

Senior Design Project Description

Company Name	<i>UNC Charlotte Mechanical Engineering</i>	Date Submitted	<i>10/10/2018</i>
Project Title	<i>Analyzing the benefits of a Haptic Shared Control Framework for remotely controlling an Unmanned Ground Vehicle (UNCC_UGV)</i>	Planned Starting Semester	<i>Fall 2018</i>

Funding:

What is the source of funds that will be used to cover all of the direct costs of this project?
 _Self (Startup)_____

Is this source of funds already secured? Yes X No _____

Personnel

Discipline	Number	Discipline	Number
Mechanical	3	Electrical	2
Computer		Systems	
Other ()			

Project Overview:

Unmanned ground vehicles (UGVs) hold promise for increasing mission performance and guaranteeing personnel safety, but the ability for a human operator to control a UGV from a remote ground station is compromised by communication bandwidth limits and latency. Automation can be added onboard where it is not subject to long-range communication, but UGVs are often used in complex environments, where full automation is not possible. Among many schemes for sharing control between human operator and automation system, haptic shared control is a promising means for combining manual control with automatic control to keep the human in the loop while promoting cooperation and avoiding automation pitfalls.

Project Requirements

This project is aimed to design an experimental platform in the form of a mini-vehicle. Specifically, we equip the vehicle with a motorized steering wheel which will be controlled by a ground station featuring a second motorized steering wheel. A radio link can be used to couple the two wheels to a common “virtual steering shaft”. While the virtual shaft is somewhat compliant, it should be sufficient to support driving the vehicle from the ground station and the transmission of steering torques applied by a driver on board to be felt by the driver at the ground station. We will use this test-bed to explore how providing haptic feedback to the human driver can support effective negotiation of control authority and improve driver/automation/vehicle system performance



Expected Deliverables/Results:

- *Experimental Set up in the form of Golf-Cart*
- *A fixed-based Experimental support for remote control of the Golf Cart*
- *Characterization of the radio-communication*
- *Identification of the system parameters*



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- *Documented Report*

Disposition of Deliverables at the End of the Project:

The hardware will be a designed for THinC Lab at the Mechanical Engineering Department at the UNC charlotte.

List here any specific skills, requirements, knowledge needed or suggested (If none please state none):

Electronics, Arduino programming, radio communication, CAD, Matlab Programming