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Design and Implementation of Automatic Agricultural Robot – Agrobot

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ABSTRACT

Agri-bot is a device that, via the use of computer programming, simplifies often difficult agricultural activities. It is a more efficient alternative to the convectional methods for accomplishing the same goals. The widespread implementation of automated in agro has facilitated several developments within the sector, and it has saved farmers both time and money. The agricultural robot may be tracked through Bluetooth from an Android smartphone. All of the computing, monitoring, and processing is designed by the sensors that are interfaced with the microcontroller and the motors. This section discusses a simple and appealing automated irrigation system that can be made by ourselves in just a few hours using an IR sensor and a Raspberry Pi computer because most people forget to water their plants and sky plants on a regular basis. These agribots have several potential uses, including harvesting, pesticide spraying, weed management, and more.

Introduction:

Traditional agricultural approaches are based on manpower and outmoded practises such the use of industrial chemical fertilisers, insecticides, herbicides, and genetically modified animals since agriculture is so crucial to a nation's economy. Agricultural robotics allow us to accomplish identical jobs in a more timely and effective manner. Diseases, weeds, bug infestations, and other stress conditions can all be detected by an agribot[13]. Agrobots don't weigh a lot. For the benefit of farmers everywhere, agricultural robots may now be operated through smartphone app[14]. Agribot is tracked using an Android app. The farmer's income is guaranteed by this. Yet, existing methods that enable mechanically driven group of primary bioinformatics for small numbers of plant in the field fall far short and the need to investigate and differentiate a large number of plants in the wild. Integrating plant biology, agricultural science, robotic vision, and computer engineering is necessary for the construction of structures that can acquire multi-modal, multi-character data directly there in field. These infrastructures need to be reliable and accurate, providing more information than is now available through automated nursery or physical field characterization. This will help us comprehend specific phenotypes as a result of plant responses to a thriving environment by linking genotypes to the cellular and answer the following questions responses.

Literature Review

1. “Smart farming using agri-bot”(K. Gowthami, K. Greeshma, N. Supraja,IJAER,2019) This paper offers a system which performs the seeding process in the agricultural field. The main idea behind this development is to perform agricultural tasks without human intervention and to implement a prototype of an effective low cost agribot. This project is based on a wireless communication by making use of Arduino and Bluetooth[14]. 2. “Automatic weed detection and smart herbicide spray robot for corn fields” (G.Sowmya, J.Srikanth,IJSETR,2017) This paper designs and develops a robot to detect weed in corn crop, by making use of image processing. The advantages of this project is time saving as it detects the beets with the help of a camera and the herbicides are sprayed on the infected crop, saves the farmers from tedious work.

3. “Designing of an Autonomous Soil: Monitoring Robot” (Patrick M. Piper and Jacob Vogel,IEEE,2015) This paper designs and develops a robot for monitoring of soil. this robot is capable of sensing the moisture an the temperature of the soil through stevens hydra probe II and it consists of GPS to navigate. 4. “IoT Based Smart Agriculture-towards making the fields talk” (Muhammad Ayaz, Mohammad Ammad-uddin, Zubair Sharif, Ali Mansour, and elHadi M. Aggoune, IEEE,2019) This paper[15] proposed a multitasking IOT based technology in the agricultural field. The idea of this structure is to help farmers produce high quality yields to meet the rising demand of food with the increased population, by making use of wireless sensors, UAVs, cloud computing, and communication technologies. the system proposes a complete technology based farming from the start till the harvesting which includes very less human interaction. 5. “Image processing-based intelligent robotic system for assistance of agricultural crops” (Nikhil Paliwal,

PankhuriVanjani , Jing-Wei Liu ,Sandeep Saini and Abhishek Sharma,IJSHC,2019) This paper determines a prototype model of image processing based IOT robot which helps in identification of the leaf infection. This consists of UGV and UAV usage which helps in detecting the disease, soil data connection and in the classification of the field to provide solutions for mixed cropping. The main purpose of this paper is to help farmers with early detection of disease. 6. "Agricultural Automation System with Field Assisting Robot-AgroBot" (C. Jeeva, SaherMairaj, ArchitkeshavGangal and Farheen, IJPAM,2018) This system consists of Arduino UNO which acts as the hearth of the system. This system consists of a camera, to detect the obstacles falling in it's path which will help in taking the required actions and it proposes three main functions: Ploughing seed dispensing and harvesting. The main idea behind this is to design a multitasking robot which in turn reduces the working hours, cuts down on labour expenses and helps in the correct way of seeding.

Existing System

Agriculture is the most important sector of Indian Economy. Indian agriculture sector accounts for 18 per cent of India's gross domestic product (GDP) and provides employment to 50% of the countries workforce. Irrigation is defined as "Artificially supplying & systematically dividing of water for agriculture & horticulture in order to obtain higher or qualitatively better production. In India most of the irrigation systems are not automated. These techniques are replaced with semi-automated and automated techniques[16],[17]. The available techniques are like terraced irrigation, drip irrigation and sprinkler system. The global irrigation is categorized by increased demand for higher agricultural productivity, poor performance and decreased availability of water for agriculture[18],[19],[20].

Proposed System:

Agorot is designed to execute four mechanisms. They are watering mechanism, drilling and lifting mechanism, seed sowing mechanism, obstacle detection, and automation respectively. The robot can only be operated by specifying the distance between the operating points, direction to which the robot first turns, etc. This can be done with the help of the android application installed on the smartphone . After getting the value of these variables, the subsequent robot operation does not require human assistance. The hardware components and various sensors are interfaced with Arduino mega 2560. DC motors are driven by using an L298N motor driver. Four DC motors are used for driving the wheels and two DC motors are used for Drilling and Lifting mechanism. Once the robot reaching the operating point, it executes drilling operation with a spiral ground drill bit attached to a 100-rpm dc gear motor, at the same time the submersible pump is turned on for pumping water. A low rpm dc gear motor coupled with rack and pinion gears is used to provide up and down movement to the drilling motor. After making the seedbed, the seeds are selected one by one by the seed sowing mechanism which is powered by a servo motor. Collected seed is then ejected to the hole with the help of a tube having sufficient diameter . Once the robot has reached the operating point, drilling and watering operations will be performed together. Only after that does the seed sowing process begin. The robot is then moving to the next operating point. This operation will continue until the robot covers the entire field. The robot navigates the field using the inputs from a magnetometer and it is interfaced with the Arduino mega 2560 . Bluetooth module is used to receive the data which is sent from the user's smartphone. Obstacle detection and Automation mechanism can be done with the help of an ultrasonic sensor. Its programming algorithm is as follows, whenever the ultrasonic sensor detects an obstacle the robot will turn 180 degrees through a sequence of steps and when the ultrasonic sensor detects obstacles twice (repeatedly by, one by one) the robot will stop its operation. The entire mechanism is powered electrically by a 12V 7500 mAhleadacid battery.

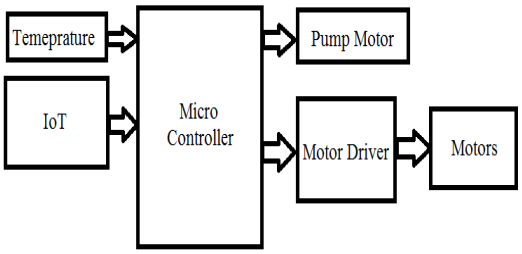
Methodology:

The agricultural robot will be using a chassis as a base to connect and assemble everything on it, will be consisting of two motors. Two of which are high torque motors. The robot is capable of doing four separate functions.

These functions will be working in different modes. Programming of different modes is done separately. The sharp sensor gives input to the robot by measuring the length and breadth of the field. Arduino is programmed in such a way that, after getting the data of length and breadth of field, mode will be selected in which the robot is made to work.

We are going to do the Agri robot giving pesticides by using the water pump. And we can also measure the temperature and humidity level present in the field.by this we can reduce the efforts of the former.

Block Diagram



HARDWARE REQUIREMNETS:

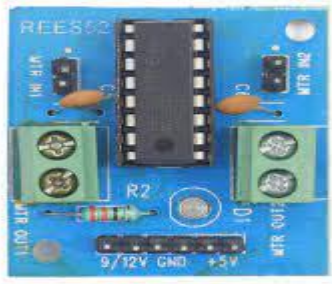
PUMP MOTOR:

A Motor pump[21] is a mechanical device, used to move the liquids/gases from one place to another by using mechanical action[22]. The working principle of the water pump is, it converts the motor's energy from mechanical to fluid flow. These are classified into various types based on the technique they use for supplying the liquid like direct, gravity and displacement.

A pump operates by using a mechanism like rotary or reciprocating and they consume energy for performing mechanical work to move the liquid. Pumps use several energy sources for their operations like manual, wind power, electricity, engines, etc. These are available in many shapes based on its application like medical to large industries.

L293 Motor deriver:

The L293D is **a 16-pin Motor Driver IC which can control a set of two DC motors simultaneously in any direction**. The L293D[23] is designed to provide bidirectional drive currents of up to 600 mA (per channel) at voltages from 4.5 V to 36 V (at pin 8!). You can use it to control small dc motors - toy motors.



Rechargeable batteries:

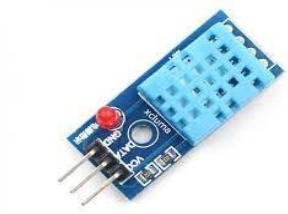
A rechargeable battery is an energy storage device that can be charged again after being discharged by applying DC current[24] to its terminals.

Power bank module:

Power Bank Module is **a super mini power bank mainboard compatible with 3.7V-4.2V li-ion battery [25]**. On-board micro USB port for battery charging and USB type A female output port supporting DC 5V 1A input and 5V 1A output. Just connect it with a 18650 battery then you can get a portable power bank.

DHT 11:

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). Its fairly simple to use, but requires careful timing to grab data[26],[27].



CONCLUSION:

This system was proposed to agriculture is basic source of livelihood People in India. It plays major role in economy of country. But now days due to migration of people from rural to urban there is hindrance in agriculture. Monitoring the environmental factor is not the complete solution to increase the yield of crops. There are no of factors that decrease the productivity to a great extent. Hence Automation must be implemented in agriculture to overcome these problems. An automatic irrigation system thereby saving time, money and power of farmer. The Traditional Farm land irrigation techniques require manual intervention. With the automated technology of irrigation the human intervention can be minimized. Continuous sensing an monitoring of crops by convergence of sensors with Internet of things (IOT) and making farmers to aware about crops growth, harvest time periodically and in turn making high productivity of crops and also ensuring correct delivery of products to end, consumers at right place and right time. So to overcome this problem we go for smart agriculture technique using IOT. This Project includes sensors such as temperature, humidity, soil moisture and rain detector for collection the field data and processed. These sensors are combined with well established web technology in the form of wireless sensor network to remotely control and monitor data from the sensors.

REFERENCES

[1] M. P. Arakeri, V. K. B. P., S. Barsaiya, and S. H. V, "Computer Vision Based Robotic Weed Control System for Precision Agriculture," IEEE 7 International Conference on Advances in Computing, Communications and Informatics (ICACCI), 2017.

[2] K. O. Flores, l. M. Butaslac, J. E. M. Gonzales, S. M. G. Dumlao, and R. S. J. Reyes, "Precision Agriculture Monitoring System using Wireless Sensor Network and Raspberry Pi Local Server," IEEE Region 10 Conference (TENCON), 2016.

[3] M. Montalvo et al., "Automatic detection of crop rows in maize fields with high weeds pressure," Expert Systems with Applications, vol. 39, no. 15, pp. 11889-11897, 2012.

[4] A. Milioto, P. Lottes, and C. Stachniss, "Real-time Semantic Segmentation of Crop and Weed for Precision Agriculture Robots Leveraging Background Knowledge in CNNs," IEEE International Conference on Robotics and Automation (ICRA), 2018.

[5] E. Hamuda, M. Glavin, and E. Jones, "A survey of image processing techniques for plant extraction and segmentation in the field," Computers and Electronics in Agriculture, vol. 125, pp. 184- 199, 2016.

[7] A. Bechar and C. Vigneault, "Agricultural robots for field operations: Concepts and components," Biosystems Engineering, vol. 149, pp. 94-111, 2016.

[8] J.-L. Tang, X.-Q. Chen, R.-H. Miao, and D. Wang, "Weed detection using image processing under different illumination for site-specific areas spraying," Computers and Electronics in Agriculture, vol. 122, pp. 103-111, 2016.

[9] X. P. Burgos-Artizzu, A. Ribeiro, M. Guijarro, and G. Pajares, "Real-time image processing for crop/weed discrimination in maize fields," Computers and Electronics in Agriculture, vol. 75, no. 2, pp. 337-346, 2011.

[10] X. Gao et al., "Review of Wheeled Mobile Robots' Navigation Problems and Application Prospects in Agriculture," IEEE Access, vol. 6, pp. 49248-49268, 2018.

[11] S. Aziz, Z. Kareem, M. U. Khan, and M. A. Imtiaz, "Embedded System Design for Visual Scene Classification," in 2018 IEEE 9th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON), 2018, pp. 739-743: IEEE.

[12] A. Rampun, B. Scotney, P. Morrow, H. Wang, and J. J. J. o. I. Winder, "Breast density classification using local quinary patterns with various neighbourhood topologies," vol. 4, no. 1, p. 14, 2018.

[13] A.V.R.Mayuri, Dr.M.V.Subramanyam," MPGA:QOS Adequacy Latitude aware Cooperative Spectrum Sensing in Cognitive wireless mesh networks by Meticulous Progression based GA", Conference on Power, Control, Communication and Computational Technologies for Sustainable Growth, G Pulla Reddy Engineering College, Kurnool, 11-12-December, 2015

[14] V.Jyothi, Dr.M. V. Subramanyam " An Enhanced technique to improve the Network Lifetime of Cognitive Sensor Networks ', International Journal of Wireless Personal Communications' pp. 12757 – 12763, May-2021

[15] C V Subhaskar Reddy, Dr.M.V.Subramanyam " Hybrid strategy for reliable transfer and packet loss reduction in Cognitive Radio Ad-hoc Networks". International Journal of Advanced Technology and Engineering Exploration, Vol 8(84) ISSN (Print): 2394-5443 ISSN (Online): 2394-7454

[16] V.Jyothi, Dr.M. V. Subramanyam " QIF-NDMRP-QOS aware Interference free node-Disjoijnt multipath routing protocol using source-Destination edge based path selection scheme. 'Webology'.pp-773-786 , ISSN:1735-

188X, Vol.19, No:2,2022.

[17] B.Anil Kumar , Dr.M. V. Subramanyam &Dr.K.Satyaprasad 'An Enhanced Energy Constraint Secure Routing Protocol for Clustered Randomly Distributed MANETs Using ADAM's Algorithm ", International Journal of Computer Networks and Inventive Communication Technologies pp.885-900. 2022

[18] SJM Murathoti.Sharone ,Dr.SowmyaGali,S.Girishbabu, VadalaNagamani, "Vlsi Implementation Of Ternary Adder And Multiplier Using Tanner Tool", Journal of Pharmaceutical Negative Results , Volume 13 ,Special Issue 5 ,2022

[19] G Chandana, V Nagamani, et.al "Enhanced Fixed width booth multiplier for improved accuracy" Journal of Pharmaceutical Negative Results , Volume 13 ,Special Issue 5 ,2022

[20] BN Rajesh, V Nagamani, G Sowmya "Temperature and Humidity Sensor Based Air Blower Controller For Food Drying", JOURNAL OF ALGEBRAIC STATISTICS, Volume 13, No. 1, 2022, p. 869 – 876, ISSN: 1309-3452.

[21] Sowmya Gali,VenkatramNidumolu Packet Loss Aware Trust Management (PLATM) for IOT Network ",International Journal of Advanced Science and Technology,Vol. 29, No. 7s, (2020), pp. 5544-5550

[22] G.SOWMYA,N.SREENIVASA RAO,2 SYED MUNNAWAR "LABVIEW Based Text Detection And Object Recognition Prototype For The Blind And The Dumb People" Journal of Emerging Technologies and Innovative Research, Vol 6,issue 5, pp-2255 to 2258,(UGC)

[23] Sowmya Gali,VenkatramNidumolu"Multi-Context Cluster Based Trust Aware Routing For Internet of Things", Journal of Mechanics Of Continua And Mathematical Sciences, Vol.-14, No.-5, Sep - October (2019), pp.396-418.

[24] N. SreenivasaRao ,Sowmya G "Graphical Approach For The Optimization Of Multi-Standard Software Defined Radio (SDR) Systems Using VLSI" Journal of Emerging Technologies and Innovative Research, Vol 6,issue 2, pp-1148 to 1152 ,Feb 2019(UGC)

[25] B. AlekyaHimabindu, G. Sowmya, T. Nagamani "Patient Health Monitoring System Using IOT" Journal of Emerging Technologies and Innovative Research, Vol 6,issue 1, pp-91-95, Jan 2019(UGC

[26] Dr. N.Venkatram Sowmya gali " Privacy And Security Investigation of RFID Authentication Based On ECC For IoT" in International Journal Of Pure And Applied Mathamatics Special Issue Volume 117 No 10 91-95 2017(Scopus Indexed)

[27] Sowmya Gali "Integrated Optical Receiver Implementation using CMOS Technology" Journal of Emerging Technologies and Innovative Research, Vol 5,issue 10, pp-953-957,Oct 2018