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Design and Fabrication of Automated Crop Cutting Machine Using IOT

PROF. M.S. MUKHEDAKAR*,
Sanjivani K.B.P. Polytechnic Kopargaon,
Email: abcdef@gmail.com

Miss. Shraddha Shirsath**
Sanjivani K.B.P. Polytechnic Kopargaon ,
Email: shraddhashirsath51@gmail.com

Miss. Aishwarya Sinare*,
Sanjivani K.B.P. Polytechnic Kopargaon ,
Email:aishwaryasinare@gmail.com

Miss. Bhumi Sonekar
Sanjivani K.B.P. Polytechnic Kopargaon ,
Email:bhumisonekar@gmail.com

Miss. Vaishnavi Khond
Sanjivani K.B.P. Polytechnic Kopargaon ,
Email:vaishnavikhond@gmail.com

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Abstract:

we have identified a recurring issue in farming practices: the labour-intensive task of crop cutting. Traditional methods not only consume time and manpower but also lack precision, resulting in suboptimal outcomes. Recognizing the potential for technological innovation in agriculture, we propose the development of an Internet of Things (IoT)-based pruning device. This device aims not only to alleviate the burden of labour-intensive tasks for farmers but also to introduce a novel approach to farming that enhances efficiency and reduces manpower requirements.To address these challenges, we advocate for the creation of an Automated Cutting Machine (ACM) integrated with IoT technology. This innovative solution promises to enhance efficiency, accuracy, and adaptability in cutting operations. The ACM will autonomously process materials based on predefined parameters, while also enabling remote monitoring and control for operators to oversee the cutting process from any location.

Keywords **—Manpower, Agriculture, Technology, IOT, Automated, Cutting Machine**

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I. INTRODUCTION

The IoT-based cutting machine project aims to automate and enhance the efficiency of pruning processes in both farming and forestry. Utilizing the capabilities of Internet of Things (IoT) technologies, this initiative enables remote monitoring and control of the machine, data collection for analysis, and optimization of cutting patterns. The design incorporates various components, including sensors, actuators, microcontrollers, and communication modules.Sensors play a crucial role in gathering data such as trim location, crop height, soil moisture, and environmental conditions. This analysis provides valuable insights into crop growth patterns, facilitates the optimization of cutting techniques, and helps identify potential issues that may affect crop yield. Control management ensures efficient operation, considering the use of rechargeable batteries, solar panels, or other energy harvesting methods.

Safety measures, such as emergency stop buttons, collision detection sensors, and fail-safe mechanisms, are also integrated into the system. Extensive field testing is conducted to validate the performance of the system, with results from this testing phase informing necessary adjustments and improvements for optimal functionality.Crop

harvesting, the final stage in farming, often consumes a significant amount of time for farmers, particularly in manual harvesting processes prevalent in countries like India. Hence, the objective is to provide farmers with a cost-effective "Crop Harvester in Agricultural Approach." This machine features a simple mechanism powered by a DC motor, offering economical and efficient harvesting operations. It involves cutting crops close to the ground or pulling out plants, including stems of various crops like pigeon peas, sorghum, pearl millet, and maize. Unlike more complex alternatives like pneumatic or hydraulic crop harvesters, this solution is designed to be straightforward and fulfill the same objectives efficiently. Powered by a DC motor and battery, it operates at approximately 1500 rpm, catering to the economic constraints of farmers while enhancing productivity in agricultural harvesting processes.

II. METHODOLOGY

- Establishing Project Goals and Requirements: Clearly outline the objectives of your project and define the essential criteria for your crop cutting machine. Consider aspects such as the types of crops to be harvested, field dimensions, cutting efficiency targets, preferred power sources, and budget constraints.

- Conducting Research and Gathering Information: Undertake comprehensive research on existing crop cutting machinery, IoT technologies, sensors, actuators, and prevalent agricultural methods. Stay updated on recent advancements in these areas and gather pertinent data to guide your design process.

- Designing the System Architecture: Utilizing your research findings and identified requirements, formulate the overall system architecture for your crop cutting machine. Define the components required, establish their interconnections, and visualize the data flow within the system using block diagrams or flowcharts.

- Selecting Hardware Components: Determine the specific hardware components necessary for your project, such as microcontrollers, sensors, actuators, and communication modules. Consider factors like compatibility with your system, power consumption requirements, and cost-effectiveness when making component selections.

III. DETAILES OF DESIGN, WORKING

The functionality of a crop cutting machine is enabled through a blend of hardware components, including sensors, actuators, and a microcontroller, coupled with software and wireless communication. Here's a simplified breakdown of its operation:

Hardware Setup: The crop cutting machine integrates various hardware elements such as cutting blades, sensors for crop condition assessment, and a microcontroller responsible for managing machine functions.

Mobile Application Interface: To operate the crop cutting machine remotely, a dedicated mobile application is developed. This application offers an intuitive interface accessible on mobile devices, empowering users to issue commands and adjust settings conveniently.

Wireless Connectivity: Facilitating seamless interaction between the mobile application and the crop cutting machine, wireless communication protocols like Wi-Fi or Bluetooth are employed. This enables establishment of a connection between the mobile device and the machine, enabling data exchange and control.

Sensor Deployment: Equipped with sensors, the crop cutting machine continuously monitors crop conditions. These sensors, which may include soil

moisture sensors, temperature sensors, or imaging devices for visual analysis, provide real-time data on factors such as crop growth stage and moisture levels, aiding in informed decision-making during cutting operations.

A. Title and Author Details

TITLE: **DESIGN AND FABRICATION OF AUTOMATED CROP CUTTING MACHINE USING IOT**

Team Members:
PROF. M.S. MUKHEDAKAR (Guide)
Miss. Shraddha Shirsath
Miss. Aishwarya Sinare
Miss. Bhumi Sonekar
Miss. Vaishnavi Khond

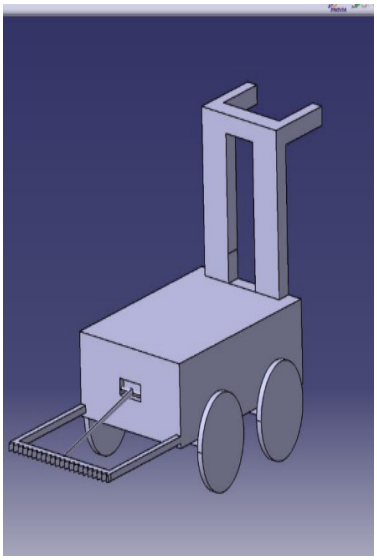


Fig. 1Conceptual View Frontend

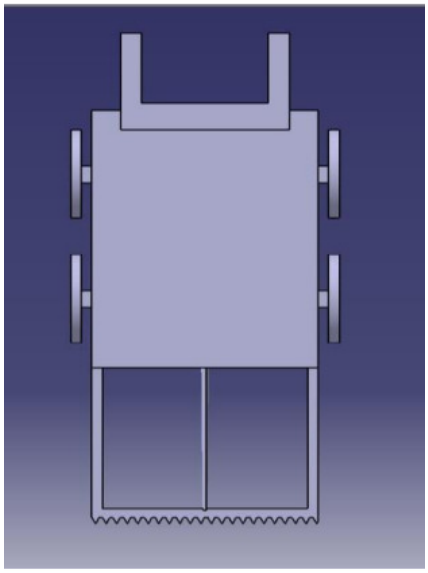
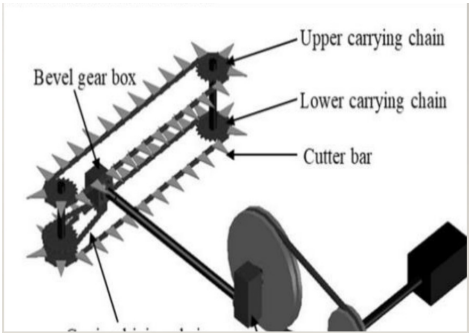


Fig. 2 Conceptual View Backend

FABRICATION PROCESS AND PHOTO



B. RESULT AND APPLICATION

The IoT-based crop cutting machine project presents numerous advantages that hold promise for the agricultural sector. Here's a rephrased version highlighting these benefits:

Enhanced Efficiency:

By automating the crop cutting process, the project reduces dependence on manual labor, thereby boosting overall efficiency and productivity. The machine's autonomous operation allows for extensive coverage of crop fields, significantly reducing cutting time.

Cost-Efficiency:

Substituting manual labor with automated machinery results in substantial cost savings for farmers. This shift minimizes labor management expenses, leading to notable reductions in crop cutting-related costs.

Applications:

1. Precision Agriculture
2. Climate Monitoring for Agricultural 3.
3. Conditions
4. Livestock Tracking and Monitoring

Smart Greenhouse Management

IV. CONCLUSION

The project focusing on an IoT-based crop cutting machine presents an opportunity to transform the agricultural sector by automating and streamlining the crop cutting process. Through the integration of sensors, connectivity, data analysis, and control systems, this machine can efficiently navigate fields, identify crops, and execute cutting tasks with minimal human intervention. Key considerations in the project's development include meticulous planning of machine design, encompassing factors like size, weight, power supply, and cutting mechanism. the incorporation of various sensors such as cameras, GPS, moisture sensors, and weather sensors is essential for acquiring crucial data about the surrounding environment and the condition of crops. Establishing a robust IoT network facilitates seamless communication between the machine and a centralized control system. Automation and control mechanisms ensure the machine's autonomous operation or supervision by operators, with built-in safety protocols and efficient power management features.

The project's success hinges on comprehensive research, compliance with regulatory standards, and rigorous testing across diverse field conditions. Furthermore, the creation of a user-friendly interface or dashboard for data visualization enables farmers or operators to monitor the machine's performance and make well-informed decisions.

In essence, the IoT-based crop cutting machine project offers significant potential to revolutionize agricultural practices, mitigate manual labor requirements, and enhance overall crop yield and productivity.

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REFERENCES

[1]Design and Development of "Crop Cutter" Article · September 2018 , Mahesh Kadam, Shankar Thombare, Sunil Aswale.

[2]"Crop cutting machine'' department of mechancal engineering,Aryabhatta college of engineering and research centre , Ajmer

[3]Automated Solar Grasss Cutter, Pushpendra Tyagi, Aman Agarwal Department of Mechanical Engineering, IIMT College of Engineering, Greater, Global Journal For Reaserach Analysis,2018

[4]Hybrid Lawn-Mower Machine, Ayush Chand kaushik[1],Arman Khan[2], ShriyanshaTripathi[3],Varun Kumar Sanchit kumar Khare UG Students, Assistant Professor, Department of Mechanical Engineering Institute of Technology and Management, Gida, Gorakhpur ,India International Journal of Adavance Research and Innovative ideas inEducation,2022

[5]A Review on Design and Modification of Grass Cutting Machine,1Akshay Ramteke, 2Yogesh Bokde, 3Amit Waghmare, 4Ajaykumar Nagpure,5Nitinkumar Padghan Students, 5Assistant Professor Mechanical Engineering Department Suryodaya College of Engineering and Technology, Nagpur, India, Journal of Emerging Technologies and Innovative Research,2022

[6] "Design and Development of manually Operated Reaper" Mr. P. B. Chavan, Mr. D. K. Patil, Mr. D. S. Dhondg. (IOSR-JMCE) Journal of Mechanical and Civil Engineeringe-ISSN:2278-1684,p-ISSN: 2320- 334X, Volume 12, Issue 3 Ver. I (May. - Jun. 2015), PP15-22

[7] " Design, Development and Fabrication of a Compact Harvester Laukik P. Raut1Vishal Dhandare2 Pratik Jain3 Vinit Ghike4 Vineet Mishra5 IJSRD - International Journal for Scientific Research & Development| Vol. 2, Issue 10, 2014 | ISSN (online): 2321-0613

