iJETRM

International Journal of Engineering Technology Research & Management
www.ijetrm.com

A REVIEW PAPER ON FERTILIZER SPRAYING AGRICULTURAL ROBOT

N. Yadagiri[1], B. Rakesh[2], CH. Shiva Ganesh[3], G. Ajay Kumar[4], P. Siddiah[5]
[1]Assistant Professor, Department of Mechanical Engineering, GNIT, Hyderabad, Telangana.
[2,3,4,5] UG Scholars Department of Mechanical Engineering, GNIT, Hyderabad, Telangana.

ABSTRACT
The population of India is increasing rapidly in order to fulfil their diet &needs, the production of foods must be increased. But this must come at affordable to everyone. In India farming is done by traditional ways beside that there has been larger development of industry and service sector as compared to that of agriculture sector. To mechanization of agriculture in India some equipment has been developed. The pesticide sprayer is one among them and it is done by traditional farm workers by carrying backpack type sprayer, which requires human effort or by using electric pump. To improve the agriculture system and to reduce the human effort and problems associated with the backpack sprayer new equipment is fabricated which will be beneficial to farmers. The equipment utilizes renewable energy source (Solar energy) which is eco-friendly to function. The solar panel gives out electric supply to system, the radio-controlled transmitter and receiver minimize drudgery of farmer. Also minimize the wastage of pesticide and time. Our contribution on our project is by using eco-friendly reliably available solar energy as a main source of energy making this multifunctional sprayer device by advancing the spraying methods which make friendly to use and operate which can be useable in different spraying stages of farming as per process requirement

Keywords:
Bluetooth Module, Microcontroller, L293D motor Driver IC, Pesticide Sprayer, Solar Power.

LITERATURE SURVEY
Neha S. Naik [1]: In later a long time, mechanical technology in horticulture division with its execution based on exactness farming concept is the recently developing innovation. The most reason behind computerization of cultivating forms are sparing the time and vitality required for performing monotonous cultivating assignments and expanding the efficiency of surrender by treating each edit separately utilizing accuracy cultivating concept. Planning of such robots is modeled based on specific approach and certain contemplations of agribusiness environment in which it is attending to work. These contemplations and distinctive approaches are examined in this paper.
S. Mohan [2]: Created agribusiness must discover better approaches to improve efficiency. One approach is to utilize accessible data innovations within the shape of more intelligent machines to diminish and target vitality inputs in more compelling ways than within the past. Accuracy Cultivating has appeared benefits of this approach but able to presently move towards a modern era of hardware.
ShahAlamgir[3]: to optimize the generation, ensure the environment from fertilizers abuse, spare cash and vitality amid the generation. The reason of this work was to create an independent versatile stage with soil testing gadget for horticulture. Soil tests are examined to decide the composition, charac-teristics or supplement levels of the soil. Smallholder ranchers can utilize basic hand-held field-testing units.
Sami Salama Hussen Hajjaj[4]: This paper explores the conceivable reasons for this marvels, by proceeding the survey of agribusiness robots, as it were this time centering on common sense and possibility. Upon broad survey and examination, the creators concluded that commonsense farming robots depend not as it were on progresses in
mechanical technology, but moreover on the nearness of a bolster foundation. This foundation envelops all administrations and innovations required by farming robots whereas in operation, this incorporate a dependable remote association, an successful system for Human Robot Interaction (HRI) between robots and farming specialists, and a system for program sharing and re-use.
Qingchun Feng [5]: In arrange to make strides automated collecting for new tomato and diminish the sum of human labor, this paper planned a tomato shrewdly picking robot. The picking robot included the vision situating unit, the

IJETRM

International Journal of Engineering Technology Research & Management
www.ijetrm.com

picking gripper, the control framework and carrying stage. Based on the working guideline of each component, the working handle of picking robot was changed. Based on his color show for picture division, the acknowledgment precision was progressed. The sacs filled with consistent weight discuss were received as the getting a handle on component of the picking end-effector, to anticipate the natural products from being harmed.

Issam Damaj[6]: a savvy farming framework was proposed (AgriSys). AgriSys centered for the most part on inputs counting temperature, stickiness, and PH. The framework may too handle troubles interesting to abandon situations, such as tidy, desolate sandy soil, determined wind, amazingly moo mugginess, and noteworthy diurnal and regular temperature changes. Furthermore, the framework advertised made strides security, faster mediations, and a more present day way of living. Due to the system's capacity to supply inaccessible get to, it was broadly utilized.

Virendra V. Shete[7]: The essential inspirations for proposed an computerization framework for cultivating are decreasing the time and vitality required to execute tedious cultivating operations and boosting the efficiency of create by treating each trim independently using the idea of exactness cultivating. This consider talks about these variables as well as a few strategies. Also, a show of an independent agribusiness robot that's as it were aiming for planting seeds is shown. It may be a four-wheeled vehicle that employments an LPC2148 microcontroller for control. Its operation is based on exactness agriculture, which makes it conceivable to proficiently plant seeds at the correct profundity and interims between lines of crops, depending on the sort of trim.

R. Patel[8]: utilized a checking framework based on microcontrollers to watch numerous natural components, such as encompassing temperature, relative mugginess, and soil dampness. Through the utilize of a microcontroller and radio recurrence remote module, the values of those parameters were wirelessly exchanged to the central unit. They ran a assortment of tests to test the sensors and remote module. When subjected to different temperatures, it was found that the dampness sensor's perusing changed fair somewhat. When presented to different deterrents, remote modules worked productively.

Soniya Zope[9]: IOT-based framework counting temperature, mugginess, photo emitter, and controller sensors has been proposed. A ace station that interatomic with intelligently program and people will work the controllers. The framework will give agriculturists a intelligent client interface. The level of generation can be raised compared to the current circumstance much appreciated to this intelligent approach.

Dr. G.S. Ananda Mala[10]: sketched out an observational show for how Indian agribusiness might advantage from the Web of Things. Their beginning proposal was to form a demonstrate that would show how their rural procedures might be utilized to clarify the IoT idea. The numerous sorts of sensors and the kinds that would be required for their agrarian employments were investigated afterward within the improvement of the sensors. They too talked around the different shapes of communication they use for interfacing to adjacent and far off hubs. The audit of the writing gave knowledge into how to form a sensor-based robot to upgrade rural exercises.

Juan Jesús Roldán[11]: agribusiness and nursery development and assembled data on planting and gathering, natural observing in the field as well as the assessment and treatment of plants. They too conversation approximately the robots proposed to achieve these errands for case controllers, ground vehicles, and airborne robots. The creators characterized considers activities related with accuracy farming and nursery development.

Marinoudi[12]: Rural robots have been the subject of broad investigate and advancement for decades and are being examined by numerous bunches around the world. Robert Bogue points to supply an diagram of a few critical and later investigate and improvements in rural mechanical technology. He too notices the robots created so distant, for illustration.

Sakai. S[13]: The rural endeavor faces various requesting circumstances along side misfortune of green water system frameworks, weeds, trim following issues since of trim elevation and severe climate conditions. But execution is frequently expanded with the assistance of innovation and in this way these issues are regularly illuminated. It can be increased with different AI-based procedures such as inaccessible detecting for soil, picture handling for weed discovery, chatbots for agriculturists, computerization of water system utilizing innovations.

N. Vamshidhar Reddy[14]: The creators displayed the require, benefits, applications and victory stories of utilizing rural robots in farming. They survey the triumphs of mechanical cultivating in numerous areas of farming. Others displayed the utilize and comes about of using robots in horticulture, they attempted to extend their information almost the utilize of agrarian robots on sake of agriculturists, particularly in creating nations like India, Paraguay, Albania, Guinea, etc.

Ito, N[15]: An energizing advancement inside the Savvy Ranches concept was a robot for watering pots in rural

iJETRM

International Journal of Engineering Technology Research & Management
www.ijetrm.com

nurseries that employments sensors for stickiness, position, and computer vision to appraise the sum of water each plant needs exclusively and after that runs the water slide required foreach plant. This procedure makes it conceivable to spare parcels of water and considerably make strides water system effectiveness.

Prajna K.B.[16]: Given a brief diagram of the distinctive sorts of mechanical innovations utilized in agribusiness and the thought of a general-purpose robot was displayed.

Santhi, P.V [17]: Farming performs a imperative work for the nation. Shrewd agribusiness is subsequently fundamental. The Web of Things will help to upgrade intelligent horticulture. The IOT works in different agrarian areas to progress time productivity, water administration, edit observing, soil administration, pesticide and pesticide control, etc.

Redmond Ramin Shamshiri [18]: others conducted an shrewd survey of agrarian mechanical autonomy. It challenges and extraordinary consideration is given to multirobot and swarm strategies.

Blender Timo [19]: Agrarian Robot Swarms (Damages) as a proposition for independent cultivating operations employing a set of facilitated robots and portrayed an application in seeding.

V. Dharmaraj[20]: a vision of how diverse agrarian divisions are regularly abused utilizing AI. It moreover considers AI Fueled thoughts for end of the and so the challenges that are expected within the future.

Mahapurush et al [21]: proposed a sun powered worked programmed pesticide showering robot to diminish the labor and utilize of power. The creator actualized the model as appeared within the Fig 2 with Arduino, ultrasonic sensor,camera, engine drive circuit, hand-off circuit to pump the sprayer circuit and the battery fueled with the assistance of sun powered board. The robot is worked with transmitter and recipient working at tall recurrence of 434 Mhz. It is an mechanized robot that's controlled by Arduino UNO R3. Mechanization of the robot is accomplished by utilizing ultrasonic sensors and Arduino UNO R3. DC engines are utilized for the operation of cutting of the grass. DC battery is utilized to control all the components of the framework.

Ranjitha et al [22]: created a robot that can sow seeds, cut gardens, and splash bug sprays. Employing a sun powered board, all of the system's components are fueled by sun based vitality. The robot is worked physically employing a Bluetooth/Android App that gives signals to the robot for different mechanics and development. As a result, it moves forward the proficiency of seed sowing, pesticide splashing, and grass cutting, as well as diminishing the issue that agriculturists confront when physically planting.

Ege Ozgul et al [23]: made the "X-Bot," a low-cost semi-autonomous robot that employments current specialized breakthroughs to do agrarian employments with tall proficiency and accuracy. The Arduino Mega 2560 microcontroller was utilized to mechanize the control of all the components. The engine driver is mindful for controlling the DC motor's speeds as well as the water pump that's joined to the spout. For way location, three ultrasonic sensors are utilized buzzer is utilized for repulsing creepy crawlies.

Umayal et al [24]: executed a model that matches with our point of actualizing decreased taken a toll pesticide splashing robot hardware that were actualized with motherboard comprising of, transmitter, collector, PIC16F87X microcontroller optocoupler, driving circuit and the stepper engine. The transmitter board is executed with IC (12E), carrier flag generator with recurrence of 434 MHZ that balances the flag and produces a balanced flag in agreement with command issued by the client. The data after passing through the blender and the speaker will be transmitted by remote transmitter. The collector gadget comprising of recieving wire is tuned to get the transmitted 434 MHZ carrier flag taken after by RF intensifier for the intensification that produces the fitting command to the robot.

Alireza Rafiq et al [25]: utilized an calculation to execute an independent robot a robot with an AVR microcontroller for controlling all the inputs and yields of the framework. Hot water pipeline tracks were set along the columns to help the robot explore. A gearbox and shaft setup disseminated control from two DC engines to two driving wheels. BASCOM-AVR form 1.11.9.8 is utilized to program the microcontroller, though PROTEUS 7 proficient is utilized to mimic the circuit.

CONCLUSION

The objective of this inquire about work was to create a low-cost rural robot to splash fertilizers in agribusiness areas as well as for common edit observing. The model framework may be a two-wheeled robot that comprises of a versatile base, a showering component, a remote controller to control the development of the robot, and a camera for edit wellbeing and development checking as well as identifying the nearness of bugs within the horticulture field. Tests conducted on the rural robot model appeared that it seem perform as required beneath real-world utilization scenarios.

iJETRM

International Journal of Engineering Technology Research & Management
www.ijetrm.com

The splash test appears that the robot is able to splash fluid fertilizers and pesticides on 20 plants per miniature utilizing the independent mode as restricted to 30 plants per diminutive by the human specialist with a rucksack sprayer. Whereas the efficiency of the robot in terms of edit scope is marginally lower than a human specialist, the work taken a toll reserve funds managed by the agrarian robot model is much more prominent because it capacities totally in an independent mode and as it were requires the operator's control to put the robot at the begin of the edit way. Besides, the agrarian robot model targets and showers the fluid fertilizer and pesticide as it were on the plants and not within the spaces between person plants, as contradicted to the human specialists with rucksack sprayer that surge the whole trim way with fluid fertilizer and pesticide. Hence, the model framework is able to not as it were diminish the work necessities and costs, but moreover result in more noteworthy asset reserve funds and decrease of the defilement in underground water sources due to siphoning prepare.

REFERENCES

[1] United Nations. World population projected to reach 9.8 billion in 2050, and 11.2 billion in 2100. Available online: https://www.un.org/development/desa/en/news/population/world-population-prospects-2017.html (accessed on 10 Feb 2020).

[2] United Nations. Global Agriculture Towards 2050. Available online: http://www.fao.org/fileadmin/user_upload/lon/HLEF2050_Global_Agriculture.pdf (accessed on 10 Feb 2020)

[3] Thornton, K.; Pradhan, S. Is agricultural adaptation to global change on track to meet the future food production challenge? Global Environ Chang 2018, 52, 37-48.

[4] Sonnino, R.; Tegoni, C.; Cunto, A. The challenge of systemic food change: insights from cities. Cities 2019, 85, 110-116.

[5] Dinar, A.; Tieu, A.; Huynh, H. Water scarcity impacts on global food production. Glob Food Sec 2019, 23, 212-226.

[6] Silvade, W.; Arun, N. Urban challenges and opportunities to promote sustainable food security through smart cities and the 4th industrial revolution. Land Use Policy 2019, 87, 104065.

[7] Erbaugh, J.; Hansen, B. Toward sustainable agriculture in the Tropics. World Dev 2019, 121, 158-162.

[8] Blandford, D.; Braden, J.B.; Shortle, J.S. Economics of natural resources and environment in agriculture. In Encyclopaedia of Agriculture and Food Systems, Van Alfen, N.K., Ed.; Elsevier, Amsterdam, Netherlands, 2014; pp. 18-34.

[9] McGowan, D.; Vasilakis, C. Reap What you sow: agricultural technology, urbanization and structural change. Res Policy 2019, 48, 103794.

[10]Vasconez, J.P.; Kantor, G.A. Human-robot interaction in agriculture: a survey and current challenges. Biosyst Eng 2019, 179, 35-48.

[11]Ullah, A.; Ahmad, J.; Muhammad, K.; Lee, M.Y. A survey on precision agriculture: technologies and challenges. International Conference on Next Generation Computing, Kaohsiung, Taiwan, 21-24 December 2017, pp.1-3.

[12]Marinoudi, V.; Sorenson, C.G.; Pearson, S.; Bochtis, D. Robotics and labour in agriculture. a context consideration. Biosyst Eng 2019, 184, 111-121.

[13]Sakai, S.; Osuka, K.; Umeda, M. Global performance of agricultural robots. International Conference on Intelligent

iJETRM

International Journal of Engineering Technology Research & Management
www.ijetrm.com

Robots and Systems, Sendai, Japan, 28 September - 2 October 2004, pp. 461-466, 2004.

[14]Gao, X. Review of wheeled mobile robots' navigation problems and application prospects in agriculture. IEEE Access 2018, 6, 49248-49268.

[15]Ito, N. Agricultural robots in Japan. International Workshop on Intelligent Robots and Systems: Towards a New Frontier of Applications, Ibaraki, Japan, 3-6 July 1990, pp. 249-253, 1990.

[16]Jayakrishna, P.V.S.; Reddy, M.S.; Sai, N.J.; Susheel, N.; Peeyush, K.P. Autonomous seed sowing agricultural robot. 2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI), Bangalore, India, 19-22 September 2018, pp. 2332-2336. doi: 10.1109/ICACCI.2018.8554622

[17]Santhi, P.V.; Kapileswar, N.; Chenchela, V.K.R.; Prasad, C.H.V.S. Sensor and vision based autonomous AGRIBOT for sowing seeds. 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS), Chennai, India, 1-2 August 2017, pp. 242-245. doi: 10.1109/ICECDS.2017.8389873

[18]Gokul, S.; Dhiksith, R.; Sundaresh, S.A.; Gopinath, M. Gesture controlled wireless agricultural weeding robot. 5th International Conference on Advanced Computing & Communication Systems (ICACCS), Coimbatore, India, 15-16 March 2019, pp. 926-929. doi: 10.1109/ICACCS.2019.8728429.

[19]Ozgul, E.; Celik, U. Design and implementation of semi-autonomous anti-pesticide spraying and insect repellent mobile robot for agricultural applications. 5th International Conference on Electrical and Electronic Engineering (ICEEE), Istanbul, Turkey, 3-5 May 2018, pp. 233-237. doi: 10.1109/ICEEE2.2018.8391337

[20]Arima, S.; Shibusawa, S.; Kondo, N.; Yamashita, J. Traceability based on multi-operation robot: information from spraying, harvesting and grading operation robot. Proceedings 2003 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM 2003), Kobe, Japan, 20-24 Ju;ly 2003, pp. 1204-1209, 2003. doi: 10.1109/AIM.2003.1225514

[21]Boobalan, S.; Jeevabharathi, M.; Sathish, R. Highly precise autonomous operated agriculture robotic machine to fertilize plants selectively controlled by using PLC. International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering 2016, 5, 8727-8733.

[22]Shivaprasad, B.S.; Ravishankara, M.N.; Shoba, B.N. Design and implementation of seeding and fertilizing agriculture robot. International Journal of Application or Innovation in Engineering and Management 2014, 3, 251-255.

[23]Ko, M.H.; Ryuh, B.; Kim, K.C.; Suprem, A.; Mahalik, N.P. Autonomous greenhouse mobile robot driving strategies from system integration perspective: review and application. IEEE ASME Trans Mechatron 2015, 20, 1705-1716.

[24]Konam, S.; Naga Srinivasa, R.N.; Mohan, K.K. Design encompassing mechanical aspects of ROTAAI: robot to aid agricultural industry. International Conference on Soft Computing and Machine Intelligence, New Delhi, India, 26-27 September 2014, pp. 15-19. doi: 10.1109/ISCMI.2014.38

[25]Monta, M.; Kondo, N.; Shibano, Y. Agricultural robot in grape production system. International Conference on Robotics and Automation, Nagoya, Japan, 21-27 May 1995, pp. 2504-2509. doi: 10.1109/ROBOT.1995.525635