

Multifunctional Robotic Vehicle for Agriculture Application

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Abstract: Mobile application controlled agriculture robot is a device used in agricultural activities with the aim to reduce manual activity, as labor shortage is the crisis of the recent agricultural production. Agricultural productivity relies on various factors such as water availability, soil fertility and quality of seeds, labors, availability and allied agricultural machineries. The labor shortage is the major concern for the cause of reduced productivity. In this research, a mechanical device with the aid of the mobile control is proposed to engage for multiple agricultural activities. This mechanized robot is expected to overcome the labor shortage and likely to enhance the agriculture productivity. Agricultural robotics is machine programmed to do agricultural task. The robot which is controlled by the mobile application or by a program which is used for harvesting, Plough, spraying and cutting and also includes camera monitoring manner with the help of this mobile application. The robot will be operated by a battery which is connected with a solar panel for recharging. The challenge and demand of designing and developing of robots is to work in synchronization with the nature.

Key words: Harvesting • Plough • Spraying • Cutting • Camera monitoring • Solar energy (Recharge)
• Mobile android app (Control System)

INTRODUCTION

Recently, students in the world are heading to automation and sophistication. It is highly important to have an advanced automation in the field of crop growing.

In pasta, farmers generally depend on conventional agricultural equipment, which depended on bullock, camels etc. This project contains microcontroller as a main device it is easily accessible device for controller and driving of various devices like DC motor etc. It will work involuntarily till the end of seed chamber only regular attention should have to user on seed chamber [1]. These tiny vehicles could be expressed from existing mass produced tools such as car parts without the essential for particular design and tooling. Assurance and liability will be a lot easier with smaller self-governing machines. The new technology has an automatic mode in which it can take its own decision for contesting. Seed detection, DNA mapping and weeding are the some features added to this [2]. In India, nearly about 70 percent of people are depending upon agriculture.



Fig. 1: Agriculture robot

As compared to other fields of globalization, agriculture system seems less. So, it is necessary to make some advancement in this field. We are applying the idea of robotics technology in Agriculture. In agriculture, the opportunities for robot-enhanced productivity are immense and the robots are appearing on farms in various guises and in increasing numbers. We can expect the robots performing agriculture operations mobile application control system such as spraying and mechanical weed control, fruit picking, watching the farms day and night for an effective report. Agriculture robot is

a robot designed for agricultural purposes. It is designed to minimize the labor of farmers in addition to increasing the speed and accuracy of the work. It performs the elementary functions involved in farming i.e. harvesting, spraying, cutter, plough and camera monitoring and they gradually appear advantages in agricultural production to increase productivity, improve application accuracy and enhance handling safety.

Methodology in Operating the Following Tools

Cutter: The motor operates cutter by which it is used for cutting weed or harvesting. Selective harvesting engages the concept of only harvesting those parts of the crop that meet certain quality thresholds. Examples are to only harvest barley below a permanent protein content or unite 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. The ability to sense the quality factor before harvest and also harvest the plants without damaging the plants [1]. There are 4 types of cutter here we use chain saw model cutter by this help of cutter we easily plot the crops like sugarcane, remove weeds and cultivate the maize and millet. Here this cutter has sharp rounded and fine cures by this design there is no need to make it sharp after cultivating and cropping the plants during the season of cultivation.



Fig. 2: Cutter blade

We also could operate this all the four directions and front and back. The cutter has positioned at very front which can be operated by mobile application switch which controls to turn ON for moving forward for the cutting the various crops with very perfect manner as if how human involves physically. At end of the job, we could turn off the cutter to come to rest position by using the same switch.

Harvesting and Plough: The discerning harvesting involves the perception of only harvesting those parts of the crop that meet certain quality thresholds. It is

considered to be a type of presorting based on sensory insight [2]. This can be strengthened effective manner by applying this mobile application and which compensate demand of labor in this present scenario especially more applicable for the future generation. This sort of applications is user free for all sorts of people since them very familiar in operating mobile and internet.



Fig. 3: Plough

Hence, we can operate the plough tool easily as if we operate the Cutting tool by the aforesaid above methods. And also we operate the plough tool towards up and down direction for the deep tilling purpose by which we can gain more out tone. When we operate the mobile application forward direction the tiller will move forward and operate backward the tiller will move the same direction to all our focused area of our all field.

Spraying: The nozzle is connected with motor which is used for scattering Pesticide over plants. Within the close-to-crop area, great care must be taken so as not to damage the crop and not to agitate the soil. One method of killing weeds close to the crop plants is to utilize a micro spray that distributes a very small amount of Pesticide directly on to the weed leaf. Machine vision can be used to spot the position of an individual weed plant and a set of nozzles mounted close together can spurt an Herbicide on to the weed. Tests have shown that splashing can be reduced when a gel is used as a carrier rather than water. Other trials have shown that when the right amount of herbicide is placed in the right way at the right time, the treatment of Herbicide can be radically reduced to about 1 gram per hectare for an infestation of 100 weeds per square meter. A micro spray system is currently under development at DIAS Bygholm, in Denmark; 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 [3-9]. A robotic irrigator is one of the types of mechanical sprinkler, which was developed to

apply alterable rates of water and chemigation to predetermined locations. Stepper motor controls the trajectory angle and sector angle of the jet and control according to the climatic conditions and necessities [2]. The task of spraying the pesticides in agriculture plays challenging at the same time which is indispensable one. To overcome this issue our mobile application robotics gives the new pavement of an important replacement for the prosperous of agriculture which is back bone of the entire world. In this application we place a motor pump and a sprayer at the top of the vehicle. The sprayer's set up is possibly to reach our targeted area in the crop field. In both left and right side of the tank provisions are available by fixing the tubes with the nozzles to spray the pesticides.



Fig. 4: Sprayer

To apply pesticides, we can switch ON and off the motor pump directly connected with sprayer through tank to turn ON spray to apply the pesticides to crop fields. The vehicle can be moved forward and backward to apply the pesticides according to our convenient by which we can save the time, economy and the value of human life. This proposed set up can be operated towards left and right direction by using mobile application robotics.

Solar Panel: The functioning rule of all today's Solar Cells is photovoltaic (PV) effect. That is solar/sun light energy is converted into an Electrical Energy. Solar cell consists of P-type semiconductor (such as Si doped with B) and N-type semi-conductor (such as Si doped with P). They are closely contacted with each other. When the solar rays fall on the top layer of P-type semi-conductor, Potential Difference between two layers is created, this causes the flow of Electrons. Due to the Potential Difference, current increases as more as solar rays fall on the surface of the P-semiconductor.

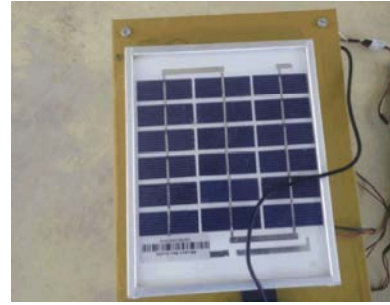


Fig. 5: Solar panel

Solar panel can be used in remote and isolated areas, forest and hilly regions. Maintenance cost is low. Solar cells are noise and pollution free. Their lifetime is long. At the outmost, this project plays a vital role to recharge battery to run the motor affixed with this robotics vehicles. This renewable solar energy supports for this project and the formers [10-12].

Camera Monitoring: Another differentiating feature about this Mobile robot is the wireless video camera through which we can view and monitor the process taking place during the plough, Cutting, spraying the pesticides and the harvesting. This also has the feature to rotate the Camera according to our requirements to ensure the progress of those work. By this facility, we can closely watch to avoid any misfortune, at the same time carry out the overall performance very accurately, cost effective manner and give assurance on its performance. All those proceedings will be viewed clearly on our mobile's screen very feasibly. This standard and updated Mobile robot is used to interface the agriculture with the available technology without wire.



Fig. 6: Camera monitoring

Bluetooth Control System: The project aims on designing a robot that could be operated using android mobile phone. The controlling of the robot is done wirelessly through Android smart phone by using the Bluetooth feature of the smart phone. This Project is on the android smart phone remote control for operating the robot.

Android is a software stack for mobile devices that includes an operating system, middle ware and key applications. Android boasts a healthy array of connectivity options on Bluetooth connection [13].

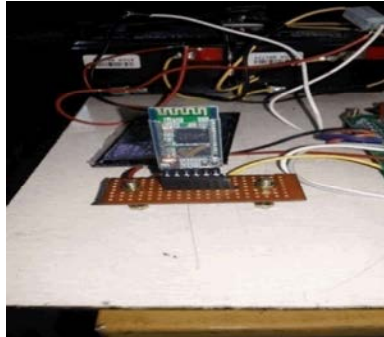


Fig. 7: Bluetooth shield

Bluetooth is an open standard specification for a radio frequency (RF)-based, short-range connectivity technology that promises to change the face of computing and wireless communication. It is designed to be used in mobile phones.

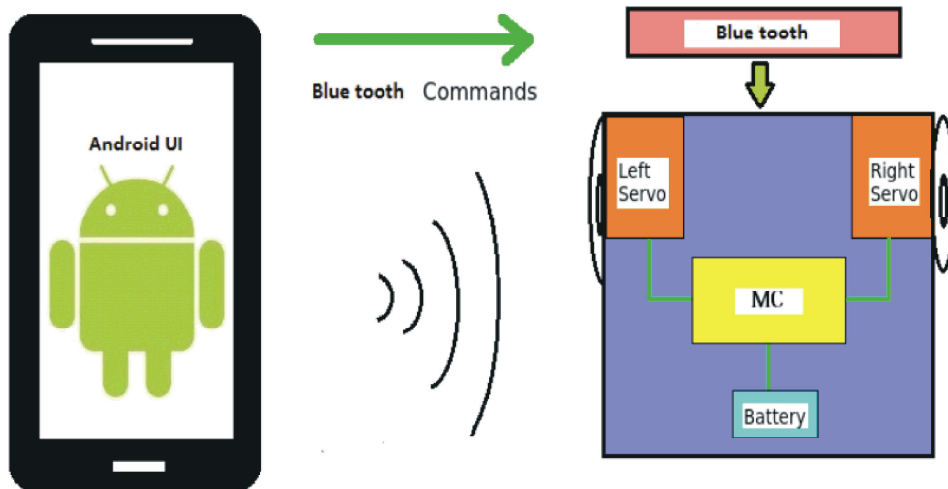


Fig. 8: Bluetooth control system

The controlling device of the entire system is a Micro-controller. Bluetooth module, DC motors are interfaced to the Microcontroller. The data received by the Bluetooth module from Android smart phone is fed as an input to the Controller. The Controller acts accordingly on the DC motors of the Robot. The robot in the project can be made to move in all the four directions using the Android phone. The direction of the robot is indicated using LED indicators of the Robot system. Operating the Robot through mobile phone, by the usage of Android touch screen smart phone in performing the task of Bluetooth wireless transmission, indicating Robot directions using LED indicators [12]. Every action we do on the robot function, it is indicated by the LCD display immediately.

Mobile Application Control System: The over view of the Project is with the help of mobile application as well as using the blue tooth application, we can operate the mobile robotic vehicles forward, backward, turn left and turn right easily [13].

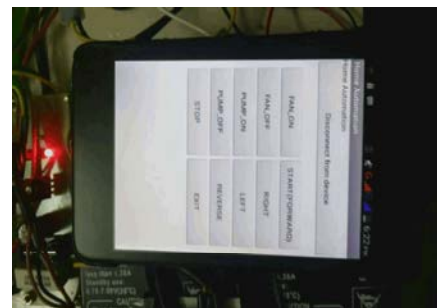


Fig. 9: Mobile application control

Following the same principle, we control and operate the Sprayer pump, Plough, Tiller, Harvesting and Cutting machine through the very Bluetooth facility. In addition to that, the Camera monitoring system functions to monitor all those above Mechanisms perfectly. At the outset, this diagram plays a vital role to recharge battery to run the motor affixed with these robotics vehicles. This renewable solar energy is being used to support this project and the farmers. Further, electric-charging is also possible. Every actions we do on the robot function, it is indicated by the LCD display immediately like cutter on/off, sprayer on/off, forward to left/right/reverse/stop all these functions could be indicated by the LCD display.

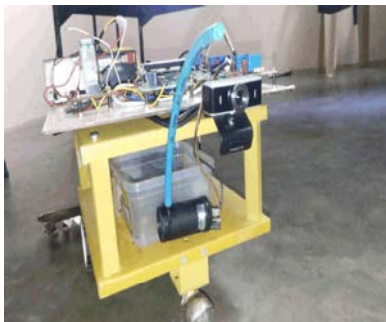


Fig. 10: Vehicle guided by mobile application

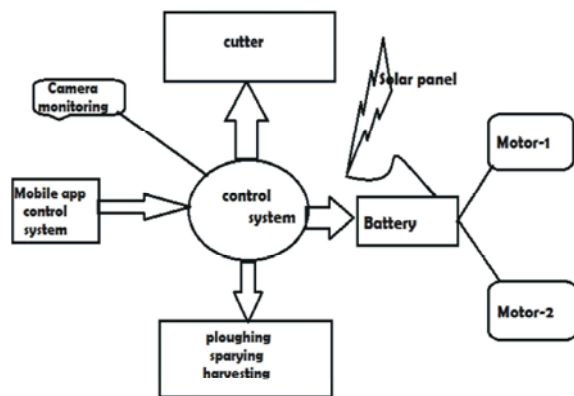


Fig. 11: Block diagram

CONCLUSION

This paper has presented progress towards achieving a future precision mobile application control system farming system. This system is designed to support the agriculture by effective Tilling, Plough, Harvesting, Spraying and cutting with camera monitoring facility. With this compact design of mobile application, we can control Robotics Vehicles and the Androids facility to control the blue-tooth. In this connection, this project plays a vital role to recharge battery to run the motor

affixed with this robotics vehicles. This renewable solar energy supports for this project and the formers. This system will reduce labor problem in future. So this system will be the best replacement for currently used systems.

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