Peter’s:

Vertical take-off and landing (VTOL) vehicles have gained significant attention in recent years due to their potential to revolutionize transportation. Our research focuses on prototyping a VTOL in order to gain a stronger understanding of how they function. To begin our project, we conducted extensive research into the design and operational principles of VTOL aircraft. We then used that knowledge to create a detailed design of our VTOL, taking into account factors such as weight, robustness, and reliability. Once the design phase was completed, we began the construction phase of the project. By using a combination of traditional subtractive manufacturing as well as newer additive manufacturing, we were able to quickly manufacture and assemble our prototype. At this point, we are eagerly looking forward to conducting a thorough evaluation of the craft's capabilities in the upcoming testing phase. We hope that this prototype will provide us with valuable insights that will improve our future iterations of the project.

Omar’s:

**Abstract**

Vertical take-off and landing (VTOL) aircraft have seen a rise in usage and development for the commercial industry. These VTOL aircraft are quite versatile in their functionality and how far of a distance they can travel. Our goal with our tiltrotor VTOL drone is to create a mix between a quadcopter and a fixed-wing aircraft to gain the benefits of both for future Student Unmanned Aerial Systems (SUAS) competitions. The benefits of the VTOL capabilities are that we would require no runway to take off and gain a stable stationary platform to use other mechanisms mid-flight. The fixed-wing benefits are that we increase our flight range and cruise speed by transitioning to having the wings create our lift instead of motors.

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 and repeatably manufacture and assemble the prototype. Currently, we are approaching the first testing of the hover and are excited to see the valuable insights that those results will give us for future iterations of the project.

Merged:

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

Because of their unique flight characteristics, vertical take-off and landing (VTOL) aircraft have seen an increase in usage and development. 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.

Ben Revision

**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. The goal of this project is to combine the benefits of a quadcopter and a fixed-wing aircraft by designing a tilt-rotor VTOL drone, allowing us to use it as a testing platform as we design and build an upscaled version of the project. 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. We then used computer-aided design (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 revised the parts as needed after identifying design flaws that occurred in the design phase or manufacturing. This presentation will review the testing phase of the project, which will include verifying the drone's hovering and transitioning capabilities, as well as a full-flight demonstration. The testing phase provides valuable insights that will improve future project iterations.