**From Concept to Prototype: The Development of a Tilt-Rotor VTOL Drone**

Vertical take-off and landing (VTOL) aircraft have seen an increase in usage and development because of their unique flight characteristics. Our goal with our tilt-rotor VTOL drone is to combine the benefits of a quadcopter and a fixed-wing aircraft for future Student Unmanned Aerial Systems (SUAS) competitions. Some of the advantages of a VTOL platform include not needing a runway to take off, gaining a stable stationary platform to use other mechanisms while in mid-flight, and increasing our flight range and cruise speed by transitioning to forward flight.

We began our project researching types of VTOL aircraft looking for a simple yet effective solution that included the following factors: weight, robustness, and reliability. Finally, we decided on the tilt-rotor design because it best met our criteria while also resembling the V22 Osprey currently in service with the US military. We then used CAD software to design and prototype our aircraft. By using traditional subtractive and newer additive manufacturing, we were able to quickly manufacture and assemble the prototype. We are now in the testing phase of the project, which will include verifying the drone's hovering and transitioning capabilities, followed by a full-flight demonstration. We are excited to see the valuable insights that will improve future project iterations.