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IPN achieves third place in drones international competition

- **The system consisted of loading, transporting and delivering construction material to a specific destination with autonomous flights of two unmanned aerial vehicles**
- **The head of the SEP, Delfina Gomez Alvarez, has pointed out that the Government of Mexico underpins Higher Education as a fundamental element in its transformation**
- **IPN's General Director, Arturo Reyes Sandoval, stressed that polytechnics academic training has led them to compete and win awards at an international level**

With a communication system between two drones to perform a joint task, a researcher from the National Polytechnic Institute (IPN) won second place in the first phase and third place in the final of the Innovation Challenge in Unmanned Aerial Systems Communications (UAS) 2020, a competition organized by the Institute of Electrical and Electronics Engineers (IEEE), through the Vehicle Technology Society (VTS), which announced the winners during the 94th IEEE Vehicle Technology Conference 2021.

The Secretary of Public Education, Delfina Gómez Álvarez, has indicated that Mexico's Government works to support Higher Education as a fundamental element in its transformation and the well-being of the population.

The IPN's General Director, Arturo Reyes Sandoval, stressed that the preparation of students in the engineering and science areas of the Institute has led them to compete and win awards internationally.

In turn, Dr. Rodolfo Vera Amaro, professor of the Interdisciplinary Professional Unit in Engineering and Advanced Technologies (UPIITA), with the support of student Madison Burke, from Virginia Technological University, United States, developed a system of three components: a ground base station (GCS) and two quadcopter drones built by him,





capable of carrying out a flight plan with an autonomous and coordinated trajectory, to load, transport and deliver a payload.

"We used two guided and coordinated unmanned aerial vehicles (UAVs) to transport a payload to a remote area, for which we implemented a personalized communication protocol that would use only one drone as an intermediary between the ground control station (GCS) and the second drone, an activity that could be monitored in real time through a telemetry and control interface," detailed the polytechnic teacher.

Advised and encouraged to participate in the international competition by Dr. Walid Saad, a professor at Virginia Technological University and an expert in wireless networks and communications for unmanned aerial vehicles, the polytechnic professor obtained from the american institution the financing required for the construction of the drones and registration in the competition that was held in two stages.

In the first, the teams presented a three-page concept paper with its design, use case, communication protocol and illustrations, with the format of scientific article for IEEE Congresses, in which the project of the polytechnic professor was among the 10 finalist teams and obtained the second place of the general competition, which ensured his passage to the final.

The second part consisted of outdoor demonstrations, but the situation caused by the COVID-19 pandemic prevented this modality, so the sending of demonstration videos was requested and the polytechnic teacher sent the recording of the Virginia Tech Drone Park of synchronized and autonomous experimental flights of the drones, in addition to the documentation required by the selection committee, which gave him third place.

Dr. Vera Amaro traveled to the University of Virginia to continue his PhD research on remote monitoring of endangered animals with drones, where he collaborated on a project on the development of a model to measure the quality of telecommunications links between the drones of a coordinated group or swarm and the probability of their formation stability with the use of control laws, project in which he also received advice from doctors Alberto Luviano Juárez, from UPIITA and Mario Eduardo Rivero Angeles, from the Computer Research Center (CIC), both from IPN.

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