



# UAV DASL Antenna

Team D1:  
Kalli Albright  
Kaitlyn Barr  
Dustin Branges  
Daniel Johnson

October 3, 2017



# OVERVIEW

- Project Description
- Background/Benchmarking
- Customer Requirements
- Engineering Requirements
- Designs Considered
- Schedule
- Budget

# PROJECT DESCRIPTION

- Dr. Shafer - Dynamic and Active Systems Lab (DASL)
- National Science Foundation (NSF)
- Unmanned Aerial Vehicle (UAV) to track wildlife
- Using VHF telemetry tag tracking
- Need to gimbal antenna for better data





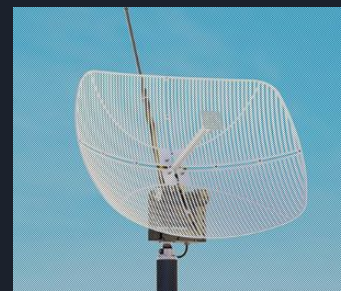
# BACKGROUND

- Modular octagon housing
- Communication to a Raspberry Pi
- Gimbal antenna to the bottom



# BENCHMARKING

- MOOG Antenna Pointing Mechanisms
  - 2 degrees of freedom
  - Made for spacecraft
- Octopus Portable Tracking Antenna
  - Made for tracking UAV from ground
  - Integrated pointing algorithm
- Marcus UAV Retractable Gimbal
  - Retractable camera
  - 180 degree tilt

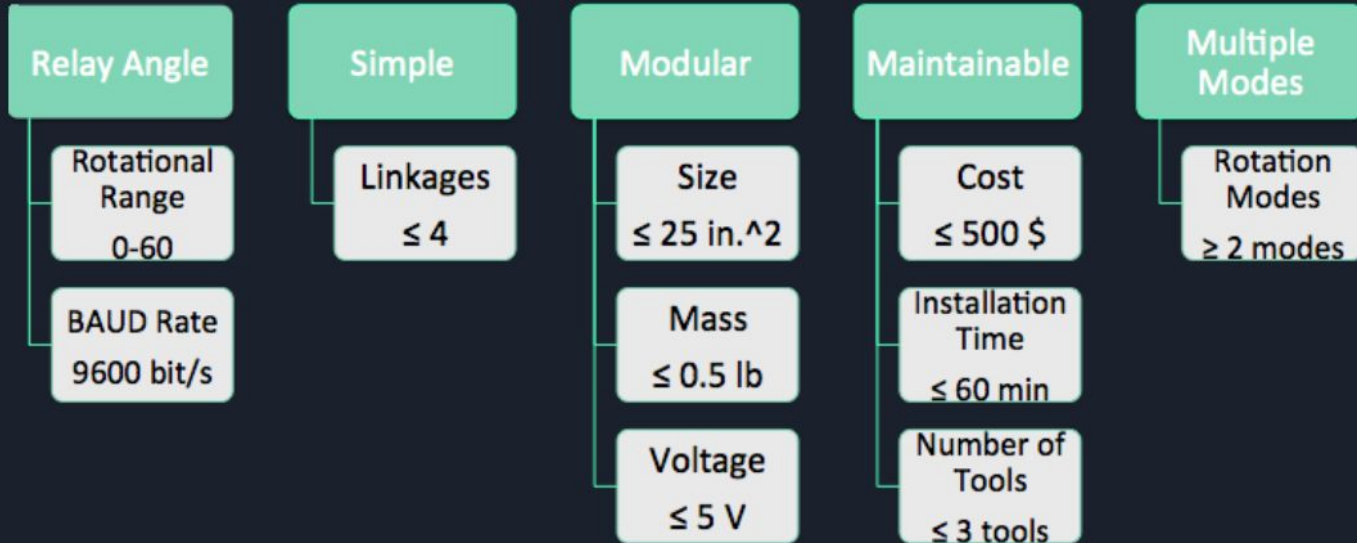




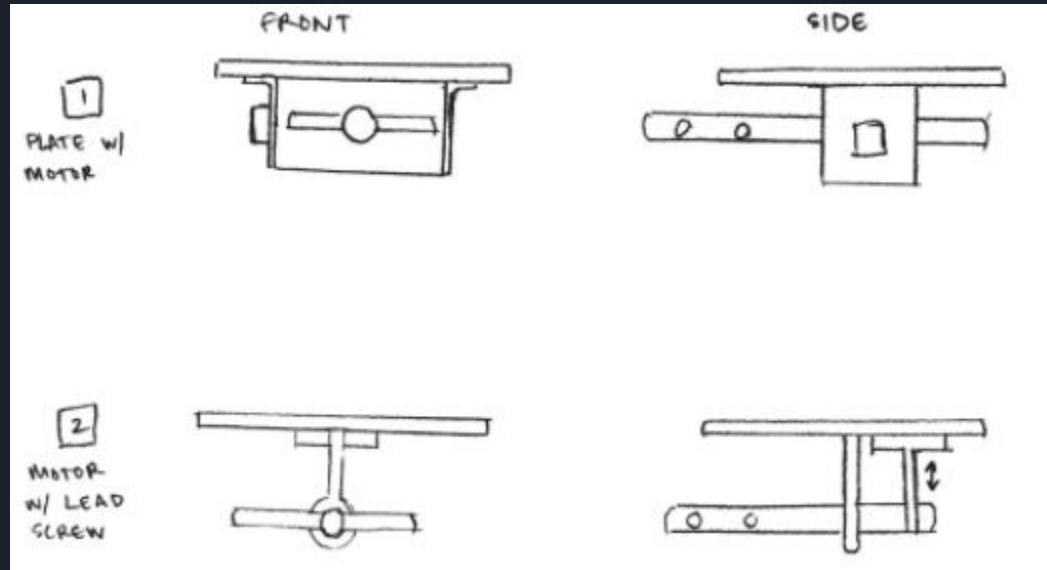
# CUSTOMER REQUIREMENTS

- Relay Angle to Customer (5)
- Simple (4)
- Maintainable (4)
- Modular (3)
- Multiple Modes of Movement (2)

# ENGINEERING REQUIREMENTS

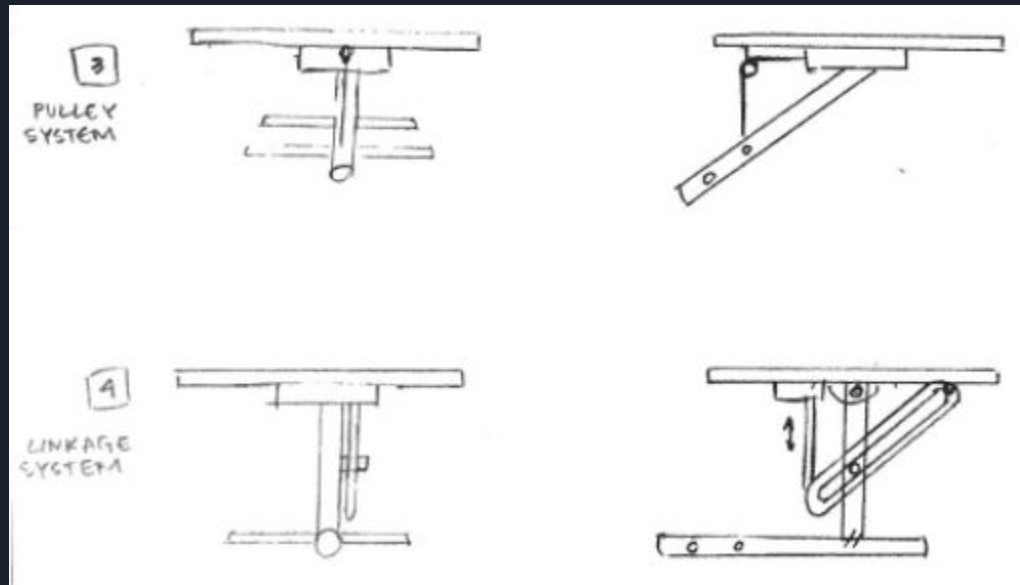


# DESIGNS CONSIDERED 1-2

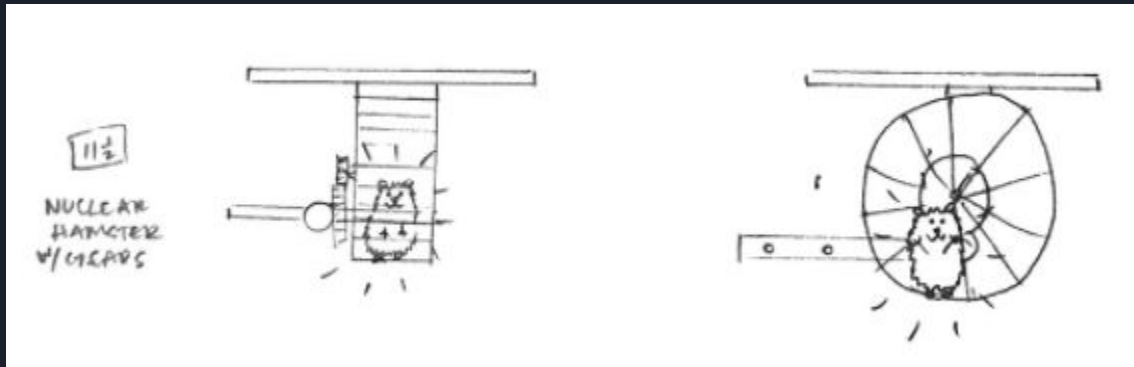




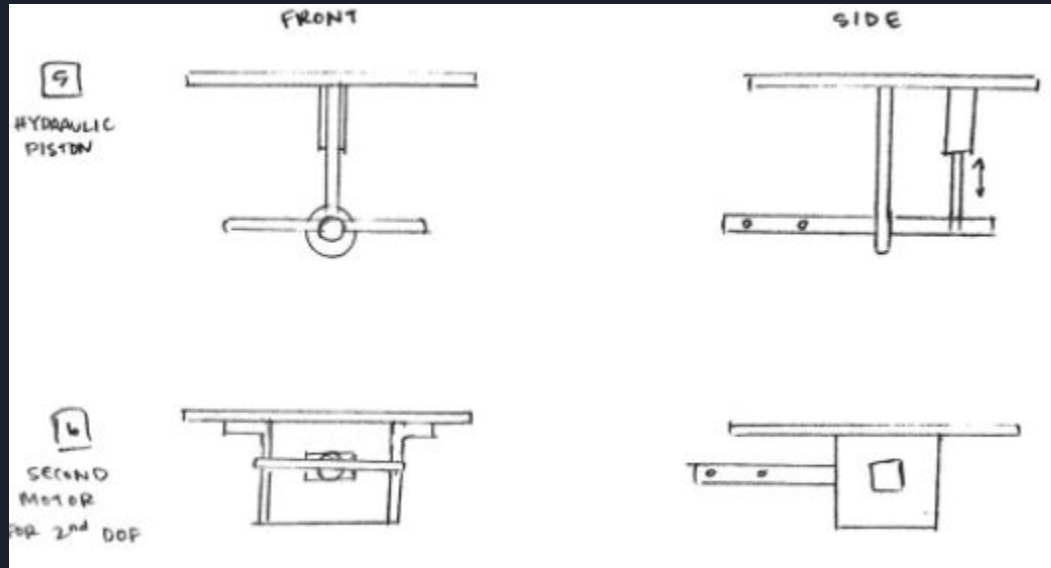
# DESIGNS CONSIDERED 3-4



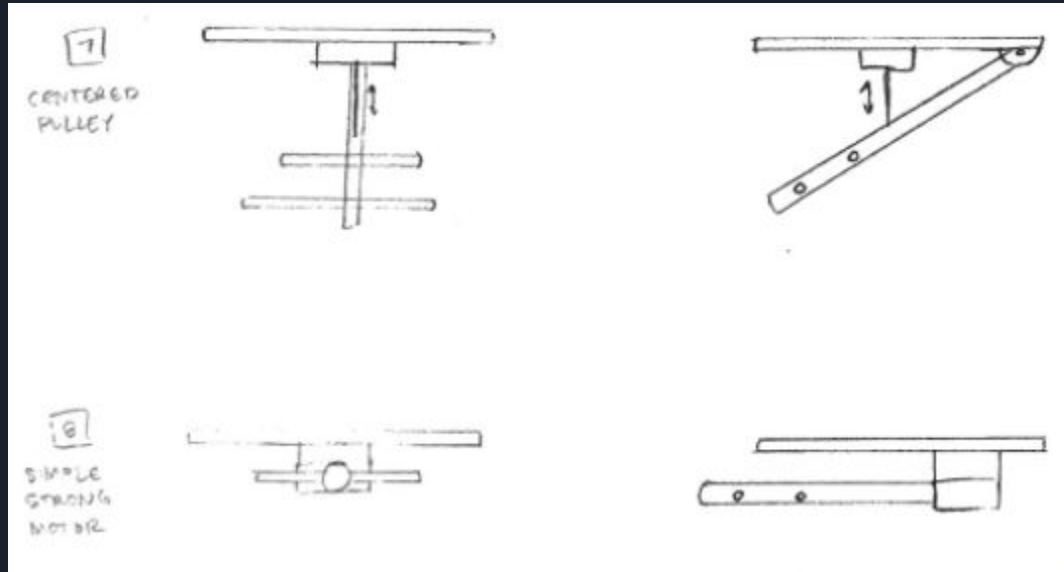
# OTHER DESIGNS



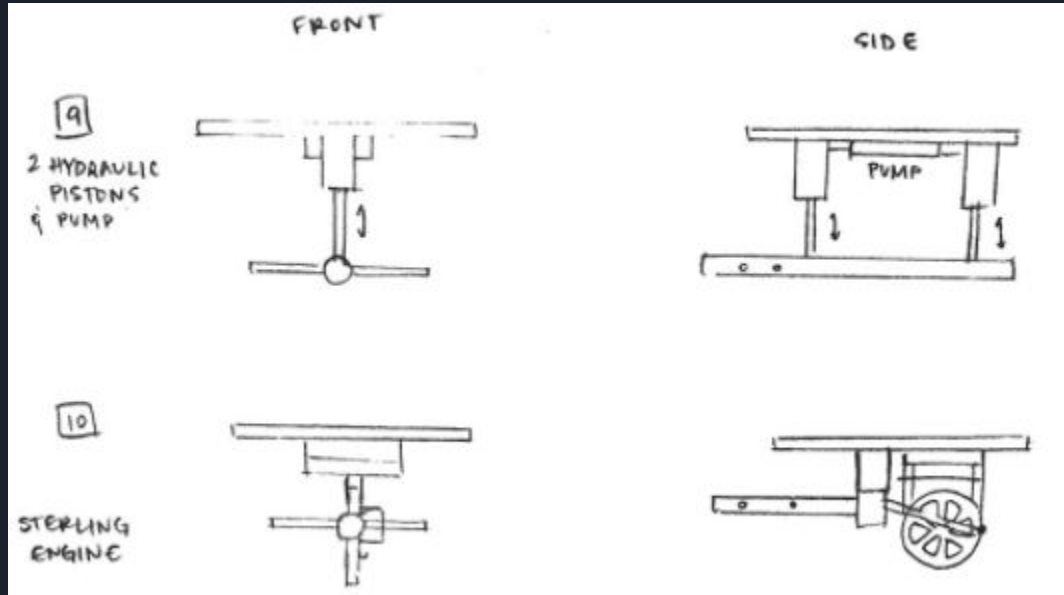
# DESIGNS CONSIDERED 5-6



# DESIGNS CONSIDERED 7-8



# DESIGNS CONSIDERED 9-10



# SCHEDULE TO DATE

| Activities                      | Responsible Party | Week 1 |        |        | Week 2 |        |        | Week 3 |        |        | Week 4 |        |        |
|---------------------------------|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                                 |                   | 9 / 11 | 9 / 13 | 9 / 15 | 9 / 18 | 9 / 20 | 9 / 22 | 9 / 25 | 9 / 27 | 9 / 29 | 10 / 2 | 10 / 4 | 10 / 6 |
| 1.) Project Research            | All               | Grey   |        |        |        |        |        |        |        |        |        |        |        |
| 2.) Contact Customer            | Kaitlyn Barr      |        | Green  |        |        |        |        |        |        |        |        |        |        |
| 3.) Meet with Customer          | All               |        |        | Grey   |        |        |        |        |        |        |        |        |        |
| 4.) Write Background            | Kalli Albright    |        |        |        | Yellow |        |        |        |        |        |        |        |        |
| 5.) Customer Requirements       | Daniel Johnson    |        |        |        | Blue   |        |        |        |        |        |        |        |        |
| 6.) Engineering Requirements    | Dustin Branges    |        |        |        | Pink   |        |        |        |        |        |        |        |        |
| 7.) House of Quality            | Kaitlyn Barr      |        |        |        | Green  | Green  |        |        |        |        |        |        |        |
| 8.) Existing Designs            | All               |        |        |        |        | Grey   |        |        |        |        |        |        |        |
| 9.) Black Box Model             | Dustin Branges    |        |        |        |        |        | Pink   |        |        |        |        |        |        |
| 10.) Functional Model           | Kalli Albright    |        |        |        |        |        | Yellow | Yellow |        |        |        |        |        |
| 11.) Subsystems                 | Daniel Johnson    |        |        |        |        |        | Blue   | Blue   |        |        |        |        |        |
| 12.) Designs Considered         | All               |        |        |        |        |        |        | Grey   | Grey   |        |        |        |        |
| 13.) Design Selected            | All               |        |        |        |        |        |        |        | Grey   | Grey   |        |        |        |
| 14.) Presentation               | Kaitlyn Barr      |        |        |        |        |        |        |        |        | Green  | Green  |        |        |
| 14.) Preliminary Report Editing | All               |        |        |        |        |        |        |        |        |        | Grey   | Grey   | Grey   |

# SCHEDULE 10/9 - 11/3

| Activities                           | Responsible Party | Week 5 |         |         | Week 6  |         |         | Week 7  |         |         | Week 8  |        |        |
|--------------------------------------|-------------------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|--------|
|                                      |                   | 10 / 9 | 10 / 11 | 10 / 13 | 10 / 16 | 10 / 18 | 10 / 20 | 10 / 23 | 10 / 25 | 10 / 27 | 10 / 30 | 11 / 1 | 11 / 3 |
| Peer Evaluations                     | All               | █      |         |         |         |         |         |         |         |         |         |        |        |
| Analytical Analyses Team Memo        | All               | █      |         |         |         |         |         |         |         |         |         |        |        |
| Individual Analyses                  | All               |        |         |         | █       |         |         |         |         |         |         |        |        |
| Design Description                   | Kaitlyn Barr      |        |         |         |         |         | █       | █       |         |         |         |        |        |
| Description of Prototype Fabrication | Daniel Johnson    |        |         |         |         |         |         | █       |         |         |         |        |        |
| Proof of Concept                     | Kalli Albright    |        |         |         |         |         |         |         | █       |         |         |        |        |
| Testing Procedures                   | Dustin Branges    |        |         |         |         |         |         |         |         | █       | █       |        |        |
| Programming Simulation               | Dustin Branges    |        |         |         |         |         |         |         |         |         | █       | █      |        |
| Operator Procedures                  | Kalli Albright    |        |         |         |         |         |         |         |         |         | █       |        |        |
| Bill of Materials                    | Daniel Johnson    |        |         |         |         |         |         |         |         |         | █       |        |        |
| Gantt Chart for Next Semester        | Kaitlyn Barr      |        |         |         |         |         |         |         |         |         |         | █      |        |
| Final Report Editing                 | All               |        |         |         |         |         |         |         |         |         |         |        |        |

# SCHEDULE 11/3 - 12/15

| Activities                      | Responsible Party | Week 10 |         |         | Week 11 |         |         | Week 12 |         |        | Week 13 |        |        | Week 14 |         |         |
|---------------------------------|-------------------|---------|---------|---------|---------|---------|---------|---------|---------|--------|---------|--------|--------|---------|---------|---------|
|                                 |                   | 11 / 13 | 11 / 15 | 11 / 17 | 11 / 20 | 11 / 22 | 11 / 24 | 11 / 27 | 11 / 29 | 12 / 1 | 12 / 4  | 12 / 6 | 12 / 8 | 12 / 11 | 12 / 13 | 12 / 15 |
| Peer Evaluations 2              | All               | █       |         |         |         |         |         |         |         |        |         |        |        |         |         |         |
| Analytical Analyses Team Memo 2 | All               | █       |         |         |         |         |         |         |         |        |         |        |        |         |         |         |
| Individual Analyses 2           | All               |         |         |         | █       |         |         |         |         |        |         |        |        |         |         |         |
| Final CAD Package and BOM       | All               |         |         |         |         |         |         | █       |         |        | █       |        |        |         |         |         |
| Final Prototypes Summary        | Kaitlyn Barr      |         |         |         |         |         |         |         |         |        | █       |        |        |         |         |         |
| Final Proposal Revision         | All               |         |         |         |         |         |         |         |         |        | █       |        |        | █       |         |         |
| Peer Evaluations 3              | All               |         |         |         |         |         |         |         |         |        |         |        |        | █       |         |         |





# BUDGET

- Allowed \$1,000
- Target < \$500

## Anticipated Costs

| ITEM              | QUANTITY    | UNIT COST       |
|-------------------|-------------|-----------------|
| Arduino Parts     | N/A         | \$130.00        |
| Motor             | 1           | \$100.00        |
| FTDI Cable        | 1           | \$20.00         |
| 3D Printing Costs | \$0.10/gram | \$100.00        |
| Fasteners         | N/A         | \$50.00         |
| <b>Total</b>      |             | <b>\$400.00</b> |



# QUESTIONS

- Any requirements you would add?
- Are there any designs you prefer?
- Any changes you would make to designs considered?