



# Active Reflector Surface Shaping

Harris Sponsor:  
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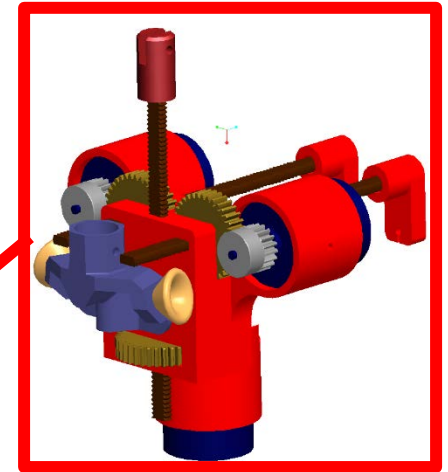
Faculty Advisors:  
Dr. William Oates

Team – 9

Cameron Duncan  
Akeem Jordan  
Raymond Mak

## Background

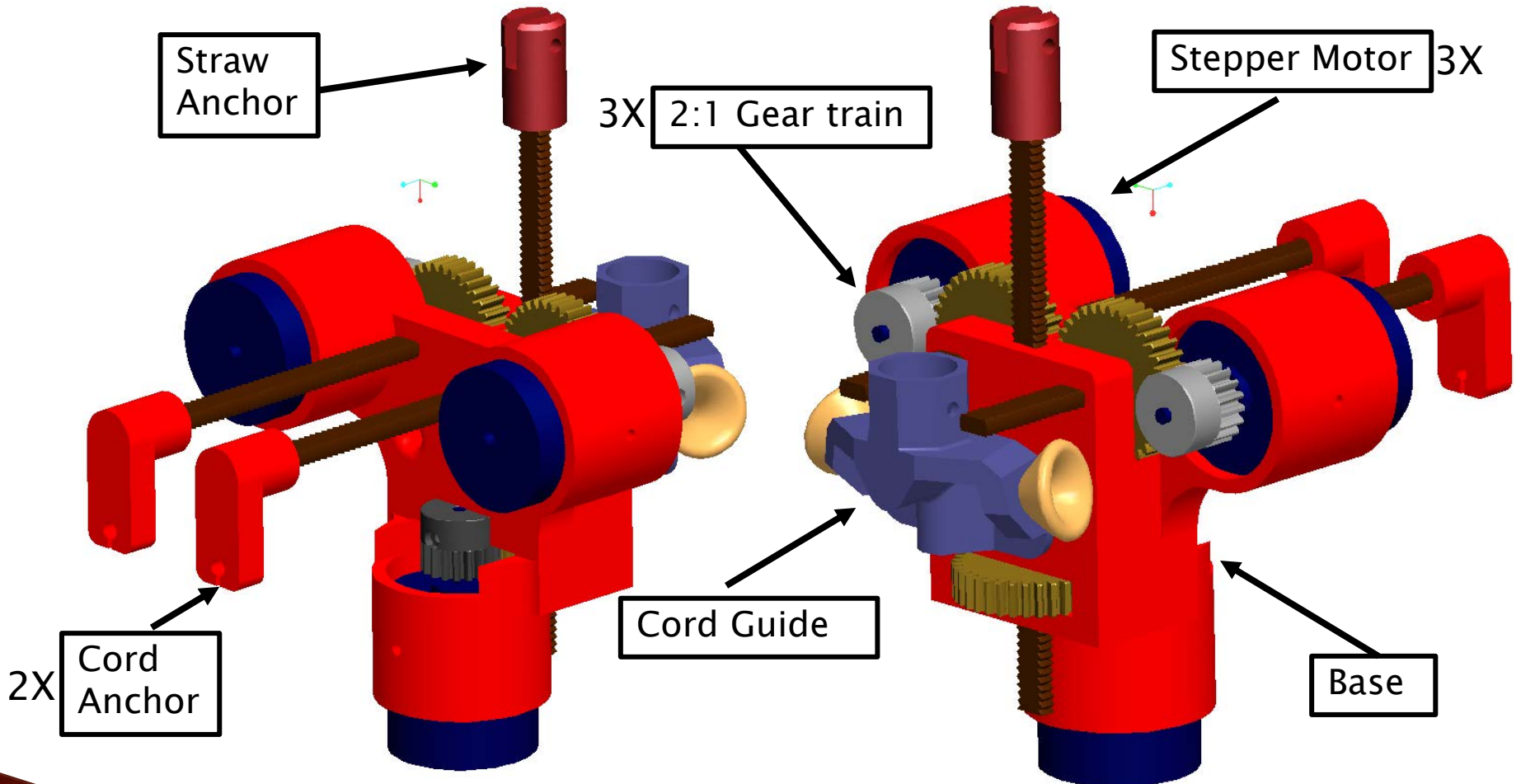
- ▶ Mesh reflectors
  - Pull chords and straws to adjust shape
  - 8 ribs, 17 per each rib, 136 total adjustment points



# Project Scope

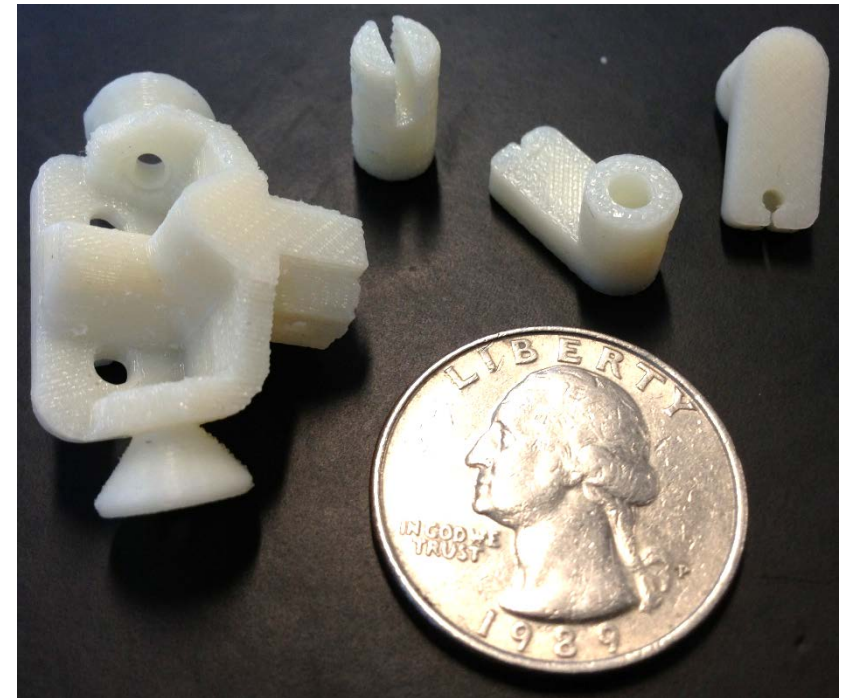
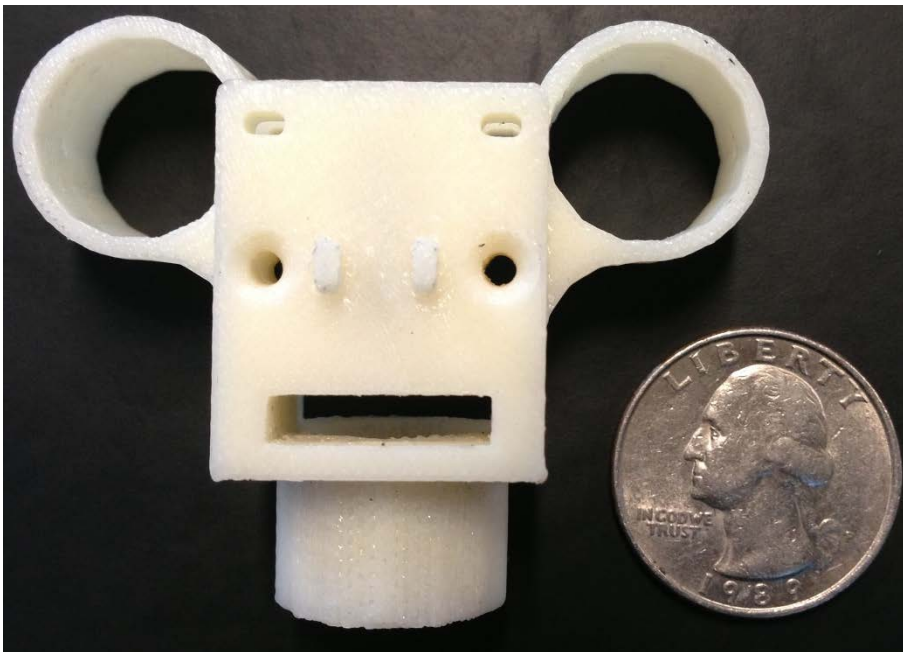
- ▶ Main Goal:
  - Build one automated high precision adjustment mechanism
  - Generate user friendly control logic
  - Tabletop visual demonstration
  - Ability to measure accurate displacement
- ▶ Secondary Goals (if weight allows):
  - Wireless system
  - Integrated power supply

## Final Design



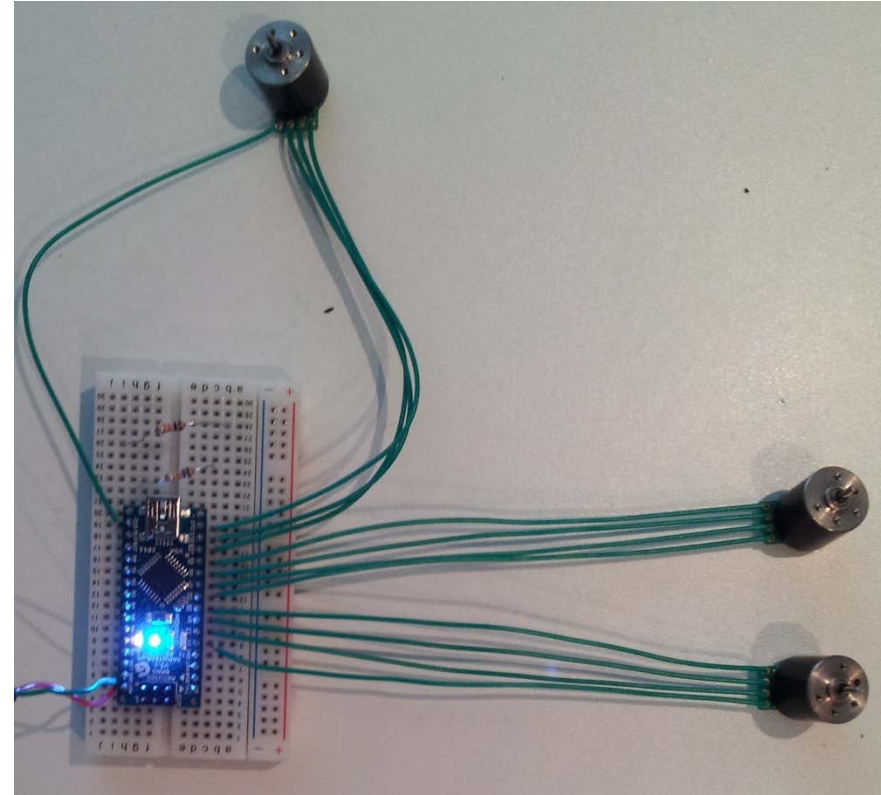
## Prototype

- ▶ Rapid-prototyped base
  - Issues with tolerances
  - Will assemble and make improvements accordingly



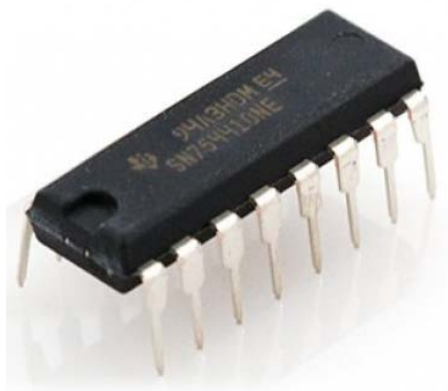
# Programming

- ▶ Serial input
  - Accepts input from keyboard
- ▶ Rotates set amount in certain directions
- ▶ Switch between motors



## Ordering Conflicts

- ▶ Motor driver chip and lithium ion polymer battery mixed up with other teams order
  - Set team back a week
- ▶ Gear order had slow process time, expected by end of next week
  - Delays fitting and necessary modifications of CAD



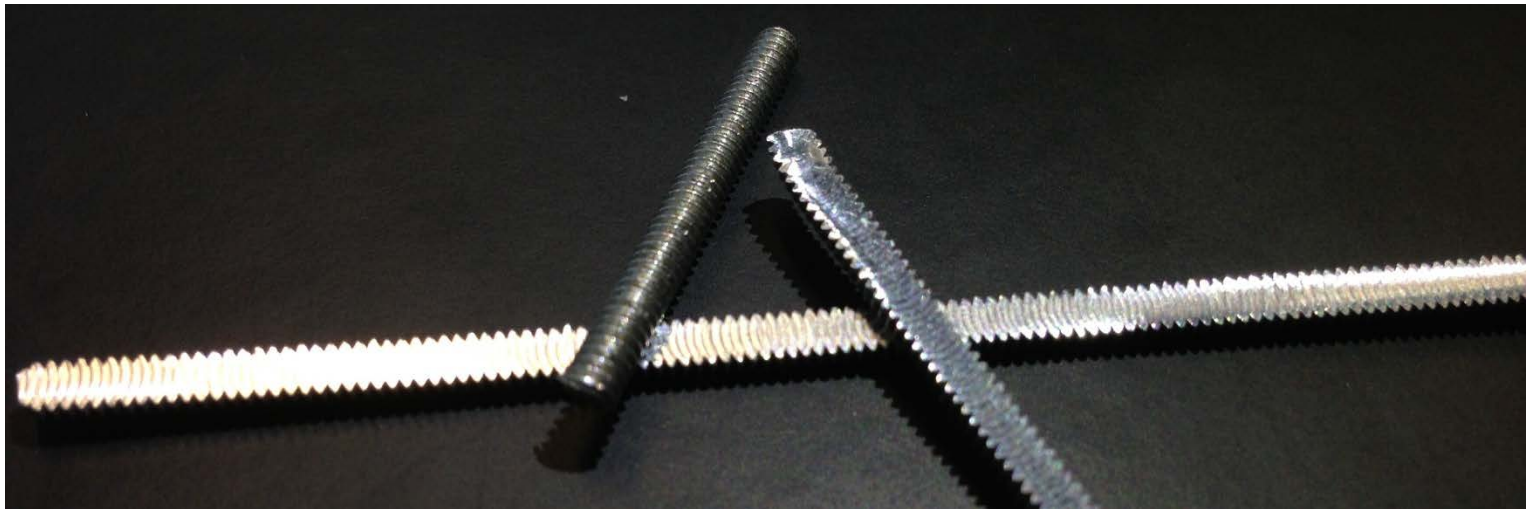
# Budget

Component	Purpose	Cost/Unit	Total Cost	Supplier
Arduino Nano	Microcontroller	\$42.79	\$42.79	Digikey
Faulhaber AM1524	Stepper motor	\$117.6	\$352.80	Micromo
4-40 all thread	Gearing system	\$3.13	\$3.13	McMcaster
850mAh Polymer Lithium Ion Battery	Power source	\$8.95	\$8.95	Sparkfun
TI SN754410	Motor driver	\$2.35	\$4.70	Sparkfun
Gear Stock	Drive		\$74.44	SDP/SI
Rapid Prototype	Base	\$3/cm <sup>3</sup>	<u>\$34.20</u> not included in total	FSU COE
Machine shop labor	Mill threads flat	\$60/hour	<u>\$60.00</u> not included in total	FSU COE
<b>Total</b>			<b>\$487.14</b>	
<b>Budget remaining</b>			<b>\$2012.86</b>	

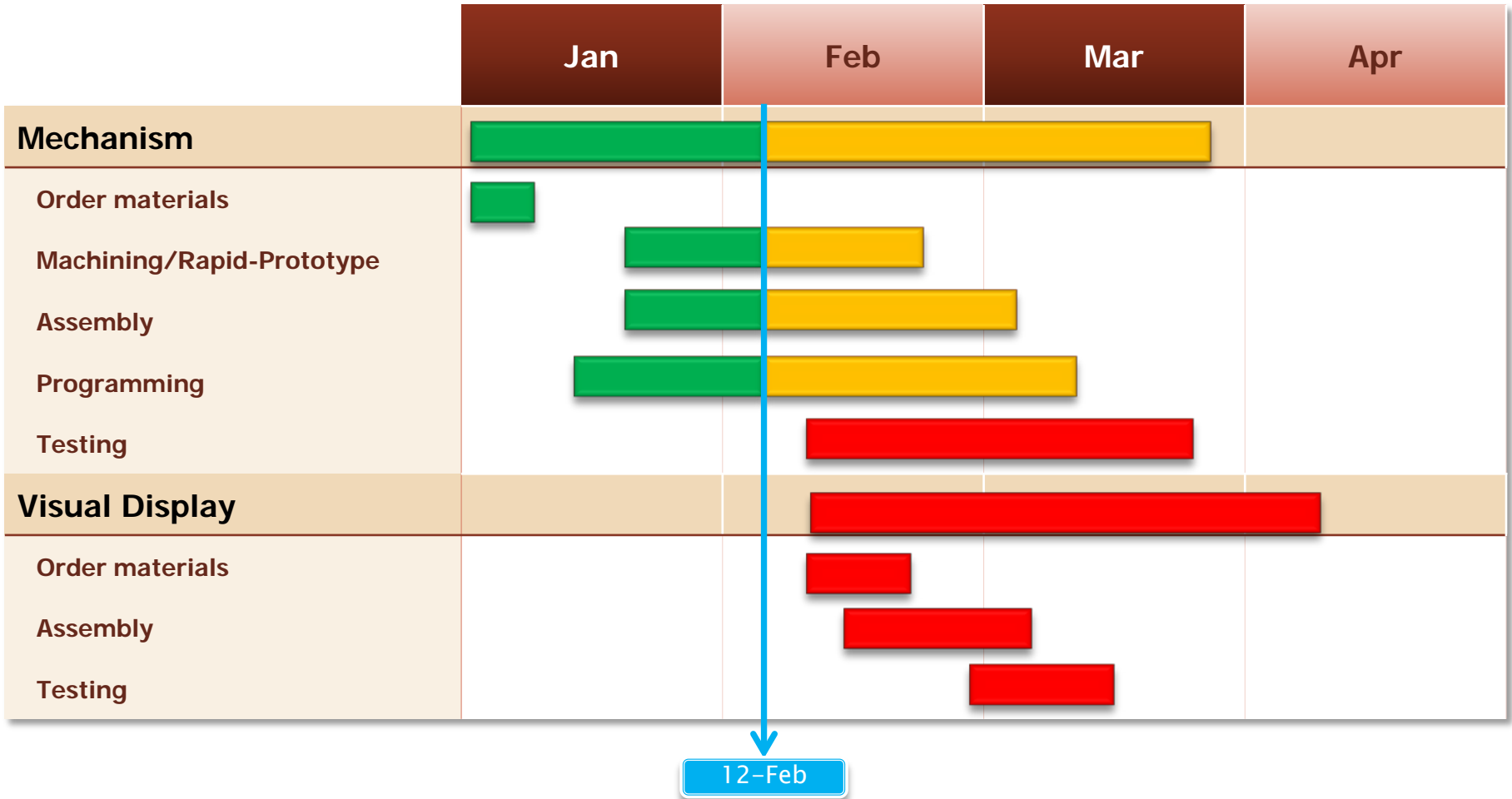


## Challenges

- ▶ 3D printer prototype has inconsistent profile
- ▶ Aluminum 4-40 all thread rods unable to be milled flat from FSU COE machine shop
  - Harris has offered to help us machine
- ▶ Acquiring data acquisition hardware



# Current Status



Completed



To be completed



Not started



# Moving Forward

- ▶ Program Arduino with motor driver chip
  - Get printed circuit board
- ▶ Review CAD model for second prototype
  - Integrate wireless components if weight allows
- ▶ Order materials for visual demonstration
  - Aluminum 80/20 T-slotted frame
  - LVDTs
  - Graphite cord alternative
- ▶ Trip to Harris Corp. facilities in Melbourne, FL

# Questions / Comments



## References

- ▶ [http://eng.fsu.edu/me/senior\\_design/2013/team9/](http://eng.fsu.edu/me/senior_design/2013/team9/)
- ▶ <http://harris.com/>
- ▶ [http://www.faulhaber.com/uploadpk/EN\\_AM1524\\_PCS.pdf](http://www.faulhaber.com/uploadpk/EN_AM1524_PCS.pdf)
- ▶ <http://arduino.cc/en/Main/ArduinoBoardUno>
- ▶ [http://www.macrosensors.com/GHSA\\_GHSAR\\_750.html](http://www.macrosensors.com/GHSA_GHSAR_750.html)
- ▶ <http://www.sdp-si.com/>
- ▶ <http://www.rushgears.com/>