot ISAAC2

The environmental implications are additional advantage. In some regards, Phytotechnology could benefit the ecology over conventional methodology like Minimized inputs to reduce waste and pollution, controlled biodiversity by retaining non-competitive weeds, more intelligent physical methods replacing chemical solutions. Economic factors include lower labour costs (a significant saving if they can be made fully autonomous), incremental investment in, perhaps, a small machine each year, rather than a single large machine every 6 years. These small vehicles could be articulated from existing mass produced tools such as car parts without the need for particular design and tooling. Consideration of social aspects shows that the public are ready for smarts machines to be used in food industry, by the level of interest shown by the media and when being demonstrated. Insurance and liability will be a lot easier with smaller autonomous machines. The new technology has an automatic mode in which it can take its own decision for combating. In addition to this it also includes some of the features like seed detection, DNA mapping, weeding

METHODOLOGY

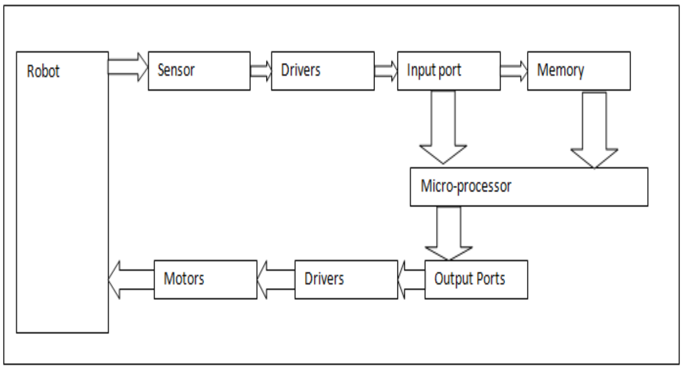

Figure 2: Block Diagram of a Simple Robot

The new technology has an automatic mode in which it can take its own decision for combating. In addition to this it also includes some of the features like seed detection, DNA mapping, weeding, micro-spraying, irrigation and harvesting

In this technology, initially the robot will test the soil of the land of cultivating area. After testing the soil, it will place the seed and monitoring the status of the seed. The monitoring status mainly defines the climatic conditions. After the plant grows, it will checks the DNA structure of the growing plant with the uploaded structure and enriches its nutrients by mutation. The monitoring of the plant will take place and climatic conditions are also measured. Finally it will cultivate the plant with enriched nutrients

PHYTOTECHNOLOGY

The approach of treating crop and soil selectively according to their needs by small autonomous machines is the natural next step in the development of Precision Farming (PF) as it reduces the field scale right down to the individual plant or Phytotechnology. One simple definition of PF is doing the right thing in the right place at the right time with the right amount. This definition not only applies to robotic agriculture (RA) and phytotechnology but it also implies a level of automation inherent in the machines. Automatic sensing and control (on-the-go) for each task is also important and many research papers have shown that these systems are feasible but most are too slow, and hence not economically viable, to be operated on a manned tractor. Once these systems are mounted on an autonomous vehicle, they may well suddenly become commercially viable

MODERN AGRICULTURE

Modern agriculture uses a lot of energy. It comes in many forms from fertilisers and chemicals to tractors and fuel. The Phytotechnology approach tries to target the introduced energy to improve efficacy. Chamen (1995) identified that a 72% energy saving can be made in cultivation energy by moving from traditional trafficked systems (256 MJ/ha) to a non-trafficked system (79 MJ/ha). This was for shallow ploughing and did not include any deep loosening. From this we forecast that 80-90% of the energy going into conventional method is there to repair the damage done by large tractors. It would be much better to not cause compaction in the beginning which is one of the reasons that leads us to consider using small light machines. If this approach were taken, it would appear that the crop production cycle could be reduced to three stages: Seeding, Plant care and (selective) harvesting. A micro spray system is currently under development at DIAS Bygholm, in Denmark. Traditional or macro spraying can be very efficient, especially when they cover large areas. Most equipment manufacturers are developing larger machines, with 42 meter booms currently under development (pers. com. Hardi International). When mounting booms this big, they have inherent stability problems as the tractor has a relatively small wheelbase and they tend to oscillate. One method to improve stability would be to mount a spray boom between two unmanned robots that travelled in adjacent tramlines. This robotic gantry could apply both liquid sprays and fertiliser and be able to regulate itself according to current weather conditions. If it became too windy then the gantry could just stop and wait until conditions improved. Variable rate, patch spraying, minimizing.skips and overlaps could all be built into the original design specifications by controlling individual nozzles. Turning on the headland would be different, as it would not include rotation – just translation, as the robots could turn but the boom remains parallel to its working direction. Sensing systems could be mounted on a trolley that could move along the spray boom as in the crop scouting section

ROBOTIC IRRIGATION

A robotic irrigator in the form of a mechatronic sprinkler (to simulate a travelling rain gun) was developed to apply variable rates of water and chemigation to predefined areas. The trajectory and sector angles of the jet were controlled by stepper motors and could be adjusted according the current weather and the desired pattern by a small computer

When the airborne water was blown down wind, the jet angles could be adjusted to compensate by measuring the instantaneous wind speed and direction (Turker et al. 1998). This system could not only apply the required water in the right place but could irrigate into field corners

SELECTIVE HARVESTING

Selective harvesting involves the concept of only harvesting those parts of the crop that meet certain quality thresholds. It can be considered to be a type of pre sorting based on sensory perception. Examples are to only harvest barley below a fixed protein content or combine grain that is dry enough (and leave the rest to dry out) or to select and harvest fruits and vegetables that meet a size criteria. As these criteria often attract quality premiums, increased economic returns could justify the additional sensing

To be able to carry out selective harvesting effectively, two criteria are needed; the ability to sense the quality factor before harvest and the ability to harvest the product of interest without damaging the remaining crop. Most agricultural equipment is getting bigger and hence not suited for this approach. Smaller more versatile selective harvesting equipment is needed. Either the crop can be surveyed before harvest so that the information needed about where the crop of interest is located, or that the harvester may have sensors mounted that can ascertain the crop condition. The selective harvester can then harvest that crop that is ready, while leaving the rest to mature, dry, or ripen etc

Alternatively, small autonomous whole crop harvesters could be used to selectively gather the entire crop from a selected area and transport it to a stationary processing system that could clean, sort and maybe pack the produce. This is not a new idea, but updating a system that used stationary threshing machines from many years ago. Alternatively a stripper header could be used to only gather the cereal heads and send them for threshing

CONCLUSIONS

Now a day's every where a common technology will be used but in this type of agricultural resurch study it will be something different result provide by useing this multifunctional robot.In this study has group out a vision of how aspects of crop generation could be automated one. Although exist manned operations can be sufficiant over big area there is a potential for decricing the scale of remedy with autonomous robots that may result in even higher capable & efficient. The manufacturer process may be raising but the overall concept requires a paradigm shift in the way we think about mechanisation for crop production that is based more on plant needs and novel ways of encounter them rather than developed existing methodology & technology

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