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Novel Approach for Automatic Seed Sowing Machine

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Abstract – *Throughout the centuries agriculture is main source of living in India. Agriculture is said to be the first income source in India. As technology evolved with automation sector being consistently evolved in various fields. Proposed system Automatic Seed Sowing Machine to integrate the automation in agriculture sector. For reduced human efforts and to reduce the time taken by workers manually sowing seed. Added advantage of the system is it uses mechanism for Seeding different seeds. Also uses an IR sensor which is capable of sensing any obstacle detected in path of seed sowing machine. Proposed system is tested on field for testing the reliability of system.*

Key Words: Automation, Agribot, Robotics, IR Sensor, Obstacle Detection.

1. INTRODUCTION

Agriculture as primary source is crucial part of Indian economy. Starting from ancient India various tools and techniques for agriculture are evolved throughout the decades. According to annual report 2021 of agriculture department there is huge demand for food grains most of for wheat and rice. Around 54.6 % workers are engaged with agriculture in India [1]. Also growing technology leads to the innovations in agriculture fields such as smart irrigation system, advanced automotive for agriculture, smart fertilizer spreaders such as uses of drones, Plantation monitoring, disease identification etc. Prior to the researches performed in the field of agriculture automation is playing major role for reducing the human efforts, saving time and improving on field accuracy [2]. Proposed mechanism for Automatic Seed Sowing Machine is integrated with sensors technology and robotics mechanism with selecting different seeds on time sowing. Proposed system uses Arduino Uno and IR sensor for obstacle detection. Prior to the development literature study was performed for better understanding of the concept. Various researches in this field includes:

A fully automated multi-crop seeding mechanism, with the utilization methods, advantages and disadvantages and the process involving in the designing of the machine [3]. Another work for design and developed a single row direct planter for maize. The planter may be attached to a walking or riding type two-wheel tractor [4]. Using advantage of solar energy for seed sowing machine [5]. The calculations were referred from this paper. Another approach for Automatic seed sowing machine integrated with IoT which helps the users to monitor the data on blynk app [6]. An approach for automatic seed sowing robot referred to take considerations for current agriculture scenario [7]. Another work involves development of automatic seed sowing machine reducing the use of pulleys as shaft directly controls the sowing mechanism for reducing overall system complexities [8]. Another approach uses an ARM controller based automatic seed sowing machine with moisture control functionalities [9]. Prior to the existing systems the proposed system introduces approach for multi seed sowing mechanism allows user to select the type of seed they want to sow.

1.2 Proposed System

A reliable system for selecting different seed mechanism with automatic seed sowing machine The machine will operate in such a way that the user only has to put the value in the system and accordingly the machine will operate. Suppose the user put the value 1 (and if we define 1 as for particular seed) then accordingly the motor will set its rpm and the process of seeding will continue. Similarly if person sets any other value then accordingly the machine will operate.

2. METHODOLOGY

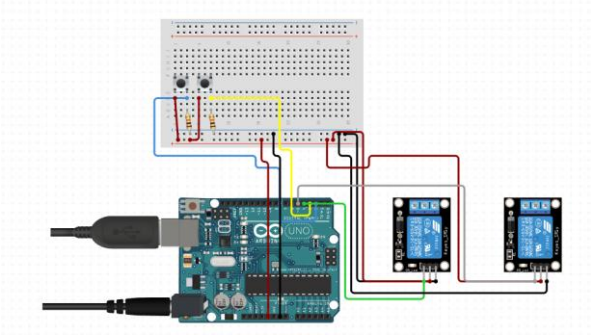

Fig. 1 Internal Circuit Diagram

While considering the solution the design must be kept simple so that the proper working of the machine is possible acquiring low weight by reducing the no. of pulleys required.

Fig. 1 shows the internal circuit diagram of motor control using relay and switch circuit with the help of Arduino Uno.

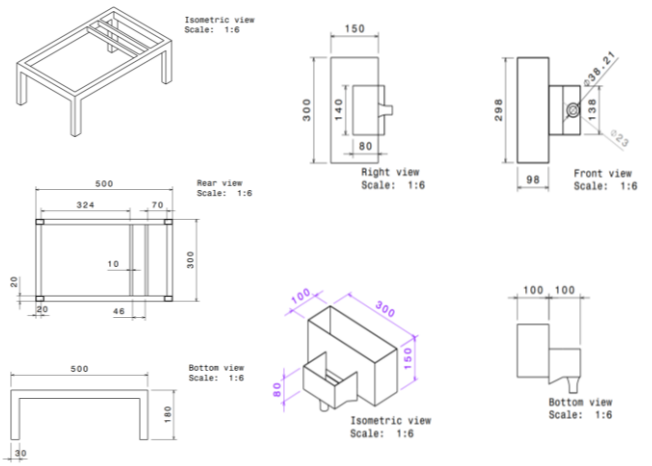

Fig. 2 Design of Proposed System

Fig. 2 shows the design of the machine for deciding optimum position of the components. Frame forms the basic or the skeletal part of the system and mechanically supports all the subsystems of the seed planter. The ploughing system is already fixed to the frame, along with the handle bar which provides means for providing a mechanical push. The inclination and the height of the seat post can be adjusted as per convenience, based on the operation.

2.1 WORKING

Initially all seed materials are loaded in machine. Then the system will take the input from user such as which seed is to be soawed. According to that the wheels should move in straight or right path. Rotation of the wheels are sensed by a proxixmity sensor. For obstacle detection IR sensor comes in picture. If obstacle is detected on the path the machine will stop working until the path is cleared. A low torque and high RPM dc motor is used for proposed machine. Rotating wheels rotates the seed droping disc with the help of shaft. From the furrows seeds are start soawing. Also the distance between the two seeds is calculated.

4. TOOLS AND TECHNOLOGY USED

System is integrated with arduino uno technology which is low cost and user friendly development board. A IR sensor for obstacle detection. A relay module for switching the motor. Dc brushed motors which generates torque directly from DC supply. A Lead Acid battery to supply the power the system for standalone working of the system. Solid works design tool is used for initial design considerations and modelling of the system.

5. RESULTS AND ANALYSIS

After successfully assembling the system. On field testing is performed such as Level 1 testing for Straight line sowing, Level 2 uneven seeds distribution, Level 4 and Level 5 for opened to atmosphere seeds fertilizers at some places and Non uniform depth of seeds sown. Reducing this difficulties the proposed system performed good choice for agriculture automation with low cost and high reliability system.

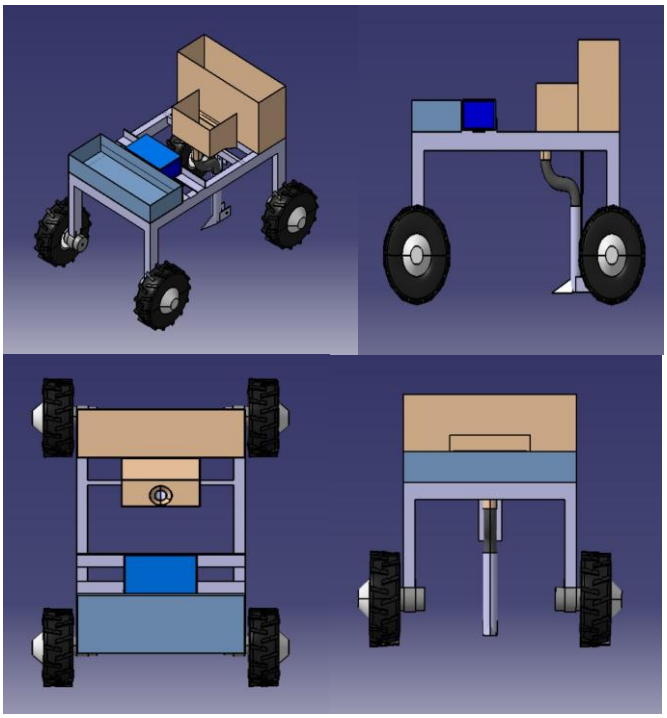

Fig. 3 Cad Model of Proposed System.

Above fig. shows the CAD model implementation of the proposed system with optimum positions of the components and portable design solution for automatic seed sowing machine. The CAD implementation is designed using Solid Works tools.

Table 1. Test evaluation of Proposed System

Test Evaluation					
Soil Type	Depth	Moisture	Row Spacing	Distance between each seed dropped	Expected Seeds Drops
Medium	40-45 cm	20	25 cm	2.5 to 3 inch	60

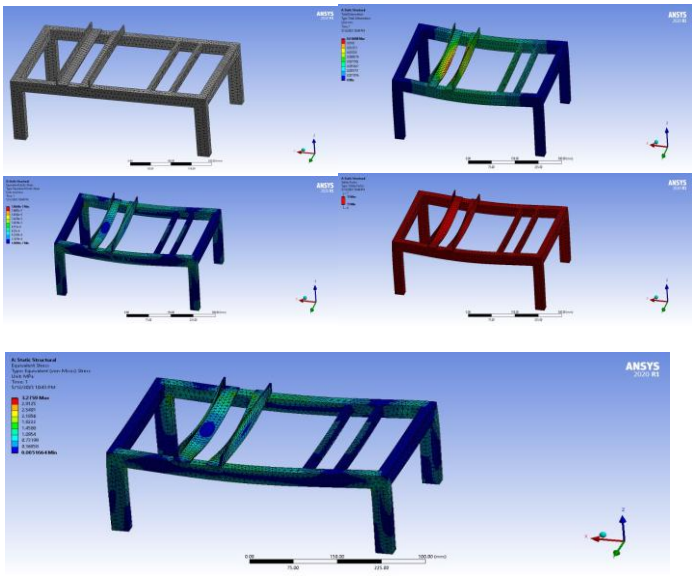

Fig. 4 Analysis of system on ANSYS

Fig. 5 Top view of proposed system

Fig 6. Motor and Shaft Assembly

Fig. 7 Seed Hoper Assembly

6. CONCLUSIONS

Proposed system is good alternative to Tractors which nowadays are common in every part of the world but Automatic Seed Sowing Machine is cost effective alternatives to traditional methods which involves man power or time constraint can be reduced using the proposed system. Proposed system can be easily manufactured in small scale workshops with minimum cost excluding the cost of internal circuit. Further the system can be modified according to the user requirements such as functionality can be improved for selecting the seed type, sowing depth estimation etc. Overall the proposed system is reliable solution for automation in agriculture sector for efficiently work on sowing seed on field.

7. FUTURE SCOPE

Currently the proposed mechanism is limited to the depth of sowing. To increase the rate of proper germination the proposed model can be modified with customizable furrow which can increase the depth of sowing about 8 cm. Also currently the system doesn't employ any alert or report about seeding process. So in future working on GSM and GPS based modules can be introduced in the system so that more accuracy can be achieved. Also the proposed machine can be expanded to add functionalities like Fertilizer Spreading or Water spreading from which two dedicated task can be performed like seeding and on spreading the fertilizers. Also RF modules can be introduced in the system for remote controlling and operating the machine from distance.

REFERENCES

[1] Annual report 2021, Department of Agriculture, Cooperation & Farmers welfare, Government of India, Krishi Bhawan, New Delhi – 110001.

[2] Agricultural Technologies in India: A Review. P K Joshi and Deepak Varshney Department of Economic Analysis and Research India.

[3] Bamgboye, Adeleke Isaac and Adekunle Mofolasayo. "Performance Evaluation of a Two-Row Okra Planter." Agricultural Engineering International: The CIGR Journal (2006): n. pag.

[4] Sai Prasanth, Sathish kumar, Sattanathan periyasamy, Shaolin Mathew , Design & Development of Automatic Seed Sowing Machine by Utilizing Solar Energy , [International Journal of Scientific & Engineering Research Volume 11, Issue 10, October-2020 ISSN 2229-5518] .

[5] Senthilnathan N, Shivangi Gupta, Keshav Pureha and Shreya Verma , School of Mechanical Engineering, Vellore Institute of Technology, Vellore, Tamil Nadu, India , FABRICATION AND AUTOMATION OF SEED SOWING MACHINE USING IOT , [International Journal of Mechanical Engineering and Technology (IJMET) Volume 9, Issue 4, April 2018, pp. 903–912, Article ID: IJMET_09_04_103 Available online at http://iaeme.com/Home/issue/IJMET?Volume=9&Issue=4 ISSN Print: 0976-6340 and ISSN Online: 0976-6359] .

[6] K.Saravanan , S.P. Sundar Singh Sivam , S.RajendraKumar , K.SathiyaMoorthy , DESIGN AND FABRICATION OF AUTOMATIC SEED SOWING ROBOT FOR AGRICULTURAL FIELD , [International Journal of Pure and Applied Mathematics Volume 120 No. 6 2018, 11749-11766 ISSN: 1314- 3395] .

[7] P. Baladarshini, S. Monika, N. Dhanalakshmi , Dr. A. Asha , DESIGN AND FABRICATION OF UNIVERSAL SEED SOWING MACHINE , [International Journal of Advanced Technology in Engineering and Science Vol. No.5, Issue No. 05, May 2017 , ISSN 2348-7550].

[8] Smita N. Solanki1, R. T. Ramteke , Pragati S. Dhande , Agricultural Automatic Seed Sowing Machine: A Review , [International Journal of Research in Engineering, Science and Management Volume 5, Issue 2, February 2022 https://www.ijresm.com | ISSN (Online): 2581-5792] .

[9] [8]. Thorat S. V., Kasturi M. L., Patil G. V. and Patil R. N. (2017). Design and Fabrication of Seed Sowing Machine. [International Research Journal of Engineering and Technology. Vol. 4 (9), 704-707].

[10] Er. Monica Nikhil Deoghare. "Solar Operated Multigrain Seed Sowing and Fertilizing Machine." *International Journal for Innovative Research in Science & Technology* 6, no. 3 (2019) : 1-3.

[11] Senthilnathan, N. & Gupta, S. & Pureha, K. & Verma, S.. (2018). Fabrication and automation of seed sowing machine using IoT. International Journal of Mechanical Engineering and Technology. 9. 903-912.

[12] Parvatikar, Anuradha G and Meghana Kulkarni. "Automatic Seed Sowing and Moisture Control Using ARM Controller." (2017).

[13] Deshmukh B. and Verma D. (2018). Fabrication and implementation of automatic seed sowing Machine.[International journal of engineering sciences & research Technology. Vol. 7 (1), 274-281].

[14] Mudalagi S., Tanodi M. and Huddar S. (2016). Automated Solar Powered Seed Sowing Machine. [Journal of Advances in Science and Technology. Vol. 12 (25), 478-485].

[15] Shinde T. A. and Awati J. S. (2017). Design and Development of Automatic seed sowing machine. [SSRG International Journal of Electronics and Communication Engineering. Vol. 2348 (8549), 41-44].