

PlantGuard AI™ – Autonomous Plant Disease Detection System

With global agriculture facing losses of up to 25% due to plant diseases, PlantGuard AI™ addresses a critical need in a $20B+ precision agriculture market. Growing demand for AI-driven farming tools positions this system as a transformative solution for boosting yield and ensuring food security.

PlantGuard AI™ offers investors access to a high-growth AgriTech segment. Its patented AI and robotics integration presents licensing, manufacturing, and global distribution opportunities, especially in regions facing food security challenges.

This system is protected by us patent No. US12277762B1 which was granted to *King Saud University* in 2025-04-15. A fully functional prototype of the system was developed and tested by the *Center of Smart Robotic Research*, *College of Computer and information Sciences*, King Saud University. This patented technology represents the future of autonomous plant diseases detection systems.

System Components

The intelligent robotic PlantGuard AI™ extinguishing system consists of two units:

1

Robotic Acquisition & On-site Detection

The system uses a small mobile robot equipped with a camera, navigation unit, GPS, and a simple traction setup to move through the field on its own. As it travels, it takes pictures of the plants and analyzes them on the spot using a built-in neural-network model. This allows the robot to recognize the type of plant, spot any signs of disease, and note the exact location where the problem is found. By handling the scanning work automatically, the robot reduces the need for manual inspection and helps cover large areas more efficiently.

2

Data Transmission & User Notification

When the robot detects a plant that may be diseased, it doesn’t keep the information to itself. Instead, it sends the image, the identified plant name, the disease it found, and the plant’s GPS location directly to a user’s mobile device through a wireless connection. This lets farmers or field workers quickly see where issues are happening and respond sooner. The transmitted information also helps keep a clear record of plant health across the field, making ongoing monitoring and decision-making easier.

Applications

The PlantGuard AI™ robotic system has a wide range of applications in various environments where plant allocated somewhere.

1

Precision Agriculture Monitoring

The robot patrols fields to detect diseased plants and their locations, helping farmers apply treatments efficiently and improve crop yield.

2

Early Disease Detection in Orchards

The system can detect plant diseases at early stages, and thereby helps the stakeholders taking necessary actions before it is too late.

3

Greenhouse Automation

Inside greenhouses, the robot monitors plant health continuously, helping operators adjust conditions and prevent disease.

4

Urban Farming & Vertical Farms

The robot navigates dense urban or vertical farms to detect plant issues early and maintain consistent growth in limited spaces.

5

Livestock Feed Crop Monitoring

It monitors crops grown for animal feed, ensuring they remain healthy and nutritious for livestock.

Advantages of the PlantGuard AI™ Robotic System

1

Automated Field Monitoring

The robot navigates fields autonomously, continuously monitoring plants without constant human supervision.

2

Early Disease Detection

It detects diseases at an early stage, helping prevent spread and reducing crop losses.

3

Accurate Plant Identification

The onboard neural network identifies plant species and disease symptoms reliably for precise decision-making.

4

Scalable for Large Fields

The robot can cover large areas efficiently, providing consistent monitoring across the entire field.

5

Record-keeping and Analysis

Collected data can be stored for tracking disease patterns, analyzing trends, and improving farm management.

6

GPS-based Localization

Each plant is recorded with its exact GPS location, making it easy to find and treat affected plants.

7

Real-time Processing

Images are analyzed on-site, enabling instant detection without relying on external servers.

8

Wireless Data Transmission

Plant images, disease type, and location are sent directly to the user’s device for quick review.

9

Reduced Labor Costs

Automation reduces the need for manual monitoring, lowering operational costs.

Technical Specifications of the Prototype

Robot

- Jetson Nano from Nividia
- Arduino Mega
- GM37 Geared with Encoder
- L298N Driver Motor

Navigation System

- RPLidar A1M8 as navigations bar.

Software system

- Yolov8 as AI model
- Melodic ROS system for integrated
- Unity3D for the app

AI Plant Disease Detection

- Pre-trained on over 15K potato images
- Recognition Speed: Up to 20 frames per second

Camera Specifications

- Resolution: Up to 8MP
- Frame Rate: Up to 206 frames per second
- Adjustable Field of View: 73°, 83°, or 50°



Figure of the patent prototype

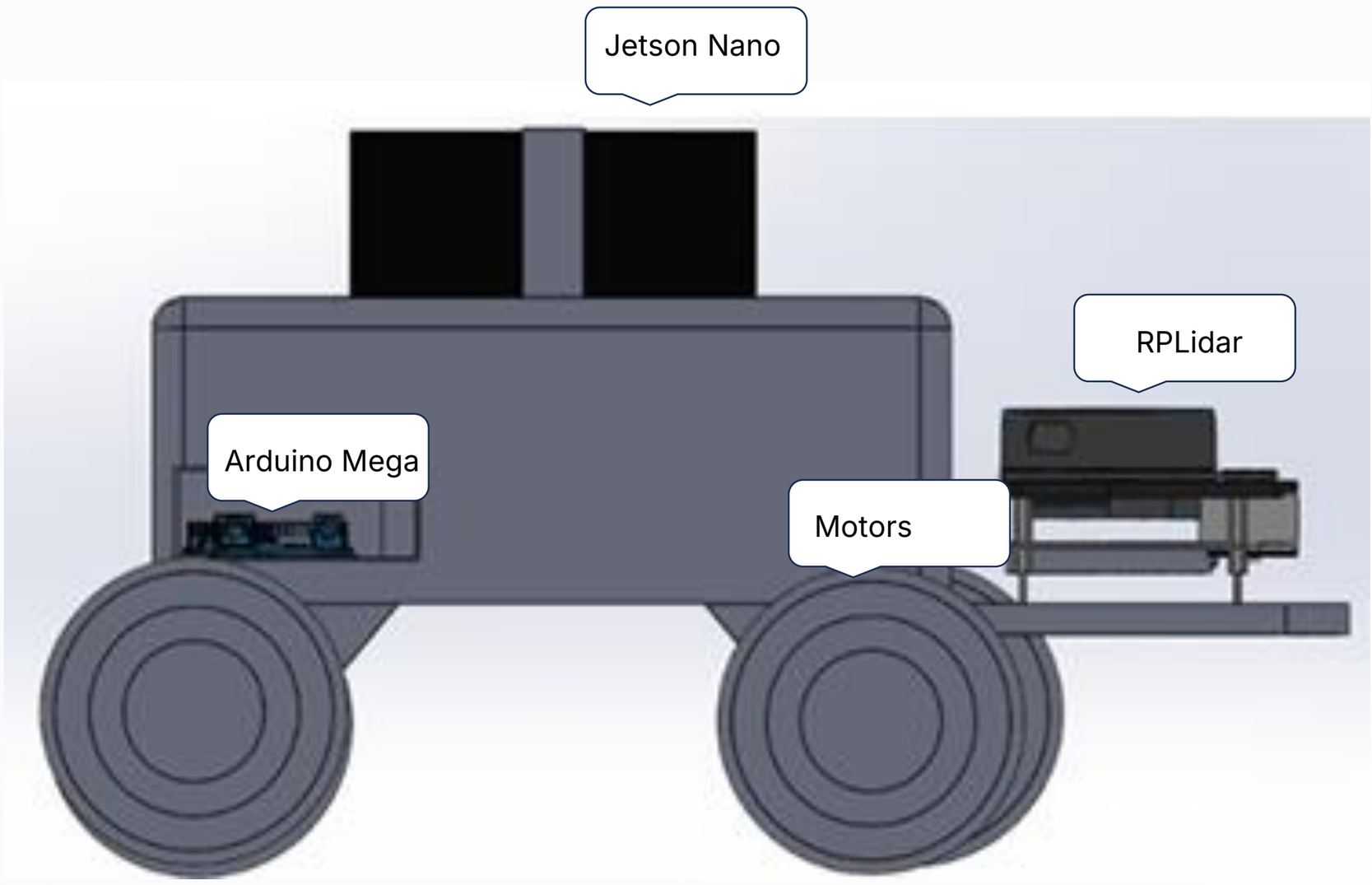


Figure of the robot and its components

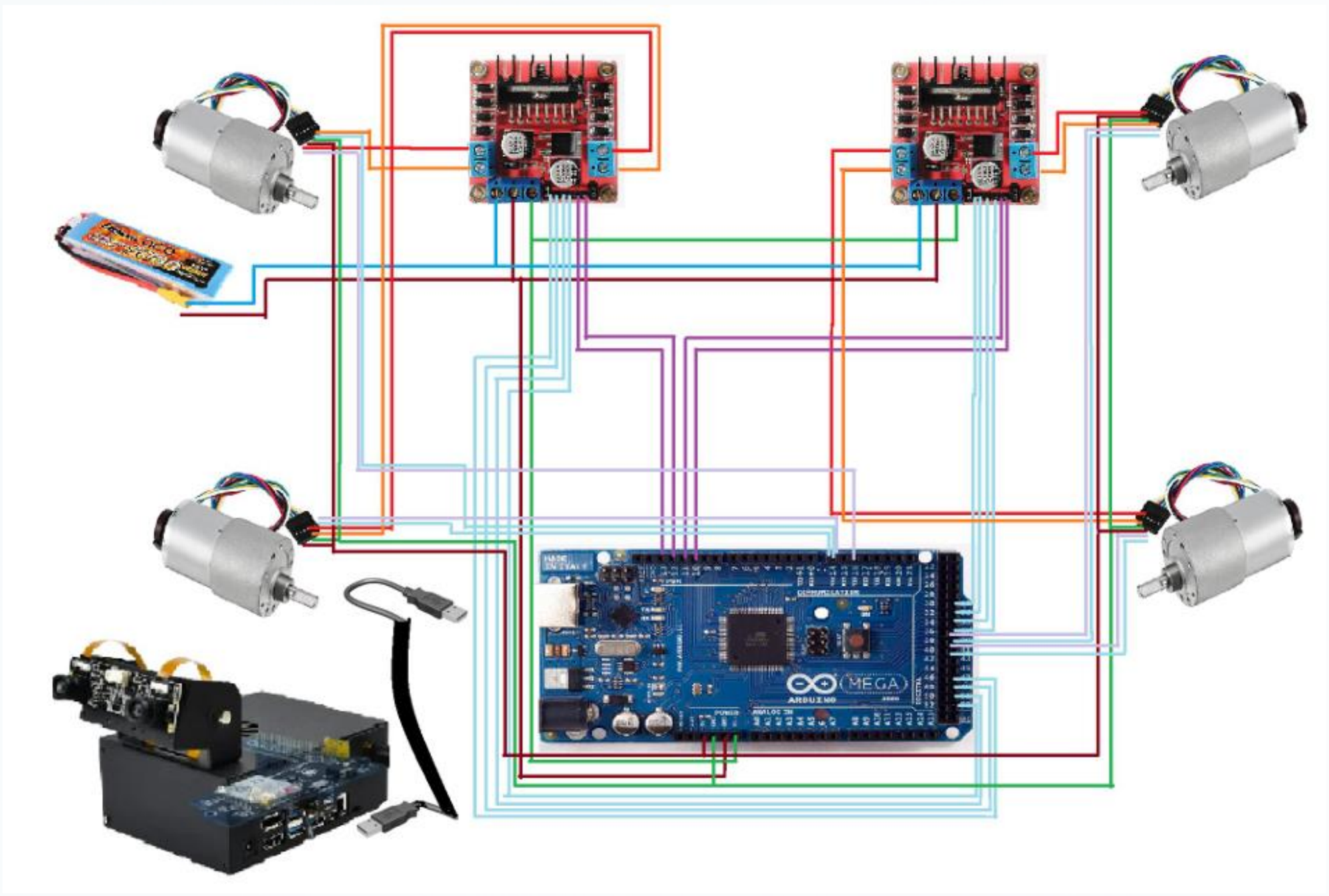


Figure of the deeper-view of the system

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