Agriculture Based Drones

Ravana 2.0

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Introduction

A drone is a remotely piloted aircraft. Unmanned aerial vehicles (UAVs) or unmanned aircraft systems are more official titles for drones. In essence, a drone is a flying robot that can be commanded remotely or autonomously using software-controlled flight plans stored in its embedded systems. It is coordinated with onboard sensors and a global positioning system (GPS).

Drones have two primary modes of operation which are flight and navigation. Drones need a power source to fly, such as a battery or fuel. Additionally, they have rotors, propellers, and a frame. A drone's frame is often constructed of lightweight composite material in order to minimize weight and improve agility. Drones need a controller, which enables the operator to launch, steer, and land the aircraft through remote controls. The controller and the drone interact using radio waves, such as Wi-Fi.

UAVs have been most closely identified within the defense industry. Initially, they were utilized for anti-aircraft target practice, information collection, and, more controversially, as weapons platforms. Drone usage by nonmilitary entities has expanded significantly during the last decade. Apart from surveillance and delivery, UAVs are utilized for drone industries such as journalism, search and rescue, disaster response, asset protection, animal monitoring, firefighting, communications relay, agriculture, and healthcare.

Drone integration with internet of things (IoT) technology has resulted in the profusion of industrial applications. Drones combined with on-ground Internet of Things sensor networks may assist agricultural organizations in monitoring land and crops, energy companies in surveying power lines and operating equipment, and insurance companies in monitoring properties for claims and policies. From logistics to agriculture to security, unmanned aerial vehicles and the Internet of Things are often addressed in the same term. They contribute to widespread connection and interaction.

Problem and background

The population is growing at a rapid rate; food security is a complex problem in world countries. According to the United Nations' Food and Agriculture Organization (FAO), over 815 million people are vulnerable to food insecurity, with Asia responsible for 64%. By 2050, the world's food supply must rise by 50% to feed a population of nine billion. On the other hand, essential agricultural resources such as land and water are becoming more limited. According to a 2018 survey, 9.2 percent of the world's population experienced severe food insecurity. Any additional reductions in food availability will result in a really pathetic situation. Additionally, there was a moderate degree of food insecurity up to 17.2 percent of the total population, which indicates they did not have access to healthy and appropriate food on a regular basis. The combination of moderate and severe food scarcity affects around 26.4 percent of the entire population.

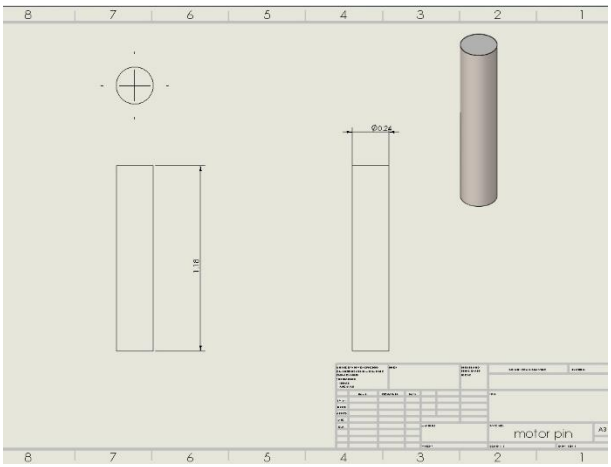
The COVID-19 pandemic significantly impacted agricultural production and food supply networks. Many farmers could not get vital agricultural inputs such as labour, seeds, fertilizer, and pesticides on time, resulting in decreased productivity. Numerous south Asian countries are in the developing stage, and they are confronted with the problem of a large population and agricultural efficiency that is much lower than that of technologically mature nations. Sri Lanka is faced with a similar situation. This is because of its low-level agricultural technology, limited access to electricity, and untrained farmers, among other factors. Almost 73% of the Sri Lankan population is directly or indirectly dependent on agriculture. Farmers continue to use traditional procedures for seed sowing, composting, and pesticide treatment, among other things. Traditional pesticide and fertilizer spraying procedures are inefficient and time-consuming, indicating a need for technical progress in this area. The COVID-19 epidemic makes it very difficult for conventional farmers to manage crop, fertilizer, and pesticide application

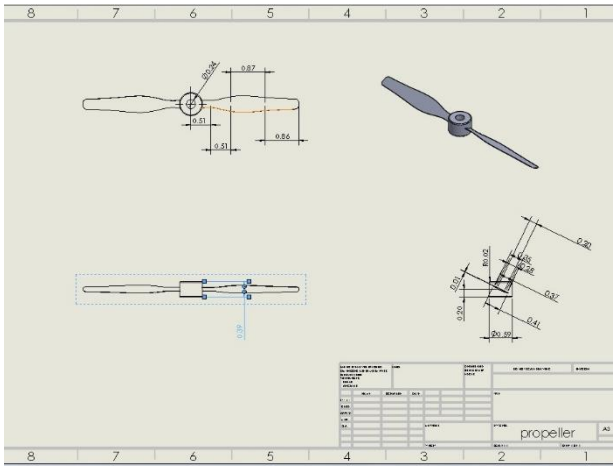
Methodology and Design

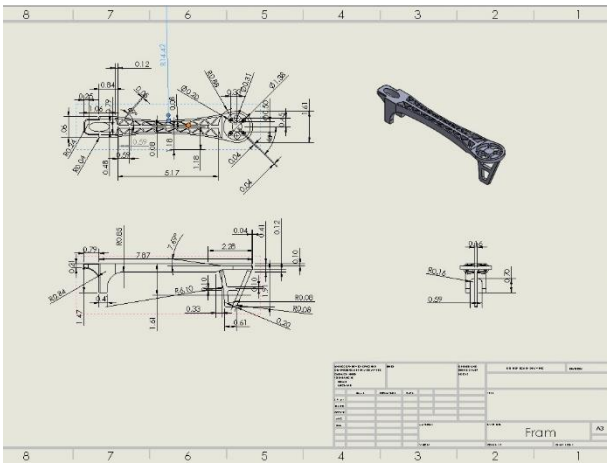
Agriculture is a significant source of revenue in Sri Lanka. Crop production rates in agriculture are determined by various factors such as temperature, humidity, and rainfall, which are unavoidable causes. Agriculture is dependent on some things such as pests, disease, and fertilizers, all of which can be controlled by properly treating and managing crops. Pesticides may boost agricultural output, but they can have a negative impact on human health. The primary objective of this project is to develop an agricultural drone capable of monitoring, collecting data, managing irrigation, monitoring livestock, spraying pesticides, mapping, and surveying. Several designs are based on unmanned aerial vehicles in this study (UAVs). Pesticide usage in the agricultural drone is critical, and it will be much easier if we employ intelligent devices such as robots and other technology.

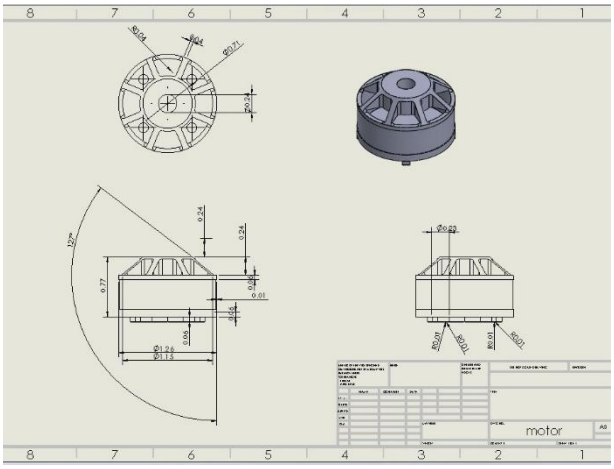
We explored numerous technologies that are being utilized to minimize human labour in various agricultural processes like insect identification, UREA spraying, and fertilizer spraying in crop-dusting sectors. Drones are used to measure and record crop height. They use lidar remote sensing technology, which lights the crop with a laser and measures the reflected light to determine distance. This may assist farmers in optimizing agricultural productivity and promoting environmentally friendly farming practices. Our design is an evolution of quadcopter unmanned aerial vehicles (UAVs) and processes multipurpose drones specifically for the Drone industry. Additionally, we investigated integrating different additional systems into a quadcopter system. The mentioned method entails developing a prototype that utilizes low-cost components such as a BLDC motor, an Arduino, and ESC wires.

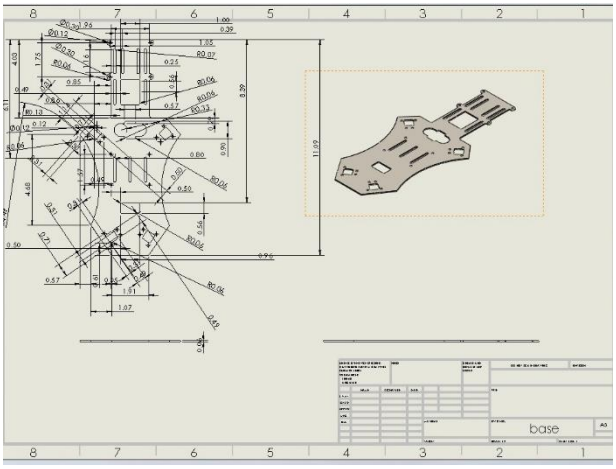
2DDesign and 3D Modelling Files

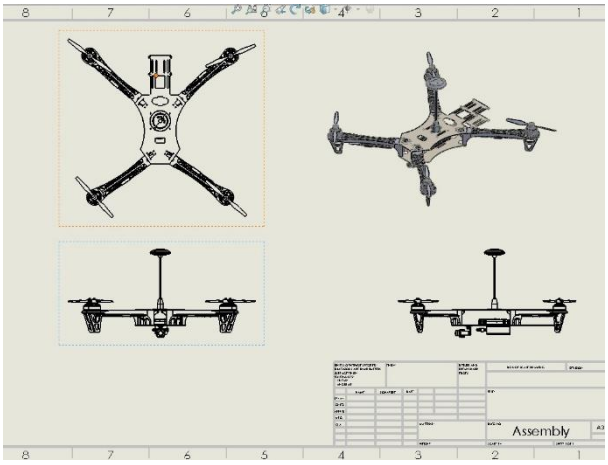












For further reference on 3D modeling and simulation watch the following link - https://www.youtube.com/watch?v=bE2cUUyAzoE&ab_channel=JayanthanAmalanathan

3D Model - Assembly

Conclusion

Agriculture drones have the potential to boost crop yields significantly. Agriculture drones can assist farmers in revolutionizing the agriculture industry. Today's farmers spray insecticides and instigate water using a hand pump. Humans spend excessive time spraying crops and do not apply insecticides evenly. However, by introducing a drone-based technology, we can finish the spraying operation in a fraction of the time required by humans. Humans spend between 100 to 200 rupees per hour for pesticide spraying; in comparison, if a drone consumes 3 watts of power, it will only price 10 rupees for energy. The drone will spray the nutrients consistently, ensuring that no crops are harmed. According to World Health Organization studies (WHO), drones would save time spent spraying pesticides and help minimize illnesses caused by fertilizer on the human body, like skin ailments, according to World Health Organization studies (WHO). As a result, farmers' efforts will be reduced while using drones for agricultural purposes. It is critical to follow all design and development processes for PCB design while developing the appropriate circuits. Similarly, it could reduce human work in other agricultural activities.

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