



# **Tethered Operation of Autonomous Aerial Vehicles to Provide Extended Field of View for Autonomous Ground Vehicles**

*Nyit Sin Phang*

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This thesis was part of the ongoing research conducted at the Naval Postgraduate School to achieve greater collaboration between heterogeneous autonomous vehicles. The research addresses optimal control issues in the collaboration between an Unmanned Aerial Vehicle (UAV) and Autonomous Ground Vehicles (AGV). The scenario revolves around using the camera onboard the UAV to extend the effective field of view of the AGV. For military operations, this could be helpful in improving security for convoys and riverine patrols. There were three main problems addressed in this thesis. The first problem dealt with the design of a UAV control law that takes into consideration the relative speed differences between the UAV and the AGV. The UAV was assumed to have a greater speed compared to the AGV in this thesis. The second was the keystone field of view projection effect of the UAV's onboard camera onto the earth. The image captured by the camera was distorted due to the view angle of the camera from a high elevation. The third problem addressed was control of the location of the UAV to ensure the reliability of the communication network between the UAV and the AGV. The communication was assumed to be a linear function of the relative positions of the UAV and the AGV.

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