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Design and Development of Farm Robotics

Ravi Kumar K N[1], Thanuja K[2]

[1,2]*Electrical & Electronics Engineering Department & G Madegowda Institute of Technology, Bharathinagara*

Abstract

Traditional seedplanting techniques in India often involve the use of tractor-driven drillers or animal-drawn funnel pipes. Nowadays, speed, energy economy, sensors for precise guidin g, and enabling technologies like GPS and wireless connectio n are the main focus of the development of autonomous field robots. Given the realities of the Indian farming sector, the system that is built must be more cost-effective than conventional techniques and tractors in terms of operating speed accuracy, fuel consumption, and the amount of physical energy needed by humans. Farmers will truly benefit from the final product if these problems and factors are appropriately addressed. Based on this, a robot that automates these tasks for the seeding process needs to be able to go straight ahead on uneven farm field roads, the moisture content of the soil may have an impact on the soil digging function, and the sensors.

Key Words: Seed planting, Autonomous field, Robots

1.INTRODUCTION

Plantations of seeds are automatically done by using DC motor. The distance between the two seeds are controlled and varied by using Microcontroller. It is also possible to cultivate different kinds of seeds with different distance. Also the project consists of sprinkler, which would be used for reducing the wastage of fertilizers that is done by spraying the senses from wheel movement and the on and off of the sprinkler would be controlled by Microcontroller. When the Robot reaches the end of the field we can change the direction with the help of remote switches. Designing of such robots is modeled based on particular approach and certain considerations of agriculture environment in which it is going to work. The main reason behind automation of farming processes are saving the time and energy required for performing repetitive farming tasks and increasing the productivity of yield by treating every crop individually using precision farming concept. A general-purpose autonomous robotic control system designed for agriculture field applications has four core abilities: guidance, detection, action and mapping which are considered in the designing according to the application requirement. Some of the major operations in farming which are under research and automation are seeding, plugging, digging, leveling, pesticides spraying, water spraying.

The objective of the research is to develop a robot farming system using multiple robots. The research will discuss the application of multiple robots in Japan agriculture for rice, wheat and soybean. The robot farming system includes a rice planting robot, a seeding robot, a robot tractor, a combine robot harvester and various implements attached on the robot tractor. One of the key elements of the robot farming system is that it should be more economical to the farmers. The important parts of the farming system are the robot management system, low-cost system, robot farming safety, and real-time monitoring/documentation. This article provides an overview of worldwide development and current status of precision-agriculture technologies based on literatures generated mainly during the past years. The topics include natural-resource variability; variability management; management zone; impact of precision agriculture technologies on farm profitability and environment; engineering innovations; information management; worldwide application and adoption trend of precision-agriculture technologies; and potentials of the technologies in modernizing the agriculture in the world. A brief review of research in agricultural vehicle guidance technologies is presented. Application of new popular robotic technologies will augment the realization of agricultural vehicle in future. Agricultural Robotics is the logical proliferation of automation technology into bio systems such as agriculture, forestry, green house, horticulture etc. Presently a number of researches are being done to increase their applications. Some of the scientist contributions are mobile robot, flying robot, forester robot, Demeter which are exclusively used for agriculture. A brief discussion is being done about the types of robots which increase the accuracy and precision of the agriculture.

2. Methodology

The Internet of Things was the target market for Blynk. Among its many other amazing capabilities are remote hardware control, sensor data presentation, data storage, data visualization, and much more. The platform consists of three main parts.

• The Blynk App enables you to use the many widgets we offer to create stunning interfaces for your projects.
• Blynk Server: in charge of all communications between the hardware and the smartphone.
We can host a private Blynk server locally or utilize our Blynk Cloud. Its open-source software can run on a Raspberry Pi and can effortlessly manage thousands of devices.
• For all of the widely used hardware platforms, Blynk Libraries facilitate communication with the server and handle all incoming and outgoing commands.

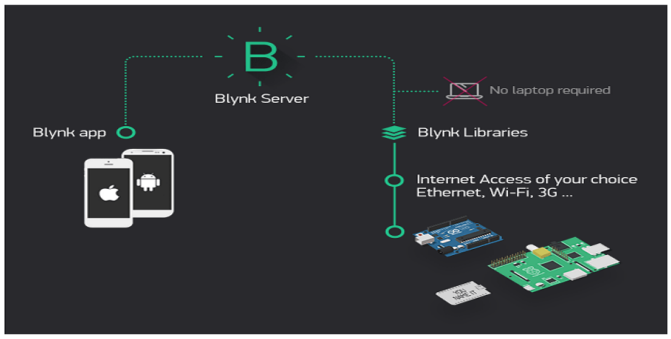

Fig. 1: Smart phone

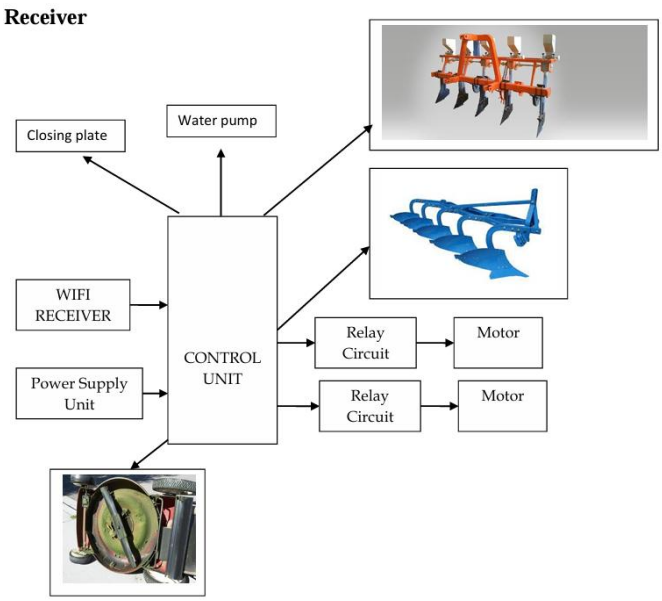

Fig. 2: Block diagram of Reciever

Improvements in horticulture are necessary for this task. In this case, remote association is used for the how AGROBOT operates. It is powered by a 12V force supply. Sensors that detect temperature and moisture content are necessary for harvest development and soil ripeness. The microcontroller works after receiving information from the worker. There are engines connected to the pesticide and water sprinkler systems. The ability to deal with less manual labor and the prevention of disease transmission is the greatest advantage. It is the safest method for developing yields without requiring manual labor. Microcontrollers are used to operate the engines, sprinkler, and seed sower. ESP8266 is used to send and receive sensor data and meanderer development directions independently.

Over history, agriculture has evolved from a manual occupation to a highly industrialized business, utilizing I wide variety of tools and machines. Researchers are now looking towards the realization of autonomous agricultural vehicles. The first stage of development, automatic vehicle guidance, has been studied for many years, with a number of innovations explored as early as the 1920s. The concept of fully autonomous agricultural vehicles is far from new; examples of early driverless tractor prototypes using leader cable guidance systems date back to the 1950s and 1960s. In the 1980s, the potential for combining computers with image sensors provided opportunities for machine vision based guidance systems. During the mid-1980s, researchers at Michigan State University and Texas A&M University were exploring machine vision guidance. Also during that decade, a program for robotic harvesting of oranges was successfully performed at the University of Florida.

In 1997, agricultural automation had become a major issue along with the advocacy of precision agriculture. The potential benefits of automated agricultural vehicles include increased productivity, increased application accuracy, and enhanced operation safety. Additionally, the rapid advancements in electronics, computers, and computing technologies have inspired renewed interest in the development of vehicle guidance systems. Various guidance technologies, including mechanical guidance, optical guidance, radio navigation, and ultrasonic guidance, have been investigated.

3. Advantages of Robot

The ROBOT is a basic tool for automation and will be of great use to perform repetitive tasks of picking and placing in an industrial production line

- Its use can be extended and exploited by few modifications to do difficult and hazardous tasks for nuclear applications.
- It can be used to do work effectively due to its great-added accuracy which will results the quality improvement in the work.

4. Motors & Actuators

Geared DC motor is used for vertical to and fro motion of elevator. It accepts PWM pulses from the microcontroller and accordingly maintains speed of the elevator.

Fig. 3: General DC motor

- Bidirectional Shaft rotation
- Accepts PWM pulses for Speed Control
- Works with wide range of Voltages
  Gear ratio of 50:1 provides a good torque for easy effortless elevator motion.
- Rugged Design for more reliability.
- Rated Voltage: 12V
- Operating Voltage Range: 3V-12V
- Current at No Load: 50mA
- Current at Full Load: 500mA
- Gear Ratio is 50 :1
- Motor Shaft Speed: 100 RPM
- Torque:2.7 KgF-cm

5. Interfacing Geared DC motor to ATMEGA 32:

ATMEGA32 regulates DC motor with gearing that uses the L298 chip. The L298 is a high current dual full-bridge

driver designed to drive inductive loads like solenoids, relays, stepping motors, and DC motors while accepting standard TTL logic levels. Quick Recuperation Diodes are employed to inhibit An electric DC motor produces electrical noise. Brake Actuators comprises of Precision servo motor operating at 5V and a brake mechanism. ECU applies brake by providing PWM pulses to Servo motor. Servo motor angle can be defined by using PWM signals. The advantage of servo motor is precision braking by applying appropriate pressure to brake pads.

6. Result:

BLYNK Blynkwas designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, vizualize it and do many other cool things. There are three major components in the platform:

- Blynk App - allows to you create amazing interfaces for your projects using various widgets we provide.
- Blynk Server - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.
- Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and outcoming commands. Now imagine: every time you press a Button in the Blynk app, the message travels to space the Blynk Cloud, where it magically finds its way to your hardware. It works the same in the opposite direction and everything happens in a blynk of an eye.

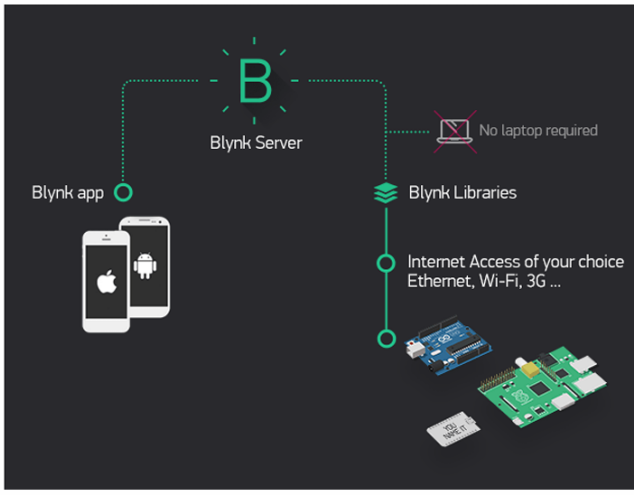

Fig. 4: Blynk App

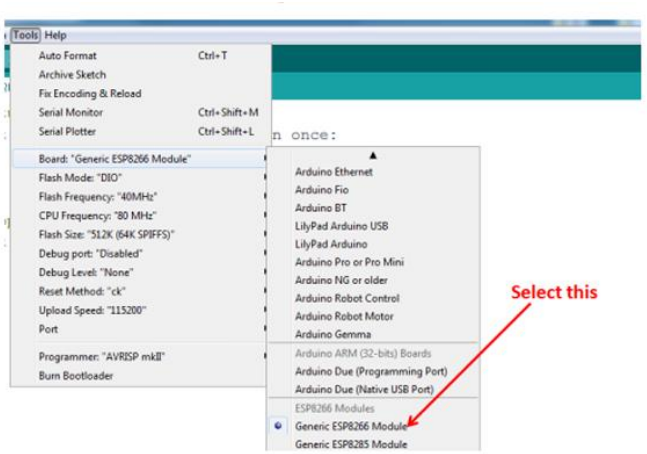

Fig. 5: Generic ESP8266

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7. CONCLUSIONS

As the machines can be made lighter and cheaper if the driver's seat, controls, and cab can be eliminated, The robots can be used in various fields in agriculture, The robots can easily work around trees, rocks, ponds, and other obstacles. The robots can reduce up to 80% of farm's use of pesticides, The robots may perform more or different tasks in the future, The robots can create jobs for the people who have to make the robots and who have to fix the robots. The robots have many fields of application in agriculture such as the Merlin Robot Milker, Rosphere, Harvest Automation, Orange Harvester, lettuce bot, and the weeder, Another field of application is horticulture, One horticultural application is the development of RV 100 by Harvest Automation Inc. RV100 is used in handling and organizing the potted plants including the spacing capabilities, collection, and consolidation, RV100 for this task offers high placement accuracy, autonomous outdoor and indoor function, and reduced production costs. The idea of applying robotics technology in agriculture is very new, In agriculture, the opportunities for robot-enhanced productivity are immense and robots are appearing on farms in various guises and increasing numbers.

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