An Innovation Challenge in Small Unmanned Aircraft System Communications for Students

Sponsor: IEEE Vehicular Technology Society

IEEE Vehicular Technology Society (VTS) is pleased to announce an Innovation Challenge in Unmanned Aircraft System (UAS) Communications for current undergraduate and graduate college and university students.

Objective: Participants engineer a working solution for coordination between two UASs to accomplish a task jointly. The objective is to demonstrate the use of UAS-to-UAS communication and coordination in a realistic, operational flight environment.

Suggested Equipment: Two small drones (UAS-1 and UAS-2) and a ground control station (GCS) each equipped with an embedded computer board (such as a Raspberry PI, Arduino, Jason) and a radio (such as WiFi, LoRa, LTE, or any custom design). While Fig.1 illustrates a suggested framework for the design, the choices regarding the number of GCSs, and the location of the embedded computer and radio, are up to the designers.

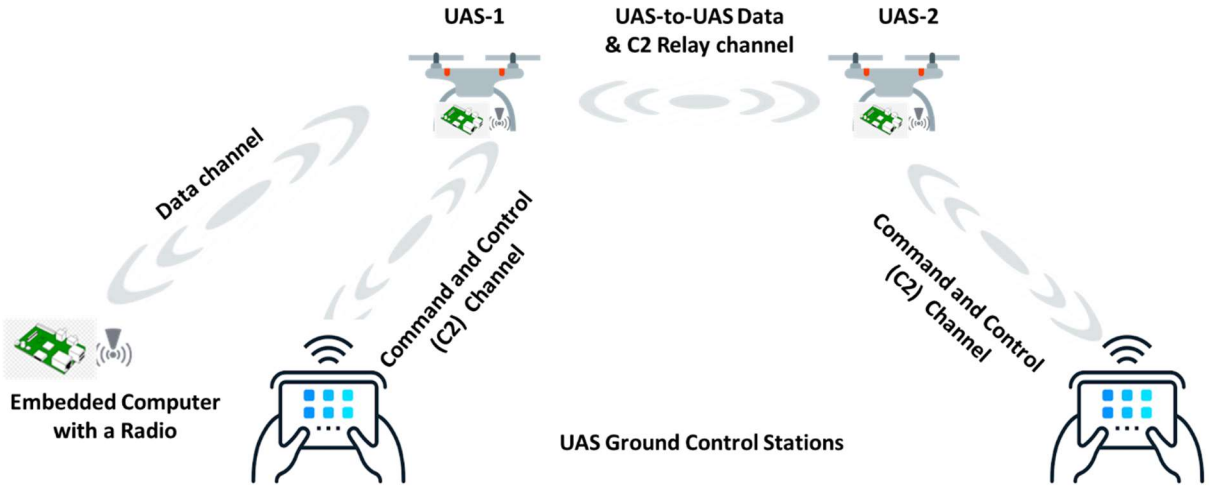

Fig. 1: UAS-to-UAS Communications Innovation Challenge Framework

Guidelines:

(1) Projects should demonstrate a collaborative task involving two UASs.
(2) UAS-to-UAS communications, i.e., UAS-1 and UAS-2 sharing telemetry and/or application-specific information between them and with the GCS, as an integral component of the project.
(3) Projects must be simple enough to be demonstrated, but, useful enough to be part of a real-world application with a broader impact.

Eligibility: This innovation challenge is open to small teams of students attending colleges and universities around the world. Each team must identify a leader and the team leader must be a student member of the IEEE Vehicular Technology Society at the time of submission.

Two-Stage Selection Process and Prizes: Selection of participating teams takes place in two stages.

Stage 1: In the first stage, teams will submit a three-page concept paper with their design, use case, communication protocol and illustrations following IEEE conference paper format. About 10 teams will be selected based on the submitted concepts. **Each winning entry will receive a $500 prize and a certificate from the IEEE VTS Ad Hoc Committee on Drones during the VTC2020-Fall**. Only those teams selected in the first stage will be eligible to move to the second stage.

Stage 2: The second stage involves outdoor demonstrations. Given the current COVID pandemic situation, IEEE VTS provides two options for the student teams to demonstrate their projects.

2A). Teams will first demonstrate their project at their own locations. They will then submit the program, a video of the demonstration and the supporting documentation to the committee.

2B). Those entries that satisfy the requirements will be demonstrated by the professional pilots from Unmanned Experts Inc., a company engaged by the IEEE VTS ad hoc committee on drones for flight tests.

Optionally, if the COVID pandemic eases and travel is allowed, one member from each team will be invited to participate in the demonstration which will be held in the U.S. The venue will be decided and shared with the selected teams ahead of the demonstration. A maximum of three teams will be selected during the second stage. Partial support towards travel costs will be provided to the participants. Three winning teams in stage 2 will receive cash awards of $2,000, $1,500, and $1,000 respectively and a certificate during 2021 Spring VTC conference.

Teams Own the Design Copyrights: The teams will own the copyright for their designs and programs. However, they must share the design, software (code), and documentation details with the selection committee. The committee will provide a letter of assurance to protect the team's intellectual property or copyrights through IEEE.

Why is IEEE VTS organizing this event? IEEE VTS established an ad hoc committee on drones to promote UAS research and education within the IEEE community. In addition, IEEE Communication Society and IEEE VTS are jointly sponsoring the development of UAS-to-UAS communication standards through IEEE P1920.2 Working Group. The innovation challenge is an event to promote UAS research among the students.

Timeline and Submission Process: Stage 1 submission window is open and will close on 25 November 2020. Stage 1 Winners will be announced around December 10, 2020. They will be recognized during the IEEE 2020 VTC Fall Conference**. Stage 2 submission window will open on 1st January 2021 and will remain open until 31st March 2021**. Winners will be recognized during the IEEE 2021 VTC Spring Conference.

IEEE VTS Ad Hoc Committee on Drones: The committee consisting of the following members will evaluate the submissions: 1) Kamesh Namuduri, University of North Texas, USA, 2) Rui Zhang, National University of Singapore, Singapore, 3) Ismail Guvenc, North Carolina State University, USA, 4). David W. Matolak, University of South Carolina, USA, 5). H. Jin Kim, Seoul National University, Korea, 6) Uwe-Carsten Fiebig, German Aerospace Center (DLR) Institute of Communications and Navigation, Germany, 7) Helka-Liina Maattanen, Ericsson, Finland, and 8) Jae Hong Lee, Seoul National University, Korea.

Contact Information and Submissions: Concept papers and enquiries can be submitted to Kamesh Namuduri, Professor, Electrical Engineering, University of North Texas, Denton, Texas**,** via email (Kamesh.namuduri@unt.edu). Interested parties can contact aerpaw-contact@ncsu.edu for the possibility of using Aerial Experimentation and Research Platform (https://aerpaw.org/) for their experiments.