**I. INTRODUCTION**
- Challenges with remote missions in Alaska
  - Long distances
  - Weather: extreme and variable
  - Drone flight time ~ 20 min

**II. OBJECTIVES**
- Design and construct and “Onion Box” with the following major capabilities:
  - Drone recharging
  - Lid opening and closing mechanism
  - Drone-shelter-operator communication

**III A. “ONION BOX” – STRUCTURAL SYSTEM**
“Onion Box”: L x W x H = 60” x 53” x 42”
- L x W = 60” x 53”
  - Plywood thickness: 1/4 in
  - Insulation: XPS 4” for R = 20 (R = 5/in)
- Lid = 60” x 53”
- Height = 42”
  - Landing gear + arm width = 6.7”
  - Platform Legs: 5” X 5” X 10”

**III A. ELECTRICAL SYSTEM**
The left shows the power and communication flow diagram for the “Onion Box.” The right shows the 12 V, 9 V, and 5 V electrical systems serving different loads.

**IV. PROGRESS AND REMAINING WORK**
The body and insulation is almost complete and the fan runs on the battery.
- The inverter shows the input DC voltage and output AC voltage as well as the consumed power by the fan.
- The sensor module was tested and confirmed to turn a mini fan on at a specified temperature.

**Remaining work:**
- Complete wiring the 12 V system
- Code Arduino for servo opening/closing mechanism
- Code and test for radio communication system

**V. FUTURE WORK/IMPROVEMENT**
Consider installing the following:
- Energy management system (EMS) for energy allocation
- Heating system
- Debris/snow/ice removal system
- Battery replacement/recharging system for smaller batteries

**Improvements:**
- Overall box design (e.g., insulation type/implementation)
- Electrical system efficiency

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