International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 05 | May - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

PESTI GUARD: FARMER-FRIENDLY PESTICIDE ROBOT

Sahana P[1], Shantha G[2], Sharath Kumar K[3], Thejas N S[4], Varsha V[5]

[1]Sahana P, department of EEE & Vidya Vikas institute of engineering and technology

[2]Shantha G, department of EEE & Vidya Vikas institute of engineering and technology

[3]Sharath Kumar K, department of EEE & Vidya Vikas institute of engineering and technology

[4]Thejas N S, department of EEE & Vidya Vikas institute of engineering and technology

[5]Varsha V, Assistant Professor, department of EEE & Vidya Vikas institute of engineering and technology

---

Abstract - Agriculture is the primary source of revenue for India's population, which accounts for nearly 60% of the country's total. Farmers work in their fields to cultivate various crops based on the environment and resources available. Farmers must use large quantities of pesticides to increase food production in order to meet such high food demand for such a large population. Traditional manual pesticide spraying operations is full of direct exposure to the pesticide liquid work environment, great harm to human body and when this pesticide may come into contact with the farmer during spraying, which may trigger skin cancer and asthma illnesses. Increased pesticide spraying can impact consumer health as it enters the food chain. The widespread use of pesticides in agriculture presents significant health risks to both farmers and consumers. The pesticide spraying robot is equipped with state-of-the-art sensors to record real-time temperature and humidity levels, providing crucial environmental data for optimized pesticide application. Farmers can remotely control the robot using a user-friendly interface, instructing it to perform specific spraying tasks while maintaining a safe distance from potentially hazardous chemicals. To address this challenge, this paper proposes a Pesticide Spraying Robot designed to minimize human contact during operation while prioritizing human health through advanced environmental monitoring and remote-control capabilities.

1.INTRODUCTION

Agriculture plays an essential position in the Indian financial system. For the rural population, agriculture is a vocation for their livelihood. All farmers use pesticides, including organic farmers. Whether from artificial or natural sources, insecticides are utilized by all farmers. The difference is organic farmers can best use insecticides from natural resources. But both synthetic and herbal insecticides have various stages of toxicity. Today solutions hugely rely upon heavy chemicals. A pesticide is a substance utilized for controlling, obviating, and ravaging pests. But when farmers spray the pest, it's far a very harmful procedure for them, they want to be very cautious like sporting proper clothes, gloves, masks, etc. Our purpose is to increment the crop yield and prevent human dangers due to poisonous chemicals. In conventional strategies, operated by hand low and high quantity hydraulic sprayer and electricity operated hydraulic sprayer with lengthy growth, lengthy lances or spray gun are used to hold fluid at different goals.

Fig1: agriculture

In this approach, the time and labor required are extra. It is hard to spray the pesticide uniformly and effectively all through the tree with the aid of the conventional technique of spraying. Tractor-operated sprayers are tough for adaption with the aid of the farmer because of present cropping styles, to be had subject size, area situation during the wet season. Traditional methods involve hand-operated hydraulic sprayers or power-operated hydraulic sprayers with long booms or spray guns. The Hand operated sprayer's tank weighs 15-17 Kg. Farmers carry this for hours. Which may lead to Shoulder injuries, body pain, or Spinal Injuries. Long-term exposure to pesticides can motive loss of reminiscence, tension, temper adjustments, and hassle concentrating. Nowadays the farmers are playing the crucial role by working hard in the agriculture lands and planting the crops for the societies living in different regions for earning their minimum needs. In India the pesticide usage is higher which 70% is whereas the world-wide pesticide usage is 44% only. Pesticides play a vital role in agriculture, but their harmful effects underscore the importance of responsible handling, protective measures, and sustainable alternatives. The inhalation of pesticide is also very dangerous as it can cause many types of cancer, skin diseases, etc.

Fig2: pesticides effect on human health

Fig3: pesticides effect on human health

In the year 2022-23, approximately 11,000 people working in the agricultural sector lost their lives due to pesticide poisoning1. These fatalities highlight the urgent need for safer practices and increased awareness regarding pesticide use. Among these, 11,000 deaths occur annually, with nearly 60% of these fatalities happening in India. For more comprehensive data and global perspectives, the World Health Organization estimates that between 2 and 5 million workers worldwide suffer from pesticide poisoning each year, with approximately 40,000 of these cases resulting in fatalities. Tractor-operated sprayers are tough for adaption with the aid of the farmer because of present cropping styles, to be had subject size, area situation during the wet season.

2. PROBLEM STATEMENT:

agriculture has relied on pesticides to protect crops from devastating pests and diseases. While these chemicals have undoubtedly increased food production, the traditional approach of manual spraying presents a multitude of challenges that threaten human health, the environment, and even the long-term sustainability of agriculture itself. Farmers are in constant exposure to pesticides and insecticides, since they spray these chemicals on to plant to keep them disease free, small particles of these chemicals also go to lungs of the farmer and cause health problem in long run.
From the moment they mix the concoctions to the act of applying them, farmers risk inhaling, ingesting, or absorbing these pesticides through their skin. This chronic exposure leads to a range of health problems, including:

Acute Poisoning: Immediate health effects like dizziness, nausea, headaches, and skin irritation are well documented. In severe cases, exposure can lead to respiratory failure, coma, and even death. Chronic Health Issues: Long-term exposure to pesticides is linked to an increased risk of various chronic diseases, including cancer, neurological disorders, and respiratory illnesses. Studies have shown correlations between pesticide exposure and Parkinson's disease, Alzheimer's disease, and birth defects.

Psychological Impacts: The constant fear of health consequences associated with pesticide use can lead to significant psychological stress and anxiety for farmers. Also, crops are very sensitive, they require proper watering or harvesting on time, usually large farm owners face problems of unreliable tractor drivers who miss dates and time which may damage crops.

3. OBJECTIVES OF THE PROJECT:

The main objective of the proposed system is

- To spray pesticide through embedded system.
- To measure and record humidity, temperature of the farm.
- To model a self-charging vehicle using solar panel.
- Electric tasing capability to electrically stun wild animals and thief.

4. OVERVIEW OF THE PROJECT:

The proposed system employs an embedded system technology to ensure farmers health and environment. An embedded system refers to a specialized computing system that is part of a larger device or system, designed to perform specific tasks or functions. Unlike general purpose computers, which are designed to run a variety of applications, embedded systems are tailored to execute predefined tasks with specific requirements for reliability, performance, power consumption, size, and cost. These systems typically consist of a combination of hardware and software components, with the software often being specifically developed for the hardware platform to ensure efficient operation. Programming languages commonly used for embedded systems development include C, C++, and assembly language, as they offer low-level control over hardware resources and are well-suited to the constraints of embedded environments.

The Arduino is the core component of the model, tasked with the crucial roles of data reception, transmission, and overall control of the system. The vehicle is propelled back and forth by a motor driver that features four pins. Each motor is equipped with two terminals, one positive and one negative. Connecting positive to positive and negative to negative will propel the motors forward, while reversing these connections will cause the motors to move backward.

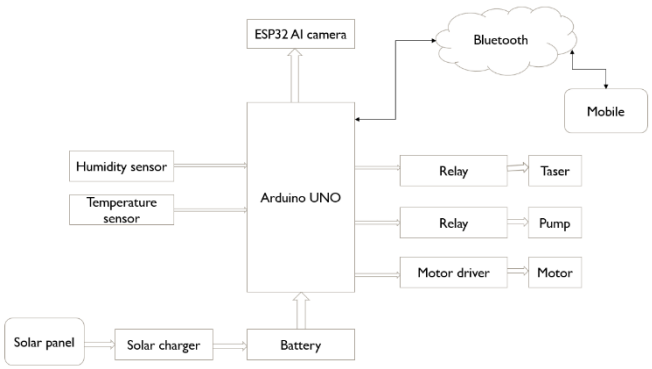

Fig4: Block diagram

The motor driver operates as a one-way communication device, receiving instructions from the Arduino. Operators can control the vehicle remotely through Bluetooth, which also serves to establish a two-way communication link between the vehicle and the operator. This Bluetooth functionality is not only pivotal for vehicle navigation but also enables live streaming capabilities. For inspection and obstacle avoidance, a camera is integrated into the system. Additionally, a one-way communication device fitted with temperature and humidity sensors is employed to monitor the farm's environmental conditions. This device captures the temperature and humidity data and transmits it via Bluetooth. The effectiveness of pesticide application on plants is significantly influenced by both temperature and humidity. Temperature plays a role in determining the volatility and stability of pesticides; higher temperatures may increase the evaporation rate of pesticides, potentially diminishing their efficacy. Conversely, lower temperatures can reduce the activity of certain pesticides or even cause them to crystallize, thereby impacting their effectiveness.

Low humidity can exacerbate the issue of pesticide application by causing rapid evaporation, which can reduce the time the pesticide has to adhere to and be absorbed by the plant. Conversely, high humidity may hinder the pesticide from drying adequately on the plant surface, which can also reduce its effectiveness. To ensure proper monitoring of these environmental factors, a sensor is utilized to measure temperature and humidity. It's important to note that there is no universal safe range for temperature and humidity as it varies depending on the specific pesticide being used; this information is typically provided by the manufacturer. To facilitate the operation of the system, separate pump relays are employed for the pump and taser. The pump's role is to dispense the pesticide, while the taser is designed to deliver an electric shock to deter any contact with the vehicle, also referred to as the bot. To maintain power sustainability, solar panels are incorporated to recharge the battery. The connection between the solar panel and the battery is established through a diode, motor driver, and Arduino, with the diode serving the critical function of preventing the backward flow of charge, thereby protecting the system's integrity.

5. CONCLUSIONS

The embedded system described in this project represents a comprehensive approach to enhancing farmers health safety through advanced Pesti guard: farmer-friendly pesticide robot. the development of a solar energy-based pesticide spraying agricultural robotic vehicle with temperature and humidity monitoring capabilities not only signifies a technological advancement in farming but also prioritizes the health and well-being of farmers. By harnessing solar energy, this robotic vehicle reduces the reliance on fossil fuels, thereby mitigating health risks associated with exposure to harmful emissions from traditional farming machinery. With the integration of temperature and humidity sensors, the vehicle ensures optimal spraying conditions, reducing the need for farmers to work in extreme weather conditions that could jeopardize their health and safety.

Moreover, real-time monitoring of environmental conditions allows farmers to make informed decisions about pesticide application, minimizing overexposure to chemicals and reducing the risk of adverse health effects. By providing timely insights into crop health and environmental factors, the robotic vehicle empowers farmers to adopt preventive measures and implement targeted interventions, thereby safeguarding both crop yields and farmer health. the solar energy-based pesticide spraying agricultural robotic vehicle represents not only a technological innovation but also a commitment to promoting farmer health and safety. By reducing exposure to harmful chemicals, minimizing physical labor, and providing real-time environmental monitoring, this technology paves the way for a more sustainable and farmer-centric approach to agriculture. Pesti guard: farmer-friendly pesticide robot represents not only a technological innovation but also a commitment to promoting farmer health and safety. By reducing exposure to harmful chemicals, minimizing physical labor, and providing real-time environmental monitoring, this technology paves the way for a more sustainable and farmer-centric approach to agriculture.

REFERENCES

1. Yash Dnyaneshwar Jiwtode, Neema Amish Ukani "SMART PESTICIDE SPRAYING ROBOT". International Research Journal of Engineering and Technology (IRJET) (2022).
2. Punit Kanse, Kaustubh Masekar, Chetan Pokale, Prof V. N. Patil, Punit Kanse. (2021) IJCRT.
3. Pvr Chaitanya, Dileep Kotte, A. Srinath, K. B. Kalyan, DEVELOPMENT OF SMART PESTICIDE SPRAYING ROBOT, International Journal of Recent Technology and Engineering (IJRTE) (2020).
4. A Narendra Babu, Mahija Cherry Blossom, A Praneetha, P Shirisha, P Mani Kishore, F Mary Mounika, G Anil Kumar, P S Brahmanandam. INTERNET OF THINGS (IOT) BASED PESTICIDE SPRAYING ROBOT - A Revolution in Smart Farming, INDIAN JOURNAL OF SCIENCE AND TECHNOLOGY (2023).
5. Elayaraja.D, Aneesh.K.C, Amrutha pavani, Arun kumar A, "SOLAR ENERGY BASED MULTIPURPOSE AGRICULTURAL ROBOTIC VEHICLE'', International Journal of Research in AdventTechnology (2018).