Design and Development of Agro Rover for Crop Monitoring

S.Janaki , R.Subash , K.Rajesh Kumar , K.Rajesh , B.Sriram

Abstract: Agriculture is that the one among the previous profession, particularly in India. today several robots and devices square measure introduced to stay the plants healthy condition and to attain full life cycle with none chemical effects to human and atmosphere. During this work automaton is meant as semi-autonomous to attain associate agriculture task with additional economical and precise by victimization current trends. The main motive of this work is to develop low value mobile robotic system to perform following actions like water spraying, insect repellent mechanism and automatic pesticide spraying mechanism attained by using vision based system using camera. This all operation is shunned any human intervention

Key words:Internet of things[IoT], Direct current[DC],Universal System Bus[USB],

I.INTRODUCTION

Robotics is a promising technology that contributes to almost every sector of the global economy, from medical to space study. Nevertheless, one sector that consistently lags behind is the agriculture. This is slightly mystifying because many farmers were used to the tools, heavy machinery and conventional agricultural techniques[1-7]. The usage of robotics related and automation technologies provides significant values to both farmers and agricultural field. These tools are used for common applications like seeding, spraying,fruit picking, plant classification, etc. Automated agricultural tasks bring many benefits to the field which avoids unexpected or dangerous effects of chemical exposure which also helps to improve overall efficiency and productivity. Automation enables many advantages to farmers or land owners which makes the task held more accurate, uniform and less costly[8-12].

II.PROPOSED SYSTEM

A digital camera may be a video camera that feeds or streams its image in real time to or through a pc to a network. once ”captured” by the pc, the video stream could also be saved, viewed or sent on to different networks movement through systems like the web, associate degree camera e-mailed as an attachment.

Revised Manuscript Received on March 25, 2019.

S.Janaki, Asst.Professor, Department of Electronics and Communication Engineering, Vel tech
R. SUBASH, UG student, Department of Electronics and Communication Engineering, Vel tech
K. RAJESH KUMAR, UG student, Department of Electronics and Communication Engineering, Vel tech
K.RAJESH, UG student, Department of Electronics and Communication Engineering, Vel tech
B .SRIRAM, UG student, Department of Electronics and Communication Engineering, Vel tech

In this system we include all the features of existing system features on addition to than vision based seed sowing system is used introduced in this paper. Vision based system can be achieved by using camera and edges of land detected by using edge detection algorithm. Robot after found out the damaged leaf it can spray the pesticide. Soil moisture level, ultrasonic sensor values and other parameter values are sent to IoT cloud – Thingspeak cloud. We can analyze the sensor values by using plots

Fig 1:Block Diagram of Agro Rover

CAMERA

Fig 2 : web camera

Once sent to a far off location, the video stream could also be saved, viewed or on sent there. not like associate degree informatics camera (which connects mistreatment local area network or Wi-Fi), a digital camera is usually connected by a USB cable, or similar cable, or designed into component, like laptops, it is shown in fig 2.

RASPBERRY PI 3
Fig 3: Raspberry pi 3

CPU: Quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz. GPU: 400MHz Video Core IV multimedia system. Memory: 1GB LPDDR2-900 SDRAM (i.e. 900MHz). USB ports: four. Video outputs: HDMI, composite video (PAL and NTSC) via three.5 mm jack. Network: 10/100Mbps local area network and 802.11n Wireless local area network. Peripherals: seventeen GPIO and specific functions, and HAT ID bus. Bluetooth: four. Power source: five V via small USB or GPIO header. Size: 85.60mm × 56.5mm, Weight: 45g, it is shown in fig 3.

Fig 4: DC Motor

A DC motor is any of a category of rotary electrical machines that converts electricity into energy. The foremost common varieties have faith in the forces made by magnetic fields. The shunt motors square measure used wherever constant speed is needed and beginning conditions aren't severe. The varied applications of DC shunt motor square measure in shaping machine Machines, Centrifugal Pumps, Fans, Blowers, Conveyors, Lifts, Weaving Machine, Spinning machines, etc., it is shown in fig 4.

Fig 5: Soil Moisture Sensor

The soil wetness detector consists of 2 probes that area unit used to measure the volumetrical content of water. the 2 probes enable this to labor under the soil then it gets the resistance price to live the moisture price. A soil wetness detector measures the amount of water containing during a material, like soil on a volumetrical or measuring basis. to get a correct mensuration, a soil temperature detector is additionally needed for standardisation, it is shown in fig 5.

Fig 6: Buzzer

In Insect Repelling unit a buzzer was used to generate signal with varying frequencies to repel insects from the field without using any toxic materials. It has built-in sonic and ultrasound sensor so it can generate three different groups of signal to repel insects and other animals from the ground: 7 kHz - Mosquito, Flea, Tick, etc, 10 kHz - Mouse, Rat, etc., 12 kHz - Cockroach, Weasel, etc. Other than that, it has 25 m. Sq approx working range, it is shown in fig 6.

Relay

SOIL MOISTURE SENSOR
Relays are unit the first protection yet as switch devices in most of the management processes or equipments. All the relays reply to one or additional electrical quantities like voltage or current such they open or shut the contacts or circuits. A relay may be a switch device as it works to isolate or amendment the state of an electrical circuit from one state to a different. Classification or the kinds of relays depend upon the perform that they're used. a number of the classes embrace protecting, reclosing, regulating, auxiliary and watching relays , it is shown in fig 7

ULTRASONIC SENSOR:

The supersonic sensing element is employed to see the space to the item, wherever it operates at the vary from 2cm to 400cm .Ultrasonic sensors ar divided into 3 broad categories: Transmitters,Receivers ,Transceivers. Transmitters convert electrical signals into ultrasound, receivers convert ultrasound into electrical signals, and transceivers will each transmit and receive ultrasound.Here we tend to ar exploitation this sensing element for obstacle detection and guiding the rover to not harm the plant, it is shown in fig 8.

WATER PUMP

The small pump operates at the voltage from a pair of.5~6V with the in operation current of 130~220mA. it's the rate of flow of 80~120 L/H. It works with the measurements from the soil wet sensing element .when water content within the field is high . it can pump out the water from the sphere throughout season wherever it'll stop the plants from drowning. once water content within the field is low ,it will pump the water to the sphere, it is shown in fig 9.

III.EXPERIMENTAL RESULT

The proposed module of Agro Rover will sense the humidity of the crop cultivating soil with the help of the soil moisture sensor and will pump out the water based on the needed level. If the water content in the soil is low then the rover will release the water which is kept at the back side of the rover in a small container. And the pesticide sprayer unit in the rover will spray the pesticide on the affected leaf by detecting with help of the camera . The insect repelling unit which will identify the insect on the leaf and will make a buzzer sound shown in fig 11.
IV. CONCLUSION

In this study, a successful rover platform was designed, built and programmed for spraying and agricultural applications. It is developed as a fully autonomous robot by adding camera and various sensors as Soil Moisture sensor, inertial measure units, ultrasonic sensor, digital camera to have better approach for agricultural applications. So, it will be able to spray given location without any human interaction and control. Data transfer will be achieved by wireless communication instead of using serial cable as before. We have extracted the edges from the acquired image and affected leaves is found then pesticide is sprayed.

REFERENCES