

# Using UAVs for Ocean Data Collection

## Design of an Instrument Attachment Arm

Lukas Crowe, Garrett Follansbee, Dr. Nathan Laxague  
Department of Ocean Engineering, University of New Hampshire



University of  
New Hampshire

### Introduction

- Wind speed collection is necessary for ocean data collection
- Anemometers (Fig. 1) collect wind speed
- Wind speed collection is a difficult task especially on a drone (Fig. 2)
- Wind speed data is often collected from a boat system
- This can create measure inaccuracies

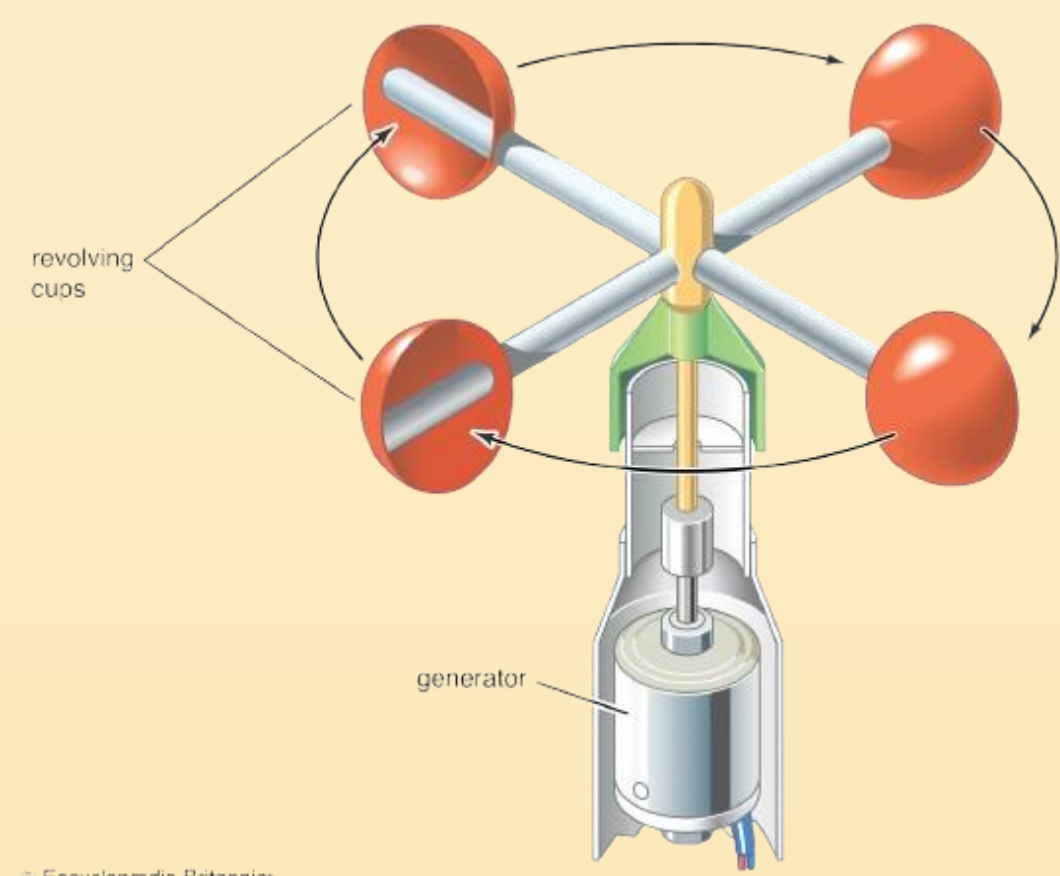


Figure 1: Typical Anemometer Design

### Methods

- Primary Design Constraint: Placing the anemometer in a location unaffected by rotor wash (Fig. 3)
- Rotor Wash Calc:  $L = 1.2 * D$ ,  
where  $D$  = Diameter of rotors and  $L$  = Length of Pipe
- Secondary Constraints: Easy to assemble and disassemble
- Design: Drafted, designed, and assembled in SOLIDWORKS 3D (Fig 4.)
- Printing: Physical prototype printed in the MakerSpace lab using a Bambu 3D Printer
- Final Design: Pin system for fast assembly, disassembly, and axial rigidity



Figure 2: Drone Collecting Data over Ocean

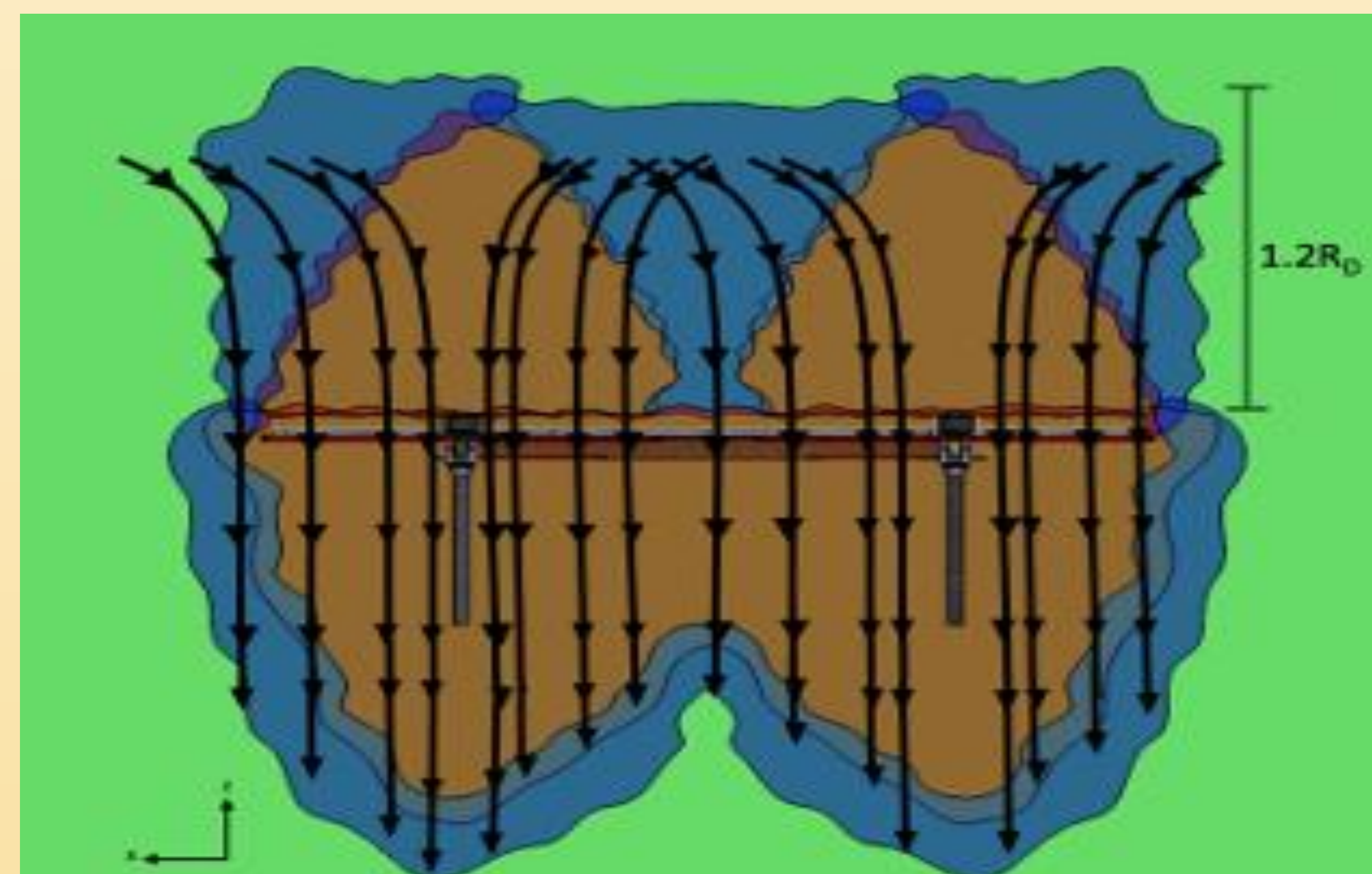


Figure 3: Rotor Wash Computational Analysis

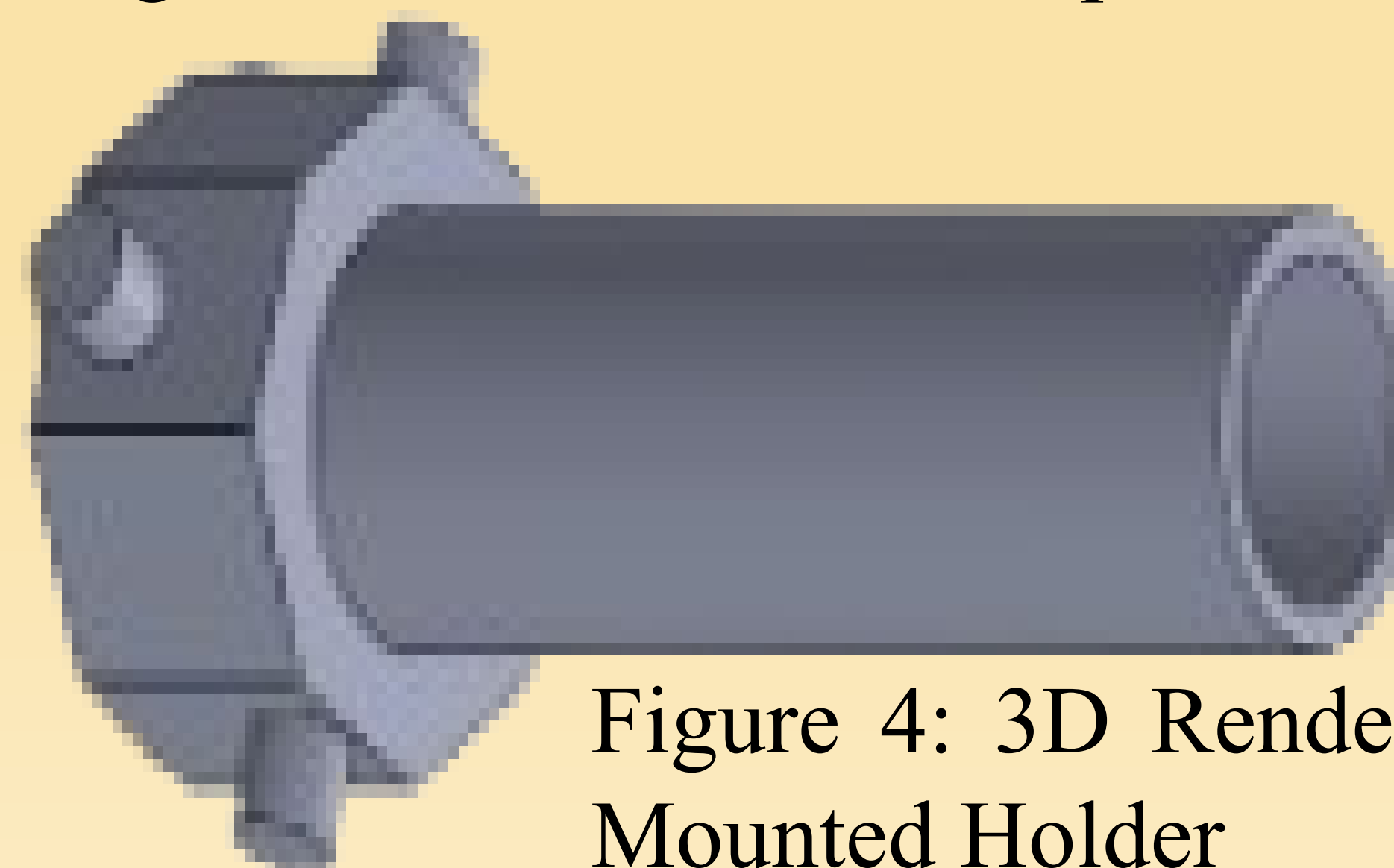


Figure 4: 3D Render of Pin Mounted Holder

### Results

- 3D Printed cylinder with octagonal base that allows it to pin it to the drone.
- Avoids rotor wash and pin system allows fast attach/detach.
- 3D printed tolerances are extremely strict causing modeling and printing differences

### Next Steps and Difficulties

- 1st Prototype was fully designed and printed with minor post-print alterations.
- Issues During the Project:
- Inexperience with 3D printing in general led to odd textures and improper fittings for some parts.
- Future Goals of the Project:
- Iterative modifications to improve the design of the anemometer holder
  - Write data from the anemometer to the SD Card via Raspberry Pi
  - Construct housing for Raspberry Pi
  - Fully waterproof the structure for outside measurements.

### Contact Information

Dr. Laxague of Ocean Engineering:  
Nathan.Laxague@unh.edu

### References

Trevor C. Wilson. 2022. Wind Speed Statistics from a Small UAS and Its Sensitivity to Sensor Location