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An Autonomous Electric Driven Portable Fodder Cutting Machine for Agricultural Application

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***Abstract*— The agricultural sector faces significant challenges in fodder preparation, particularly for small and medium-scale farmers who rely on manual labor-intensive methods. The proposed system integrates electric motor-driven cutting mechanisms with autonomous control features, enabling consistent and uniform chopping of various fodder materials including green grass, maize stalks and other crop residues. Key features of the system include adjustable cutting lengths, safety mechanisms, energy-efficient operation and user-friendly controls. This project addresses the critical need for affordable, sustainable and efficient fodder processing equipment in modern agriculture, with potential applications in dairy farming, livestock rearing and mixed farming systems.**
***Keywords*—Motor (0.5Hp), Blade, Bearing, Blade point, Chain.**

I. INTRODUCTION

Agriculture remains the backbone of rural economies, especially in developing countries where livestock farming significantly contributes to income generation and food production. Proper nutrition is essential for maintaining livestock health, improving milk yield and enhancing meat production. Fodder cutting is a fundamental process in livestock management, as uniformly chopped fodder improves digestibility, reduces feed wastage and ensures balanced nutrient intake. However, traditional fodder cutting practices, such as manual cutting using sickles or conventional chaff cutters powered by diesel engines, are labor-intensive, time-consuming and often unsafe. The autonomous feature of the machine is achieved through the integration of a microcontroller-based control system that manages motor speed, feeding rate and safety mechanisms. Sensors are incorporated to monitor overload conditions, blade speed and system performance, ensuring smooth and safe operation. The automatic feeding mechanism helps maintain uniform cutting size, thereby improving fodder quality and reducing wastage. Portability is another key advantage of the proposed system. The machine is designed with a compact frame, lightweight structure and wheels for easy transportation within farms or between fields. This flexibility allows farmers to use the machine wherever required without installing a permanent setup. Additionally, built-in safety features such as blade guards, emergency stop buttons and automatic shutdown mechanisms minimize the risk of accidents. The development of this autonomous electric-driven portable fodder cutting machine aligns with the goals of sustainable agriculture and smart farming technologies. By combining automation, renewable energy integration and ergonomic design, the system aims to enhance productivity, reduce labor dependency and improve the overall efficiency of livestock management. This innovation represents a significant step toward modernizing traditional agricultural practices and supporting farmers with cost-effective and environmentally friendly solutions. A key innovation of the system is its autonomous operation. A microcontroller- based control unit regulates motor speed, monitors blade rotation and controls the feeding mechanism. Sensors are incorporated to detect overload conditions, blockages and abnormal vibrations. In case of any irregularity, the system automatically stops to prevent damage and ensure user safety. The automatic feeding mechanism ensures uniform fodder size, which improves feed efficiency and reduces wastage. The global market for pest control in agriculture is valued at billions of dollars and there is a growing trend toward sustainable, non-chemical alternatives. This product has the potential to tap into the expanding market of eco- conscious farmers and agricultural operations that are actively seeking solutions to reduce pesticide use while maintaining high productivity. As we continue to refine the system's design and capabilities, we envision widespread adoption of this automated pest control solution, benefiting not only farmers but also the environment and consumers by reducing reliance on harmful chemical. The global

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Fig. 1: Illustration of the impact of electric shock from electricity to product humans.

I. LITERATURE REVIEW

Bessaad N. et al (2026) has investigated the concept of autonomous mowing systems in agriculture and discussed the current status, requirements and future opportunities of automated agricultural machines. The study highlights the importance of autonomous technologies in improving agricultural productivity and reducing labor requirements. It also explains the integration of smart agricultural technologies to enhance efficiency, precision and sustainability in farming operations.

Patil A. et al (2025) has discussed the development of a chaff cutter machine integrated with IoT technology. The study explains that IoT-based monitoring systems can improve the efficiency and safety of fodder cutting operations. By using sensors and internet connectivity, the machine performance can be monitored remotely, helping farmers manage fodder processing more effectively.

Mano B. et al (2024) has presented the design and fabrication of a solar-powered fodder harvester for agricultural applications. The research focuses on using renewable energy sources to operate fodder cutting systems, reducing dependency on conventional electricity. The solar-powered system improves sustainability and provides an eco-friendly solution for farmers in rural areas.

Dakhore M. et al (2024) has developed a solar operated fodder cutting and collecting machine designed for efficient fodder processing. The system integrates solar energy with mechanical cutting mechanisms to provide a cost-effective and environmentally friendly solution. The study highlights that the machine reduces operational cost and improves fodder collection efficiency.

Rao P.S. and Venkatesh M. (2021) has developed a portable electric driven agricultural cutting machine for small-scale farming applications. The research focuses on improving portability and ease of operation while maintaining effective cutting performance. The machine helps reduce manual labor and increases productivity in agricultural operations.

Hassan M. A. (2021) has evaluated the performance of a small machine designed for chopping fodder beet. The study analyzes different performance parameters such as cutting efficiency, machine capacity and power consumption. The results show that mechanized fodder chopping machines can significantly improve feed preparation efficiency for livestock farming.

Deshmukh S.P. et al (2021) has designed and fabricated an electrically operated fodder cutting machine for agricultural use. The research highlights the advantages of electric motor driven cutting systems which provide faster cutting speed and better operational efficiency compared to manual methods.

Singh R.K. et al (2020) has performed a performance evaluation of power operated chaff cutters used in small farms. The study focuses on machine productivity, cutting efficiency and operational cost. The research concludes that power operated chaff cutters are highly beneficial for small farmers as they improve fodder preparation and reduce manual labor.

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Kumar A. and Sharma R. (2021) has analyzed the design and performance of an electric operated fodder cutting machine. The study explains that electric driven systems provide better cutting accuracy, higher efficiency and reduced energy consumption compared to traditional manual machines.

Kumar A. et al (2020) has conducted an ergonomic assessment of a manual fodder cutter used in agricultural applications. The research focuses on human effort, working posture and safety aspects while operating the machine. The study emphasizes the need for improved machine design to reduce operator fatigue and enhance working efficiency.

The literature survey highlights various studies on fodder cutting machines and their applications in modern agriculture. Several research works emphasize the importance of mechanized fodder cutting systems to improve livestock feeding efficiency and reduce manual labor. Studies on electric and solar powered fodder cutting machines demonstrate the advantages of using energy-efficient and environmentally friendly technologies in agricultural operations. Research on portable and automated fodder cutting systems shows that compact and lightweight machines can provide flexible solutions for small-scale farmers and rural agricultural practices. Investigations into machine design, blade mechanisms and performance evaluation highlight the importance of improving cutting efficiency, safety and operational reliability. Furthermore, studies focusing on IoT integration and automation indicate the potential of smart monitoring and control in future agricultural machinery. Overall, these studies support the development of efficient, low-cost and portable fodder cutting machines that can enhance agricultural productivity, reduce labor effort and promote sustainable farming practices.

II. DESCRIPTION OF EXISTING SYSTEM

The proposed autonomous electric driven portable fodder cutting machine operates by converting electrical energy into mechanical energy to perform the fodder cutting process efficiently. When electrical power is supplied, the

0.5 HP electric motor starts rotating and acts as the main driving source of the system. The rotational motion produced by the motor shaft is transmitted through a chain drive mechanism, which connects the motor to the cutting shaft. This chain drive helps in transferring power smoothly and maintains the required speed for effective cutting. The motion from the chain rotates the cutting blade mounted on the shaft at a high speed.To ensure smooth operation and reduce mechanical friction, ball bearings are provided to support the rotating shaft. These bearings allow the shaft and blade to rotate freely with minimum resistance, which improves efficiency and increases the life of the machine components. As the blade rotates, the blade point comes into contact with the fodder material such as grass, leaves, or small crop residues fed into the machine. The sharp edges of the blade cut the material into small uniform pieces due to the high rotational speed and cutting force generated by the motor. In agricultural settings, these chemicals can also harm beneficial insect species such as pollinators, contributing to ecological imbalances. Financially, the recurring cost of purchasing these products imposes a burden on users, particularly in resource- constrained rural and farming communities. Another widely used traditional method is smoke-based repellents, which involve burning natural substances like dried neem leaves, cow dung or coconut husks to produce smoke that deters mosquitoes. Although this method is cost-effective and accessible in rural areas, it presents multiple limitations. The process is labour-intensive, requiring constant supervision to maintain smoke output and is unsuitable for extended or unattended use. Furthermore, the smoke emitted contains particulate matter and pollutants that can lead to respiratory problems in humans and livestock and contribute to environmental pollution. Its effectiveness is also compromised in open environments where the smoke dissipates quickly, offering only temporary protection. In modern urban settings, the use of open fires for repellent purposes is often impractical due to safety regulations and pollution control policies.d. All paragraphs must be justified, i.e. both left-justified and right-justified.

Fig.2. Existing System of Electric Driven Portable Fodder Cutting Machine

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III. PROPOSED SYSTEM

The proposed smart mosquito repellent system is a highly efficient, eco-friendly and sustainable solution designed to effectively reduce mosquito interference in agricultural fields, livestock shelters and rural living spaces. The proposed smart mosquito repellent system is a highly efficient, eco-friendly and sustainable solution designed to effectively reduce mosquito interference in agricultural fields, livestock shelters and rural living spaces. This innovative system combines multiple technologies, including real-time sensor-based activation, organic repellents and renewable solar power, to ensure consistent and automated operation with minimal human intervention.

The sensor unit is capable of detecting environmental parameters such as temperature, humidity and light intensity, which are critical indicators of mosquito activity. Once favourable conditions are detected, the system automatically activates the repellent dispersal mechanism, releasing organic, non-toxic substances known to repel mosquitoes effectively.

Unlike traditional methods that require constant manual input, this system ensures timely and efficient repellent deployment only when necessary, thus conserving resources and enhancing operational efficiency. The use of organic repellents eliminates the risks associated with chemical- based solutions, such as skin irritations, respiratory issues, environmental pollution and toxicity to non-target species. This makes the system safe for both humans and animals while preserving ecological balance.

To further support sustainable operation, the entire system is powered by a dedicated solar energy setup, enabling it to function off-grid in remote areas without dependence on conventional electricity. This not only reduces long-term energy costs but also supports environmental conservation by minimizing the system's carbon footprint. The inclusion of energy storage (e.g., rechargeable batteries) allows the system to operate even during nighttime or cloudy conditions, ensuring uninterrupted protection.

A. BLOCK DIAGRAM

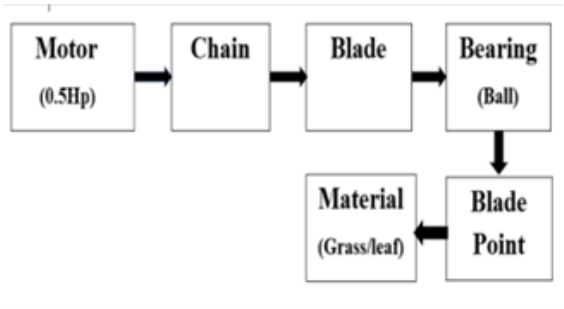

Fig.3. Block Diagram of the Proposed System

B. FLOW CHART

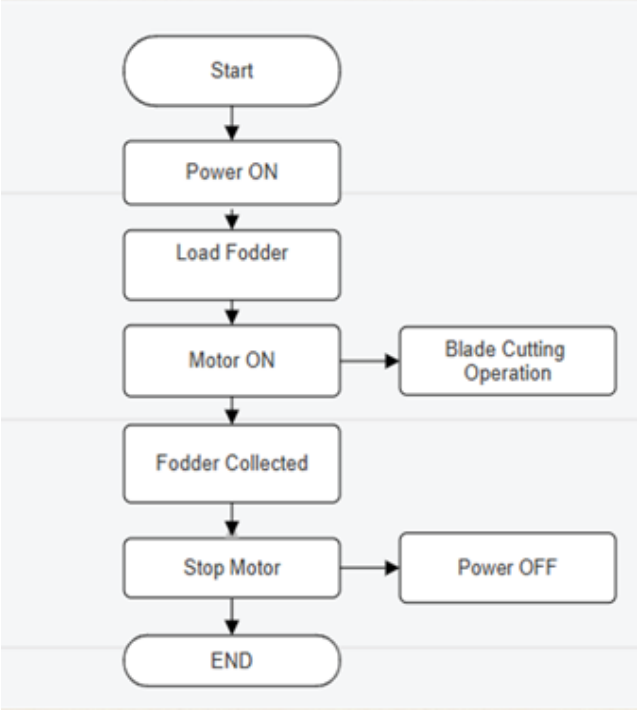

Fig.4. Flow Chart of Proposed System

V . HARDWARE IMPLEMENTATION:

The hardware implementation of the autonomous electric driven portable fodder cutting machine consists of several mechanical and electrical components arranged to perform the cutting operation efficiently. The main component of the system is a 0.5 HP electric motor, which acts as the primary power source. The motor is mounted on a strong metal frame to provide stability during operation. The

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shaft of the motor is connected to a chain drive mechanism, which is used to transmit rotational motion from the motor to the cutting shaft. The chain drive ensures proper power transmission and maintains the required speed and torque for effective cutting.

HARDWARE COMPONENTS

A. Motor**:** The 0.5 HP electric motor is the main power source of the portable fodder cutting machine. Its function is to convert electrical energy into mechanical rotational energy, which drives the cutting blade

Fig.5 Motor

B. Blade: The blade is the main cutting component of the fodder cutting machine. It is typically made of hardened high-carbon or alloy steel for strength and wear resistance. A common specification for a small 0.5 HP machine is a blade length of 150–300 mm, thickness of 3–6 mm, with a sharp cutting-edge angle of about 30–45 degrees. Its function is to rotate at high speed and slice fodder into small, uniform pieces, ensuring efficient cutting while reducing load on the motor.

Fig.6 Blade

C. Blade Point : The blade point is the sharp edge or tip of the fodder cutting machine's blade that makes the initial contact with the fodder. It is usually made of hardened steel and sharpened to an angle of 30–45 degrees for efficient cutting.

Fig.7 Blade Point

D. Chain : The chain in the fodder cutting machine is part of the power transmission system that transfers rotation from the motor to the blade shaft. Typically, a roller chain like 35 or 40 is used, with a pitch of 9.525–12.7 mm, made of hardened steel for strength and durability.

Fig.8. Chain

E. Ball Bearing : The bearing supports the rotating shaft of the fodder cutting machine and ensures smooth, low-friction movement. Typically, a deep groove ball bearing such as 6202 or 6203 type is used, with an inner diameter of about 15–17 mm, outer diameter of 35–40 mm and made of hardened steel.

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Fig.9 Ball Bearing

VI. WORKING OF PROPOSED SYSTEM

The proposed autonomous electric driven portable fodder cutting machine works by converting electrical energy into mechanical energy to carry out the fodder cutting process efficiently. When electrical power is supplied, the 0.5 HP electric motor starts rotating and acts as the main driving source of the machine. The rotational motion produced by the motor shaft is transmitted through a chain drive mechanism, which connects the motor to the cutting shaft. This chain drive helps in transferring power smoothly and maintaining the required speed and torque for effective cutting. The chain mechanism also ensures proper synchronization between the motor and the cutting blade. The cutting shaft is mounted with a sharp cutting blade, which rotates at high speed when driven by the chain mechanism. Ball bearings are used to support the rotating shaft and reduce friction between moving parts. These bearings help in smooth rotation, minimize wear and tear, and improve the efficiency and lifespan of the machine. Due to the support provided by the bearings, the blade can rotate steadily without vibration or mechanical loss. During operation, fodder materials such **as** grass, leaves, and small plant stem**s** are fed into the cutting area of the machine. As the blade rotates rapidly, the blade point comes into contact with the fodder and cuts it into small and uniform pieces. The high-speed rotation of the blade provides the necessary cutting force to chop the fodder quickly and efficiently. The chopped fodder then exits from the cutting chamber and can be collected for livestock feeding.

VII. OPERATION OF PROPOSED SYSTEM

The proposed autonomous electric driven portable fodder cutting machine operates by converting electrical energy into mechanical energy to perform the fodder cutting process efficiently. When electrical power is supplied, the 0.5 HP electric motor starts rotating and acts as the main driving source of the system. The rotational motion produced by the motor shaft is transmitted through a chain drive mechanism, which connects the motor to the cutting shaft. This chain drive helps in transferring power smoothly and maintains the required speed for effective cutting. The motion from the chain rotates the cutting blade mounted on the shaft at a high speed.To ensure smooth operation and reduce mechanical friction, ball bearings are provided to support the rotating shaft. These bearings allow the shaft and blade to rotate freely with minimum resistance, which improves efficiency and increases the life of the machine components. As the blade rotates, the blade point comes into contact with the fodder material such as grass, leaves, or small crop residues fed into the machine. The sharp edges of the blade cut the material into small uniform pieces due to the high rotational speed and cutting force generated by the motor.

The chopped fodder is then discharged from the cutting area and collected for feeding livestock. The entire mechanism works in a continuous process, allowing a large amount of fodder to be cut in a short period of time. This system reduces manual labor, saves time, and increases productivity for farmers. Since the machine is portable and electrically driven, it can be easily used in different agricultural locations and provides a reliable, efficient, and cost-effective solution for fodder preparation in livestock farming. During operation, fodder materials such as grass, leaves, and small plant stem**s** are fed into the cutting section of the machine. As the blade rotates, the blade point comes into direct contact with the material. Due to the high rotational speed and sharp cutting edge, the material is sliced into small and uniform pieces. This cutting action makes the fodder easier for livestock to chew and digest. The chopped fodder then exits the cutting chamber and can be collected in a container or basket for feeding purposes.The entire process occurs continuously as long as the motor is running and fodder is supplied to the machine. The portable design of the machine allows it to be easily moved and used in different agricultural locations. This system

significantly reduces manual labor, increases cutting speed, and improves productivity compared to traditional manual fodder cutting methods. Additionally, the electric drive provides consistent performance, low operational cost, and reliable operation for farmers.Overall, the proposed machine offers an efficient, portable, and user-friendly solution for fodder preparation in agricultural and livestock farming applications. It helps farmers save time and effort while ensuring that animals receive properly chopped fodder for better feeding and improved livestock health.

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VIII. RESULTS AND DISCUSSIONS

Fig.10. Working Model of the Proposed System

Fig.11. Developed Model of the Portable Fodder Cutting Machine

The proposed system is a electric driven portable fodder cutting machine operates by converting electrical energy into mechanical energy to perform the fodder cutting process efficiently. When electrical power is supplied, the 0.5 HP electric motor starts rotating and acts as the main driving source of the system. The rotational motion produced by the motor shaft is transmitted through a chain drive mechanism**,** which connects the motor to the cutting shaft. This chain drive helps in transferring power smoothly and maintains the required speed for effective cutting. The motion from the chain rotates the cutting blade mounted on the shaft at a high speed.To ensure smooth operation and reduce mechanical friction, ball bearings are provided to support the rotating shaft. These bearings allow the shaft and blade to rotate freely with minimum resistance, which improves efficiency and increases the life of the machine components. As the blade rotates, the blade point comes into contact with the fodder material such as grass, leaves, or small crop residues fed into the machine.

IX. CONCLUSIONS

The Autonomous Electric Driven Portable Fodder Cutting Machine for Agricultural Applications provides an efficient and practical solution for cutting fodder used in livestock feeding. The system uses a
0.5 HP electric motor, chain drive mechanism, cutting blade, and ball bearings to perform the cutting operation smoothly and effectively. By converting electrical energy into mechanical motion, the machine is able to cut grass and leaves into small, uniform pieces within a short time. The use of bearings reduces friction and ensures smooth rotation of the blade, which improves the overall performance and durability of the system. This project mainly focuses on reducing manual effort and increasing productivity in agricultural activities. Compared to traditional manual fodder cutting methods, the proposed machine operates faster, requires less human labor, and provides consistent cutting quality. The portable design makes it easy to move and use in different locations such as farms, cattle sheds, and agricultural fields. In addition, the machine is simple in construction, cost-effective, and easy to maintain, making it suitable for small and medium-scale farmers. Overall, the developed system improves the efficiency of fodder preparation and supports better livestock management. It helps farmers save time and energy while ensuring that animals receive properly chopped fodder for easy consumption and digestion. Therefore, this project demonstrates a reliable and economical agricultural solution that can contribute to improved farming productivity and sustainable livestock feeding practices.

X. REFERENCES

[1] Bessaad, N. et al. 2026. Autonomous Mowing in Agriculture: Current Status, Needs and Future Opportunities. *Smart Agricultural Technology*, Vol. 13, Article 101796.

[2] Patil, A., Shirgire, A., Ghule, M., and Totla D et al, 2025. Chaff Cutter Machine Using IoT. *Asian Journal for Convergence in Technology (AJCT)*, Vol. 11, Issue 3, pp. 65–69.

[3] Mano, B., Karthickeya, U., and Arul Kumar, A. et al, 2024. Design and Fabrication of Solar Fodder Harvester. *International Journal of Innovative Scientific Research (IJISR)*, Vol. 2, No. 4, pp. 139–144.

[4] Dakhore, M., Dhoke, A., Khulsange, N., and Maske, P.et al, 2024. Design and Development of Solar Operated Fodder Cutting and Collecting Machine. *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, Vol. 12, Issue 5.

[5] Hassan, M. A. et al 2021. Performance Evaluation of a Small Machine for Chopping Fodder Beet. *Journal of Soil Sciences and Agricultural Engineering*, Vol. 10, Issue 10, pp. 579–587.

[6] Deshmukh, S. P. et al. 2021. Design and Fabrication of Electrically Operated Fodder Cutting Machine. *International Journal of Mechanical Engineering and Technology (IJMET)*, Vol. 9, No. 8, pp. 1123–1128.

[7] Singh, R. K. et al. 2020. Performance Evaluation of Power Operated Chaff Cutter for Small Farms. *Agricultural Engineering Today*, Vol. 41, No. 2, pp. 45–50.

[8] Kumar, A. and Sharma, R. et al, 2021. Design and Performance Analysis of Electric Operated Fodder Cutting Machine. *International Journal of Agricultural Engineering*, Vol. 10, No. 1, pp. 72–76.

[9] Rao, P. S. and Venkatesh, M. 2021. Development of Portable Electric Driven Agricultural Cutting Machine. *International Journal of Engineering Research & Technology (IJERT)*, Vol. 10, No. 6, pp. 98–102.89. Achieving application requirements. In Distributed Systems, S. Mullende.