Team 26: Smart Acoustic Monitoring System

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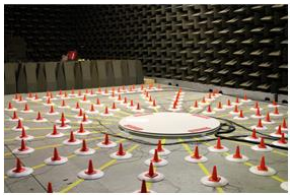
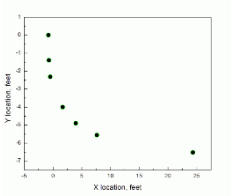
SAMS

Problem

In order to measure and quantify acoustic signals from small UAS, NASA utilizes phased microphone arrays deployed in the field. These complex arrays can take up to two weeks to set up before measurements can be taken. NASA and the NIA contracted with VT to have a team of senior, undergraduate, mechanical engineers develop a way to improve and shorten the process.





X (ft)	Y (ft)	Z (ft)
-0.79	0.00	0.00
-0.72	-1.40	0.00
-0.49	-2.32	0.00
1.69	-4.00	0.00
3.97	-4.90	0.00
7.64	-5.56	0.00
24.34	-6.53	0.00

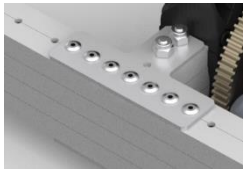
Open Source / Modular Parts Integration

3DR Pixhawk Auto Pilot Controller

80/20 parts and components for easy assembly

Arduino Uno used for actuation control

Vex Pro parts for drivetrain, inspired by First Robotics Competition



Technical Approach

- Autonomous vehicle delivers microphone sensor plates to field based array locations given by NASA
- Vehicle rides on 4 mecanum wheels, independently driven by 4 DC motors, that allow forward/reverse, rotational, and side to side movement
- Autonomous navigation is performed by a 3D Robotics Pixhawk auto pilot controller and uBlox GPS, with Mission Planner software for programming
- Cm accuracy of plate locations obtained by Swift Navigation RTK/differential GPS Piksi kit

- Plates are deployed from the vehicle to the ground via an 80/20 constructed frame and 3D printed holder mechanism and 4 linear actuators

Results

- Successful deployment of 25+ plates on paved surfaces by the 80/20 constructed frame. Also, programmed to pick plates up off ground. Holds up to 11 plates at time
- Stable vehicle platform drivable by a RC transmitter
- RTK/Differential GPS kit installed and determining cm accurate relative position to a base station
- Run time of 1.5-2 hours on 12 V lead acid battery unit

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SWIFT NAVIGATION

VEX PRO

Thanks to the NASA Langley Research Center for providing us with the necessary parts and data to create this vehicle!