Mechatronic UML Specification

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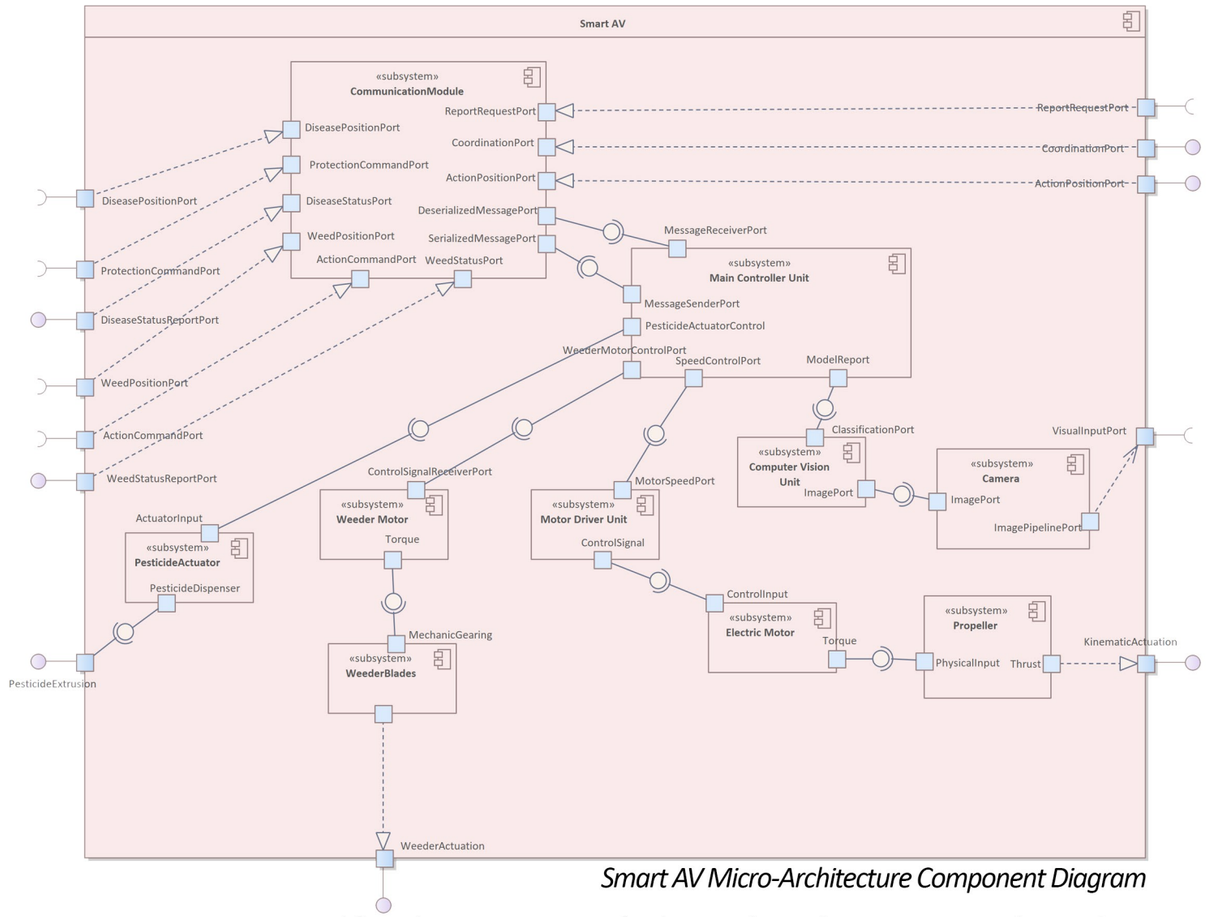
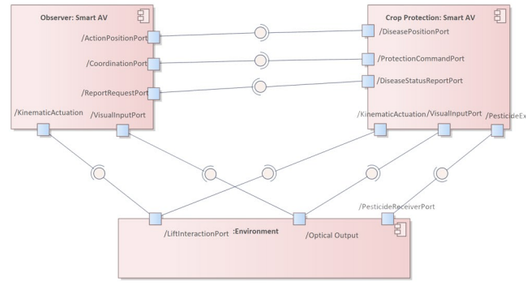
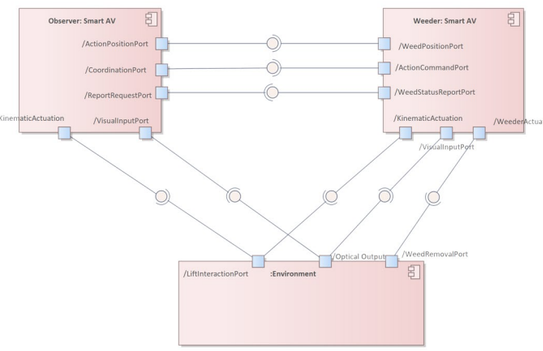


Smart AV Micro-Architecture Component Diagram

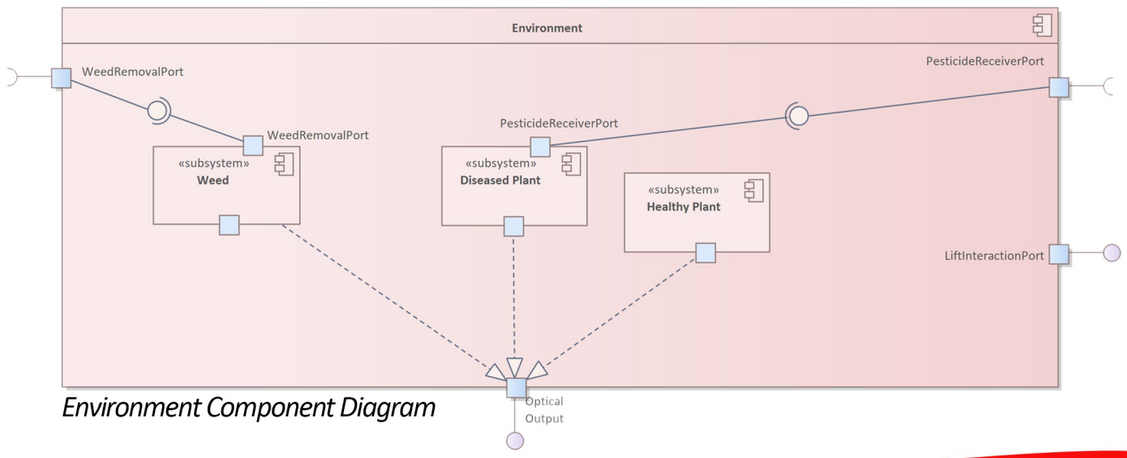
The Smart AV project exemplifies the integration of advanced mechatronic principles with precision agriculture technology. The MUML diagram illustrates a sophisticated system architecture designed for autonomous agricultural vehicles, capable of disease detection, weed control, and pesticide application. At its core, the Communication Module coordinates data flow between various interfaces, such as Disease Position, Protection Command, and Weed Status Report. The Main Controller Unit serves as the system's brain, processing inputs from the Computer Vision Unit and Camera, which utilize image recognition to classify field conditions. This information guides the Electric Motor and Propeller subsystems to execute precise kinematic actions, such as lifting and thrusting, while the Weeder Motor and Blades are engaged for mechanical weed removal. The Pesticide Actuator subsystem ensures targeted pesticide dispensing, enhancing efficiency and reducing environmental impact. Overall, this UML design highlights the seamless integration of mechanical, electronic, and software components in creating a highly autonomous and effective agricultural solution.

This UML diagram showcases the intricate interaction between the Observer and Crop Protection modules within the Smart AV system, emphasizing its role in precision agriculture. The Observer module, equipped with Action Position, Coordination, and Report Request ports, collaborates closely with the Crop Protection module, which features Disease Position, Protection Command, and Disease Status Report ports. Both modules are designed to interface seamlessly with the environment through kinematic actuation and visual input ports, enabling real-time response to field conditions. The system's environment component facilitates this interaction, managing lift, optical output, and pesticide extrusion via dedicated ports. This design ensures the precise execution of agricultural tasks such as disease detection and targeted pesticide application, enhancing both efficiency and sustainability in crop protection efforts.





Subsystems Intreaction Component Diagram



Environment Component Diagram