To Predict ▶ To Design ▶ To Perform

College of Engineering
Department of Mechanical & Industrial Engineering

ME, ECE, IE Capstone Design Programs

PROJECT ANDROMEDA
ALL SYSTEMS GEAUX

Team 20: Project Andromeda

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BACKGROUND

Long Term Research Goal

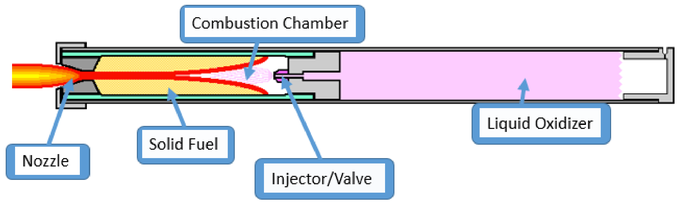
Develop a novel reusable launch vehicle that utilizes an end burning hybrid rocket engine to place payloads in low earth orbit

OBJECTIVE

Engineer a **ground support system** to bring the **capability** to *charge, statically test, and launch* hybrid rocket engines with an emphasis on *safety* and *repeatability*

HYBRID ENGINE

Engine uses solid paraffin wax as fuel and liquid nitrous oxide as oxidizer



SYSTEM ARCHITECTURE

Test System

Static Hot Fire Engine Test

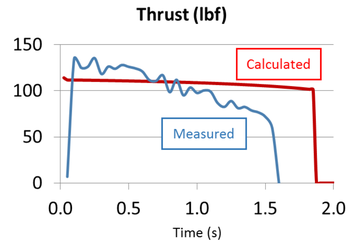
Duration: 1.75 s, Peak Thrust: 135 lb, Impulse: 800 N*s

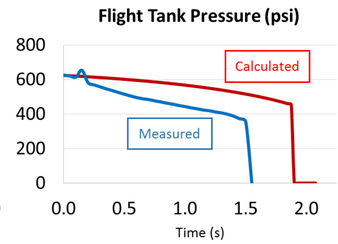
Startup | Ignition | Burn | Shutdown | Post - Shutdown

SAFETY

Hazards	Oxidant	Cryogen	Stored Energy (compressed gas)
Engineering Controls	Energy Isolation		Energy Isolation
			Bottle Stand
			Burst Disk
Procedures	CGA-G 4.1 followed		Pressure Gauge and pressure transducer
			Energy Isolation check
			Plug Removal check
PPE		Leather Gloves	Face Shield and Goggles
		Long pants and shirt	Ear Plugs
Barriers	200 foot Barrier (twice the rated separation distance per NAR/NFPA)		

ENGINE PERFORMANCE





BUDGET

Total Usable Budget: $3850		
Propulsion	$ 979	26 %
Transfer System	$ 1246	32 %
Test Stand	$ 369	10 %
Rocket	$ 269	7 %
Electronics	$ 440	11 %
Total Spent	$ 3303	86 %
Remaining	$ 547	14%

September

- Project definition
- Engineering Specifications

October

- Concept generation & selection
- Critical analysis
- Technical drawings

November

- Safety procedures
- Manufacturing drawings

December

- Address feedback
- Design revisions

January

- Purchasing
- Testing plan

February

- Purchasing
- Transfer system assembly
- Fuel grain casting

March

- Electronics testing and calibration
- Test stand assembly
- Hot fire testing

April

- Hot fire testing
- Post-test data analysis
- Wrap up