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Agribot: An Agriculture Robot

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Abstract: Agribot is a robot designed for agricultural purposes. As one of the trends of development on automation and intelligence of agricultural machinery in the 21st century, all kinds of agricultural robots have been researched and developed to implement a number of agricultural production in many countries. This Bot can performs basic elementary functions like picking, harvesting, weeding, pruning, planting, grafting.

Keywords: Agribot, Spraying, Harvesting

I. INTRODUCTION

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 autonomously such as spraying and mechanical weed control, fruit picking, watching the farms day and night for an effective report.

Agribot is a robot designed for agricultural purposes. It is designed to minimize the labour 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, seeding and removing the weeds. And they gradually appear advantages in agricultural production to increase productivity, improve application accuracy and enhance handling safety.

II. CONSTRUCTION

The main feature of the Robot is the **Ability to find the grass in the field using Image processing.** For this we are using a special purpose Web cam which will take photos inside the field and if the grass is found then he will inform the robot to cut the grass in the crop field and also he will pick the grass which has been cut by the robot. We will also use image processing for analyzing the height of the plant. If the height of the crop is larger than the reference height then the cutting mechanism will be used by the robot to cut the crop. Robot which has several motors is activated by using the relays. Relays are nothing but electromagnetic switch which ON/OFF according to the control given by the microcontroller unit.

A vision-based row guidance method is presented to guide the

Robot platform driven along crops planted in row. And the offset and heading angle of the platform are calculated by detecting the guidance row in real time in order to guide and control the platform. Vision-based row guidance is to use camera to detect and identify crop plants and then to find accurate and stable navigation information from the binary image.

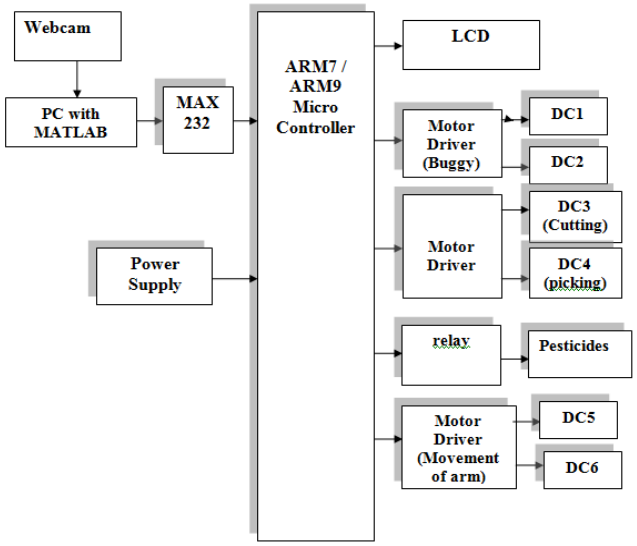

Fig. 1. Block diagram

The captured image are then processed by using image processing technique, the processed are then converted into voltage levels through MAX 232 level converter and given it to the microcontroller unit. In the microcontroller unit, c language coding is predefined, according to this coding the robot which connected to it was controlled. Webcam will continuously monitor the health of the plant as well as the height of the plant. We will keep the maximum and minimum limit of plant growth. As soon as it crosses the maximum height of the plant then we will use cutting mechanism to cut the plant.

Figure 1 shows block diagram of the whole bot that we are going to implement.

III. BLOCK DIAGRAM EXPLANATION

A. ARM 7:

This generation introduced the Thumb 16-bit instruction set providing improved code density compared to previous designs. The most widely used ARM7 designs implement the ARMv4T architecture, but some implement ARMv3 or ARMv5TEJ. All these designs use a Von Neumann architecture, thus the few versions comprising a cache do not separate data and instruction caches.

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It is a versatile processor designed for mobile devices and other low power electronics. This processor architecture is capable of up to 130 MIPS on a typical 0.13 µm process. The ARM7TDMI processor core implements ARM architecture v4T. The processor supports both 32-bit and 16-bit instructions via the ARM and Thumb instruction sets.

The ARM7TDMI (ARM7+16 bit Thumb+j tag Debug+fast Multiplier+enhanced ICE) processor is a 32-bit RISC CPU designed by ARM, and licensed for manufacture by an array of semiconductor companies. In 2009 it remains one of the most widely used ARM cores, and is found in numerous deeply embedded system designs. The ARM7TDMI-S variant is the synthesizable core.

B. LIQUID CRYSTAL DISPLAY:

LCD is used in a project to visualize the output of the application. We have used 16x2 LCD which indicates 16 columns and 2 rows. So, we can write 16 characters in each line. So, total 32 characters we can display on 16x2 LCD.

LCD can also used in a project to check the output of different modules interfaced with the microcontroller. Thus LCD plays a vital role in a project to see the output and to debug the system module wise in case of system failure in order to rectify the problem.

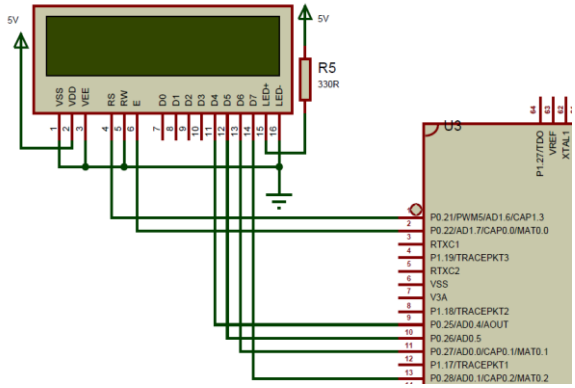

Fig. 2. LCD Used

C. CAMERA:

The Rs232 standard is used to interface the computer with the microcontroller. The computer is connected by the web camera for recognition. The matlab software window is used. Below figure 2 depicts the image of web camera.

Fig. 3. Web Camera

D. PC:

We already know about the facility of the mobile, so after receiving data from the webcam we can copy or use the same data in our PC. The PC and RF receiver can be interfaced with the help of the data cable DKU-50.

We are using the MATLAB software in our PC for the user interface with the system. With the help of this MATLAB software any user can easily make the use of the system.

This MATLAB software provides the notice typing and editing facility. Also we can copy the same content as received through mobile in the editing window and call it as a notice.

Hence the PC/MATLAB software provides the typing, editing and formatting options to the user.

E. RS 232:

RS 232 is a serial communication cable used in the system. Here, the RS 232 provides the serial communication between the microcontroller and the outside world such as display, PC or Mobile etc. So it is a media used to communicate between microcontroller and the PC.

In our project the RS232 serves the function to transfer the edited notice (or data) from PC (MATLAB software) to the microcontroller, for the further operation of the system.

DC MOTOR:

DC motors are used to physically drive the application as per the requirement provided in software. The dc motor works on 12v.

To drive a dc motor, we need a dc motor driver called L293D. This dc motor driver is capable of driving 2 dc motors at a time. In order to protect the dc motor from a back EMF generated by the dc motor while changing the direction of rotation, the dc motor driver have an internal protection suit. We can also provide the back EMF protection suit by connecting 4 diode configurations across each dc motor.

F. DC MOTOR DRIVER (L293D):

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoides, DC and stepping motors) and switching power transistors. To simplify use as two bridges each pair of channels is equipped with an enable input. A separate supply input is provided for the logic, allowing operation at a lower voltage and internal clamp diodes are included. This device is suitable for use in switching applications at frequencies up to 5 kHz. The L293D is assembled in a 16 lead plastic package which has 4 center pins connected together and used for heat sinking The L293DD is assembled in a 20 lead surface mount which has 8 center pins connected together and used for heat sinking.

IV. WORKING

Here we are proposing an agricultural autonomous Robot. The Robot will have a cutting and picking mechanism as well as it will spray pesticides on the crops. So, in all this is a completely autonomous robot.

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It has a camera which will give a live vision of the field so while it performs its basic operations we can monitor everything. For large farms a GPS based module can be installed depending on which we can fix a specific land to be harvested in which pattern or way.
After harvesting or cutting, it will pick up the crops and place it in a vessel which is beside the robot. A further spraying mechanism is also present in the robot which will spray the pesticides on the crops.

V. CONCLUSION

This paper has set out a vision of how aspects of crop production could be automated one. Although existing manned operations can be efficient over large areas there is a potential for reducing the scale of treatments with autonomous machines that may result in even higher efficiencies. The development process may be incremental but the overall concept requires a paradigm shift in the way we think about mechanization for crop production that is based more on plant needs and novel ways of meeting them rather than modifying existing techniques.

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