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Competing in SUAS 2023 Competition

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Competing in SUAS 2023 Competition

Fauzan H Hasanbasri, Fransisco Bueno, & Dr. Srikanth Gururajan

The SUAS competition is designed to foster interest in Unmanned Aerial Systems (UAS), stimulate interest in UAS technologies and careers, and to engage students in a challenging mission. SUAS 2023 competition mission demonstration consists of the following: 1) Autonomous flight. This includes manual or autonomous takeoff and landings, autonomous waypoints navigation, and obstacle avoidance. 2) Object detection, classification, and localization. This includes identifying shapes and delivering a water bottle to each target on the ground.

We competed in the SUAS 2023 competition. We used a fixed-wing aircraft (shown in Figure 1) with a Pixhawk 4 Mini flight controller to complete the SUAS 2023 mission. The Pixhawk 4 Mini will be used to perform autonomous waypoint navigation. We have an NVIDIA Jetson Nano and a GoPro inside the aircraft. The NVIDIA Jetson Nano and the GoPro will be used to identify images during flight. We designed and manufactured a glider. The glider will be used to deliver a water bottle from the aircraft to the identified image. We will not attempt the obstacle avoidance mission.

Prior to the competition, we completed numerous flights, including an autonomous, long endurance flight covering approximately 13 miles of ground track. The flight tests encompass the following:

1. Validated first flight.
2. Trimmed the aircraft.
3. Performed manual loitering.
4. Performed autonomous loitering (Hold Mode).
5. Performed PID Tuning.
6. Performed autonomous waypoint navigation.
7. Recorded video in-flight.

In June 2023, we competed in the SUAS event, held at St. Mary's Regional Airport in the city of California, MD. At the event, we successfully accomplished our stated goals of autonomous flights with waypoint navigation. We did not attempt the bottle/payload drop. Some pictures from the event are included here.