

Architecture for Multi-Unmanned Aerial Vehicles Based Autonomous Precision Agriculture Systems

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Abstract : The use of unmanned aerial vehicles (UAVs) in precision agriculture has seen a huge increase recently. As such, systems that aim to apply various algorithms on the field need a structured framework of abstractions. This paper defines the various tasks of the UAVs in precision agriculture and models them into an architectural framework. The presented architecture is built on the context that there will be minimal physical intervention to do the tasks defined with multiple coordinated and cooperative UAVs. Various tasks such as image processing, path planning, communication, data acquisition, and field mapping are employed in the architecture to provide an efficient system. Besides, different limitation for applying Multi-UAVs in precision agriculture has been considered in designing the architecture. The architecture provides an autonomous end-to-end solution, starting from mission planning, data acquisition, and image processing framework that is highly efficient and can enable farmers to comprehensively deploy UAVs onto their lands. Simulation and field tests show that the architecture offers a number of advantages that include fault-tolerance, robustness, developer, and user-friendliness.

Keywords : deep learning, multi-UAVs, precision agriculture, UAVs architecture

Conference Title : ICIUS 2021 : International Conference on Intelligent Unmanned Systems

Conference Location : Amsterdam, Netherlands

Conference Dates : May 13-14, 2021