Implementation of Cotton Picking Robotusing Arduino

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Abstract: Cotton has been picked by hand for over centuries. It is still practiced in some parts of the world. Although, most of the modern countries have machinery for picking the cotton, it is still hand-picked in India. This leads to several health problems and also besmirches the cotton. In order to overcome these problems, mechanized picking is implemented. This is operated manually which reduces the labor cost and the time taken to pick the cotton. It is a one-time investment and cost of maintenance is low.

Keywords : Arduino Mega2560, Bluetooth module, Robotic Arm, Wireless Cam.

I. INTRODUCTION

This paper aims to provide a useful method for picking cotton by the "Implementation of Cotton Picking Robot". In India, cotton picking completely manual. It is still practiced in some parts of world. One of the most important fiber, throughout the world, is cotton. The cotton textile industry obtains the required basic raw materials from cotton. India is the second largest producer of cotton all over the world (1). Cotton is the mostly cultivated and gives high profits compared to other crops. For small scale cultivation, the robot is not affordable. For the large scale cultivation, they need manual or automated types of robots to get huge profits. To mechanize the entire process, this project is implemented..

II. EXISTING SYSTEM

At present, there is a tomato picking robot which is automated. With the help of color sensor, it detects only red color and that part, which is harvested, is cut and put onto the roller. The roller rotates automatically and the tomato which is cut, falls into the collecting tank. When the collecting tank is completely filled(2,3), it will send a message to the farmer to make the tank empty. To avoid the fresh tomatoes from being rotten, the farmer needs to check whether there are any rotten tomatoes present in the tank

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III. PROPOSED SYSTEM

This system completely depends on few electronic components like Arduino Mega 2560, Bluetooth module HC-05, Robotic Arm and Wireless camera which are the integral parts of robot. The inputs to the system are Bluetooth module and motor drivers which are connected to Arduino Mega 2560. The output is the movement of wheels attached to the robotic body and the movement of the robotic arm. The wireless camera, whose output is displayed on the laptop/TV screen, used to detect non-contaminated cotton boll, which is picked by the robotic arm(4,5).
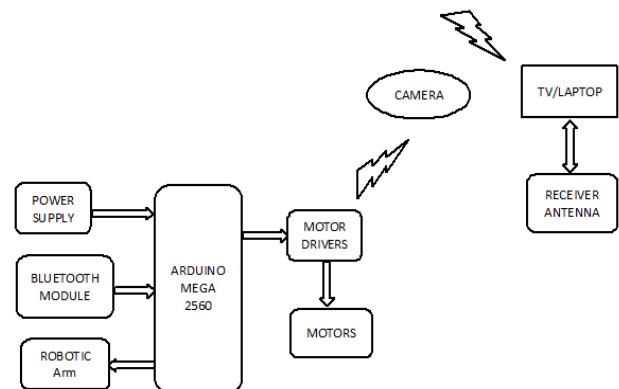
Block diagram

Fig 1: block diagram for implementation of cotton picking robot

Hardware description:

Arduino: The Arduino Mega2560 is a micro controller in the ATmega family. It is a 100 pin IC which consists of 16 analog input pins, 54 digital I/O pins out of which 14 are PWM pins. Its input voltage is 7-12V and operating voltage is 5V. It is inexpensive and open source software platform and can be executed easily. According to the requirement, we can perform the operation.

Bluetooth Module: It is a wireless connectivity module. We can perform various operations with the help of Bluetooth module when paired up with android mobile device. Its range is 9meters. It operates at 3.3V.

Dc Motors: A DC motor is a class rotatory electric machine which converts direct electric energy into mechanical energy. The speed of DC motor can be controlled by varying the supply voltage or strength of the current field of the armature.

Motor Drivers: These are used to control two motors simultaneously which supplies equal voltage to both the motors. Motor drivers protect the circuit at fluctuating voltages.

Its operating voltage is 5V, which, it uses for its internal operation. An external supply (VSS) which ranges upto 36V is used to drive motors.

Battery: Here, battery majorly serves as a source of stored electric power device which provides power to the components present in the circuit and supplying power in the areas that do not have electric power distribution.

Servo Motor: A servo motor is used for linear rotatory motion. According to the user, he can make it to rotate in required direction. It is applicable in robots and automated manufacturing.

Robotic Arm: It consists of two DC motors which are about 60rpm, one is used for opening and closing of the arm and the other is used for upward and downward motion.

Wireless Camera: Wireless camera is used to transmit audio and video signals to the receiver. Typically, it ranges between 250-300feet. The strength of signal gets reduced when there is any obstacle present in the line of sight between transmitter and receiver.

Honestech Vhs To Dvd 3.0 Se: It is a receiver part. W can see the output on TV/laptop screen with clear audio and video from the transmitter.

Software Design: The main requirements for programming Arduino are Arduino Mega 2560 and Arduino IDE (1.0.6 version). Ensure that correct board and port are selected in tool before uploading the program. Save the code, run it and debug the errors. Now, dump the code into the Arduino using dumping cable(6).

IV. WORKING PRINCIPLE:

The working of the cotton-picking robot is simple but the technology is impressive. It consists of wheels, motors, a robotic arm, a tereovision camera. The working of all these is made possible with the motor drivers, an Arduino mega 2560 and a Bluetooth module. The Arduino mega 2560 is programmed to operate the movement of the wheels, the robotic arm and the camera in such a way that it makes picking of cotton an easy job and the Bluetooth module, which is paired with the Smartphone for the operation of the robot, makes it easier.

The stereovision camera, whose frequency can be adjusted using an antenna receiver, is connected to a laptop or a TV to discern where the cotton. The commonly used frequency is 2.4GHz. A motor is attached to the camera that allows it to take a 360 degrees turn.

The robot is then made to move towards the cotton plant. The wheels used in the robot are connected to the motors and these motors are connected to the motor drivers. The wheel operations include moving forward, backwards and sideways. So, if an obstacle is present in the path of the robot, it can be maneuvered through a different path(7). These operations are made possible by using a Bluetooth module. The arm operations include upward movement, downward movement and opening and closing of its fingers. This arm is extended to the analyzed cotton boll where its fingers clamp the cotton boll, pluck it from the cotton plant and deposit it into the collecting box, which is attached to the robot. When the collecting box is full, all the tasks are suspended by using the stop operation and the cotton from the box is removed and the process continues.

V. CONCLUSION

This will help to harvest the cotton bolls and collect them in tank. It is one-time investment equipment. It is used to reduce the cost for harvesting the crop, labor charges, contamination of the crop, time taken, injuries and snake bites

VI. RESULTS

Top view of cotton picking robot using arduino

Side view of cotton picking robot using arduino

The above robot works based on arduino and can be operated with the help of a Bluetooth module. The person operating the robot has complete control over it. He can make it move forward, backward and sideways and can pick cotton with the help of the camera mounted on it and the robotic arm, whose height can be adjusted as and when required. The cotton boll is picked by the robotic arm by opening and closing it and that cotton boll is put into the collecting box, which is attached behind the robot. The collecting box is made empty when it is full

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