

## ENGR 4580 Final Report Checklist

The final report should describe and justify your current design with concise explanations, clear and labeled images, detailed analysis, and early prototyping. It should explain your preliminary testing and results, and outline your design improvement and testing plans for the next semester. This is a working document for your specific project and may include other applicable information.

**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 in global, economic, environmental, and societal contexts\*
  - Market sizing and analysis\*
- Design criteria
  - All design constraints and specifications
  - Include any national or international standards to be met\*
- Prior work research\*
  - Sources of inspiration\*
  - Competitor analysis\*
  - How is your project novel or improve upon existing technology?\*
- System flow diagram\*

### Early Prototypes (brief summary) (10)

- Design: brainstorming\*, decision matrices\*, description, justifications, images that show key features
- Testing and Analysis: objectives, procedures, photos, results, interpretations
- Lessons learned: how did these guide your design?

### Current Prototype (brief summary) (20)

- Design and Construction (5)
  - Photo of currently built prototype with subsystems and major components labeled
  - Description and justifications of layout and component/material choices
  - Differences from previous prototypes
  - CAD and photos of subsystems or major components to show key features
- Testing and Analysis (10)
  - Objectives/tests performed
  - Procedures and safety precautions
  - Qualitative results: photos/videos, observations
  - Quantitative results: tables, graphs, statistics
  - Analysis: calculations, comparison to theoretical predictions
- Lessons learned (5)

### Final Design for Next Semester (detailed explanation) (30)

- Final Design (15)
  - Complete CAD of final system with subsystems and major components labeled
  - Description and justifications of layout and component/material choices
  - Differences from previous and current prototypes
  - CAD and photos of subsystems or major components to show key features
  - Considerations for public health, safety, and welfare\*
  - Considerations for global, cultural, social, environmental, and economic factors\*
  - Applicable national or international standards and how they are met\*
  - Pseudocode or logic diagram

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

- Wiring diagram with pinouts table
- Simulations/calculations: detailed analysis for key components of final design (15)
  - 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: vector loop diagram, equations, and Matlab simulation if applicable
  - Electrical: total current, total power, battery calculations if applicable

#### **Future Vision (10)**

- Performance overview: successes, failures, major learning points
- Testing agenda: table of what and how you will test next semester to show that your project meets each design requirement
- Next semester timeline: tasks and implementation (tentative build, test, refinement goal dates, etc.)

#### **Appendices (20)**

- Dimensioned drawings with units
- Detailed budget: cumulative for this semester with part, qty, price, totals
- Bill of materials for current prototype #: part name, part # from vendor, qty, and supplier/vendor
- Bill of materials for next semester's product: part name, part # from vendor, qty, and supplier/vendor
- References and datasheet links
- Anything else applicable: extra images, detailed calculations/simulations, testing protocols, etc. whatever didn't fit earlier in the report

## **Examples on Next Page**

## Budget

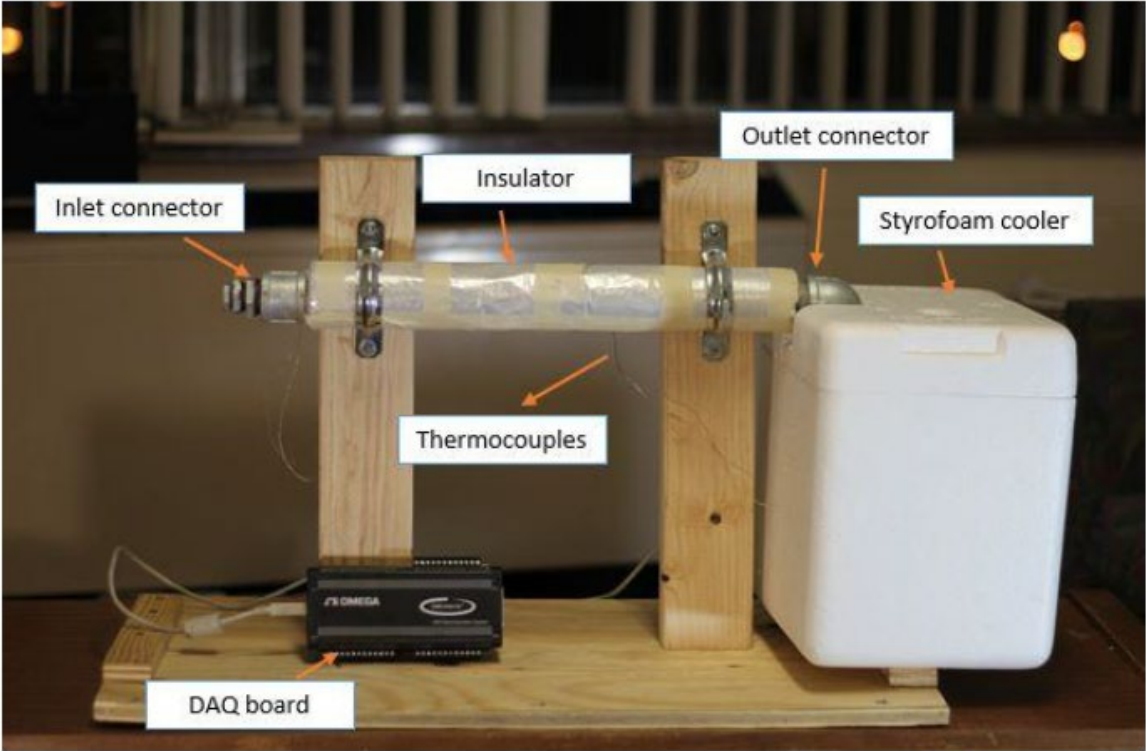
Item	Qty.	Cost	Supplier	Part No.	Who Paid	Prototype
Guitar	1	\$24	Star	MG50-BL	Revanth	1, 2, 3, 4
Alligator Clamps	2	\$2	Radio Shack	270-346	Revanth	1, 2, 3
Pulley	1	\$2.02	McMaster	3434T37	Matt	3, 4
Nylon Stud	10	\$2.84	McMaster	93665A434	Matt	3, 4
LDPE	4 ft	\$5.04	McMaster	8588K151	Matt	3
HDPE	4ft	\$4.56	McMaster	8671K56	Matt	3
Polyurethane 90	.5 ft	\$7.01	McMaster	2178T25	Matt	3
1/4" Ball Bearing	1	\$2.00	Fastenal	R4-2RS	Matt	4
1/4" 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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