

## ENGR 4580 Midterm Report Checklist

The interim report should describe and justify your current design with concise explanations, clear and labeled images, detailed analysis, and early prototyping. It should outline your testing plans and anticipated design updates for the rest of the semester. This is a working document for your specific project and may include other applicable information not listed in the outline.

**GOOD**

**NEEDS IMPROVEMENT**

**MISSING**

**Title page** with abstract, team name, member names, logo

**Table of Contents** with page numbers

### Intro (10)

- Background
  - Problem to be addressed
  - Project goals
  - Impact of your engineering solution on society
- Design criteria
  - All design constraints and specifications
  - Include any national or international standards to be met if applicable
- Prior work research\*
  - Sources of inspiration, AI design suggestions, and competitor analysis\*
  - How is your project novel or improve upon existing technology?\*
- System flow diagram\*

### Design (detailed explanation) (45)

- Design (20)
  - Initial brainstorming and design decision matrix\*
  - Description and diagram of overall system
  - Description and justifications for all subsystems
  - Any notable differences in current versus earlier designs
  - CAD and photos with labels that show key features
  - Pseudocode
  - Wiring diagrams with pinouts tables
- Simulations/calculations: detailed analysis for key components (20)
  - Dynamics or fluids: actuator, propulsion, or drag calculations with free body diagrams, formulas, and explanations
  - Statics or mechanics of materials: structural calculations such as center of gravity, stress, strain, load/shear and bending moment diagrams; include formulas, and explanations
  - Kinematics (if applicable): vector loop diagram, equations, and Matlab simulation
  - Electrical: total current, total power, battery calculations if applicable
- Lessons learned: what did you learn throughout the design process and iterations of different ideas? (5)

### Prototyping (brief summary of whatever subsystems you have built so far) (10)

- Construction: explain techniques and show photos
- Testing & analysis: objectives, procedures, results, interpretations
- Lessons learned: how did these guide your design?

### Future Vision (15)

- Testing agenda
  - Table/list of objectives/design requirements and test for each
  - Procedures and safety precautions to follow
- Anticipated design and prototyping updates
- Timeline for remainder of semester

\* From in-class assignments already done, can copy/paste and revise as suggested

**Appendices (20)**

- Dimensioned drawings for any custom parts, with units specified
- Detailed budget: cumulative for semester with part, qty, price, totals
- Bill of materials: part name, part # from vendor, qty, and supplier/vendor
- References
- Anything else applicable

**Examples on Next Page**

## Budget

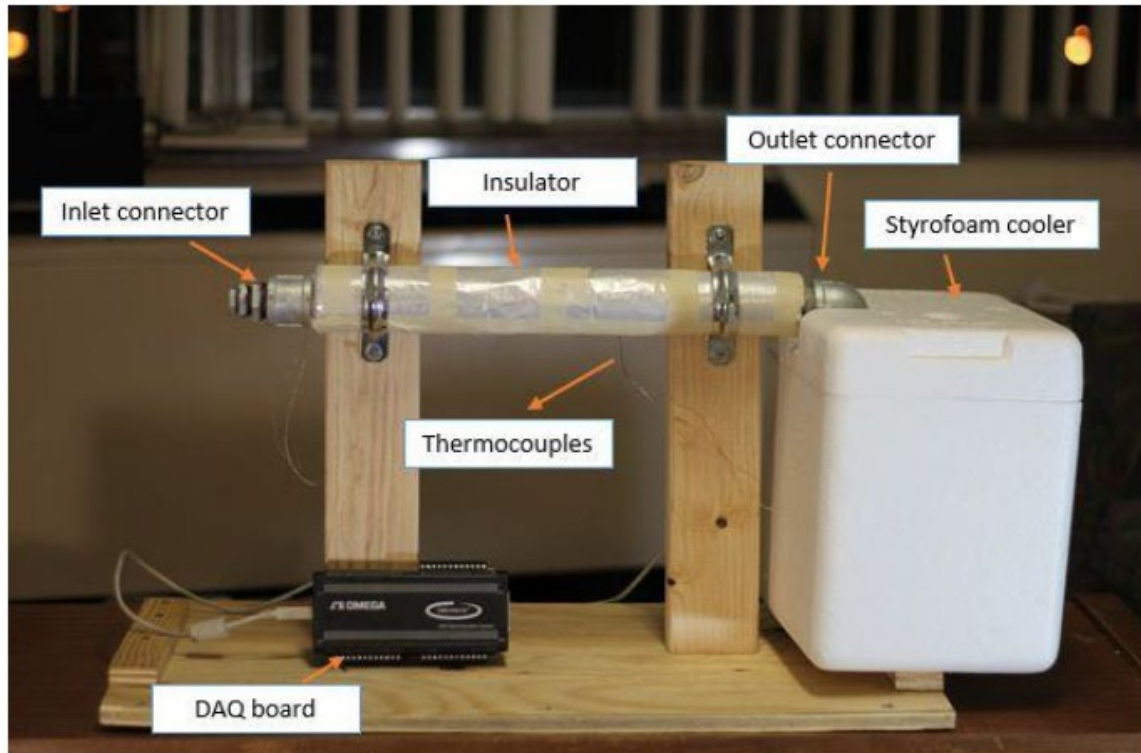
| Item                       | Qty.   | Cost         | Supplier           | Part No.    | Who Paid | Prototype  |
|----------------------------|--------|--------------|--------------------|-------------|----------|------------|
| Guitar                     | 1      | \$24         | Star               | MG50-BL     | Revanth  | 1, 2, 3, 4 |
| Alligator Clamps           | 2      | \$2          | Radio Shack        | 270-346     | Revanth  | 1, 2, 3    |
| Pulley                     | 1      | \$2.02       | McMaster           | 3434T37     | Matt     | 3, 4       |
| Nylon Stud                 | 10     | \$2.84       | McMaster           | 93665A434   | Matt     | 3, 4       |
| LDPE                       | 4 ft   | \$5.04       | McMaster           | 8588K151    | Matt     | 3          |
| HDPE                       | 4ft    | \$4.56       | McMaster           | 8671K56     | Matt     | 3          |
| Polyurethane 90            | .5 ft  | \$7.01       | McMaster           | 2178T25     | Matt     | 3          |
| ¼" Ball Bearing            | 1      | \$2.00       | Fastenal           | R4-2RS      | Matt     | 4          |
| ¼" Threaded rod            | 3 ft   | \$2.50       | Fastenal           | T Rod Z     | Matt     | 4          |
| Aluminum Square Tube 1.5"  | 14"    | \$9.50       | Metal Supermarkets |             | Dan      | 5, 6       |
| 3D Printed Overlay         | 2      | \$60         | C Ideas            | Polyjet 40A | Dan      | 5, 6       |
| M3x5 bolts                 | 4      | \$3          | Fastener South     |             | Alex     | 6          |
| Steel Square Tube 1"x1/16" | 36"    | \$10.82      | Home Depot         |             | Alex     | 6          |
| M3x16mm screws (set of 2)  | 3 bags | \$4.18       | Home Depot         |             | Alex     | 6          |
| M3x20 screws (set of 2)    | 3 bags | \$4.18       | Home Depot         |             | Alex     | 6          |
| <b>Total</b>               |        | <b>\$144</b> |                    |             |          |            |

## Bill of Materials

| Part  | Manufacturer      | Part #    | Qty | Unit Cost    | Total Cost        | Supplier   |
|---|-------------------|-----------|-----|--------------|-------------------|------------|
| Arduino Mega 2560   | Arduino           | MEGA 2560 | 1   | \$38.21      | \$38.21           | Amazon     |
| Curtis Model 1228 Motor Controller  | Curtis            | 1228      | 1   | \$430.00     | \$430.00          | Nissan     |
| 5A, 30V DC Relay  | DY                | JZC-11F   | 5   | \$1.95       | \$9.75            | SparkFun   |
| 5V Voltage Regulator  | Texas Instruments | LM7812C   | 4   | \$0.70       | \$2.80            | DigiKey    |
| Tape Reader   | Roboteq           | MGS 1600  | 1   | \$445.00     | \$445.00          | Nissan     |
| RF Transceiver  | Nordic            | NRF24L01+ | 2   | \$2.99       | \$5.98            | eBay       |
| Custom Fabrication (Chassis, Button Panel, Covers: \$200 materials + \$400 labor) | custom            | N/A       | 1   | \$600.00     | \$600.00          | Nissan     |
| 1/4" MDF Electronics Mounting Board   | custom            | N/A       | 1   | \$2.00       | \$2.00            | Vanderbilt |
|   |                   |           |     | <b>Total</b> | <b>\$1,533.74</b> |            |

\* From in-class assignments already done, can copy/paste and revise as suggested

Figure with Callouts



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