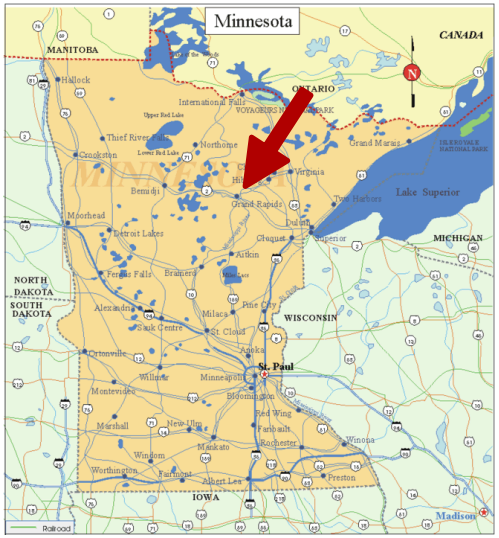
Summer Internship Exit Presentation

ER5: Dynamic Systems Test Branch

June 8 – August 14, 2015

About Me



Hometown: Grand Rapids, MN

MINNESOTA STATE UNIVERSITY MOORHEAD

- BS in Physics, Emphasis in Medical Physics (2014)
- Minor in Astronomy

Areas of Interest for future work/research

- Biomedical
- Robotics
- Propulsion

Personal Interests

- Soccer
- Hunting
- Fishing

Home

NDSU NORTH DAKOTA STATE UNIVERSITY

- Graduate Student, pursuing MS in Electrical Engineering
- Emphasis in Control Systems

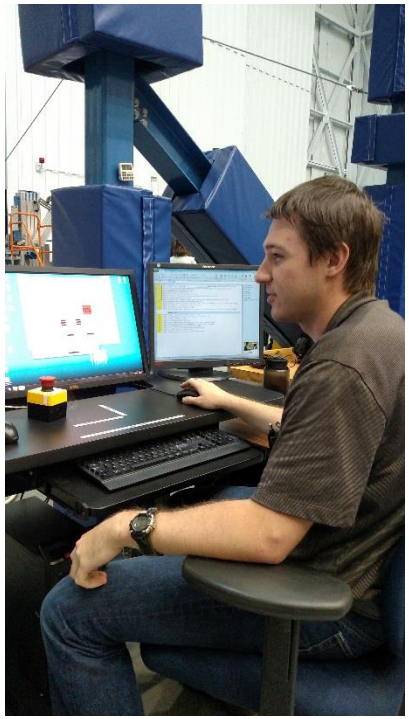
Agenda

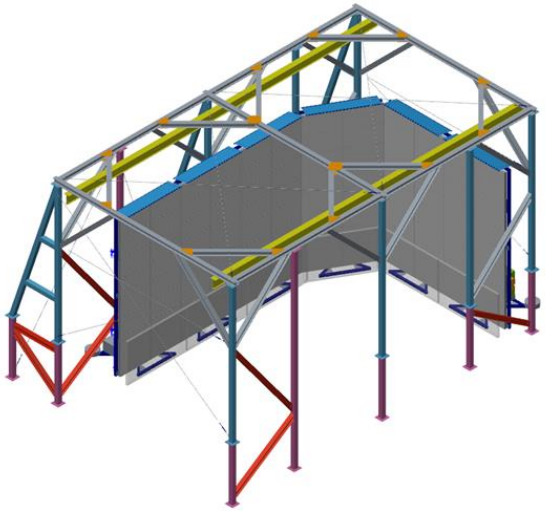
- ER5 Projects
- Takeaways
- Future Plans

ER5 Projects

Projects

- ARGOS Operator Training
- Power Distribution of Future Video Wall for ARGOS
- Service Robot





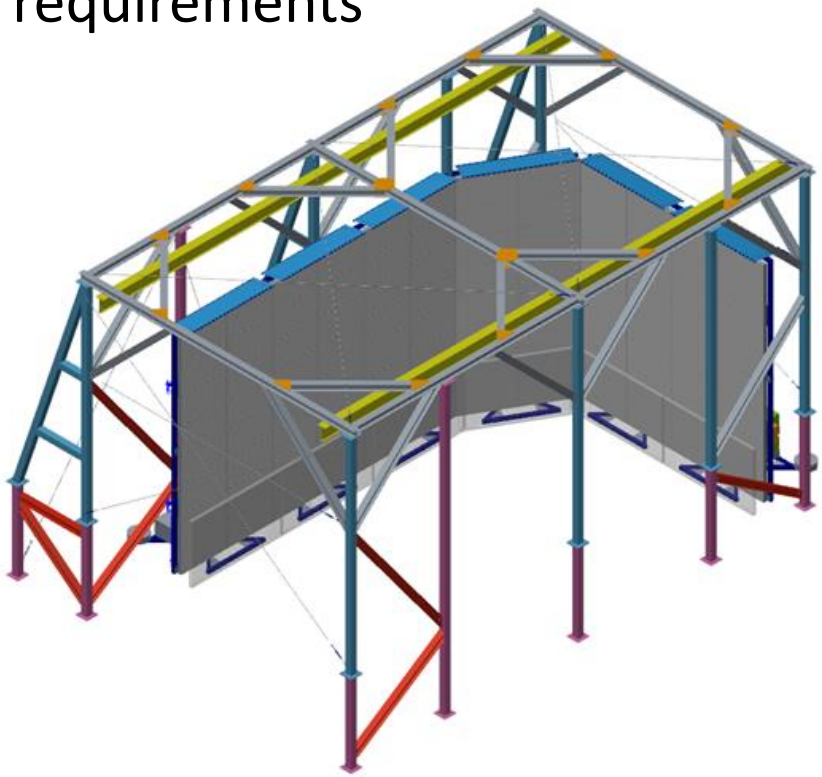
ARGOS Operator Training

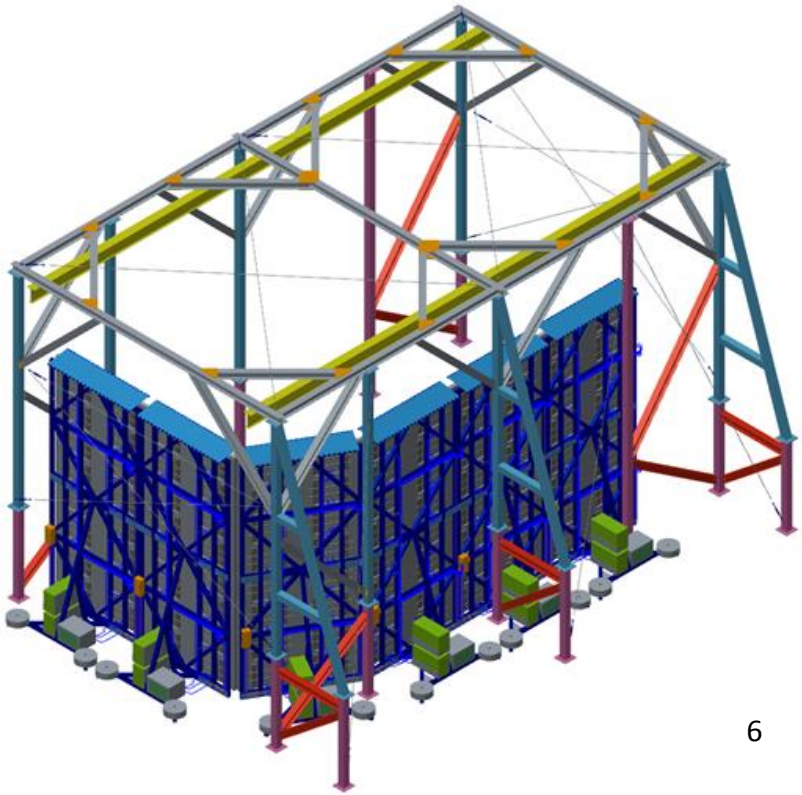
- Trained as an ARGOS operator
  - Supported two days per week
  - Supported for R2 and SAFER testing
- Setup
  - Follow documented procedure for proper startup
  - Different payloads
- Operate
  - Maintain vigilance on the control system and the payload
- Shutdown
  - Follow documented procedure for proper shutdown

Video Wall Project

- Video Wall consists of 6 video towers
- Power distribution design for towers
- Selected parts from given requirements

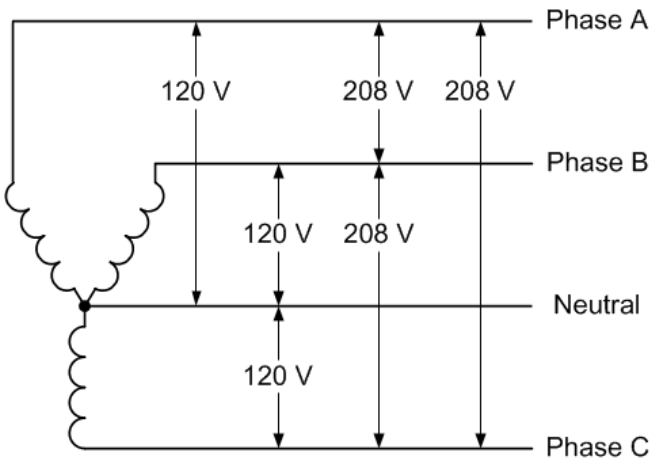
- Collaborated with:
  - Larry Dungan, Electrical Engineer
  - Frank Delgado, Project Manager/Software Designer
  - Bryan Griffith, Mechanical Engineer





Power Distribution

- Only custom electrical design is the power distribution
  - Other connections are computers and monitors
- Utilize 3-phase 208VAC
  - Allows three 120VAC single-phase
- Adequate 208VAC is available in the facility for 2 video walls in support of initial deployment
- Minimizes electrical cables from video wall to facility
- UPSs were used for power conditioning
  - Also provides power backup due to 208VAC power sags in Building 9
- Equal distribution of loads across available power



Power Distribution

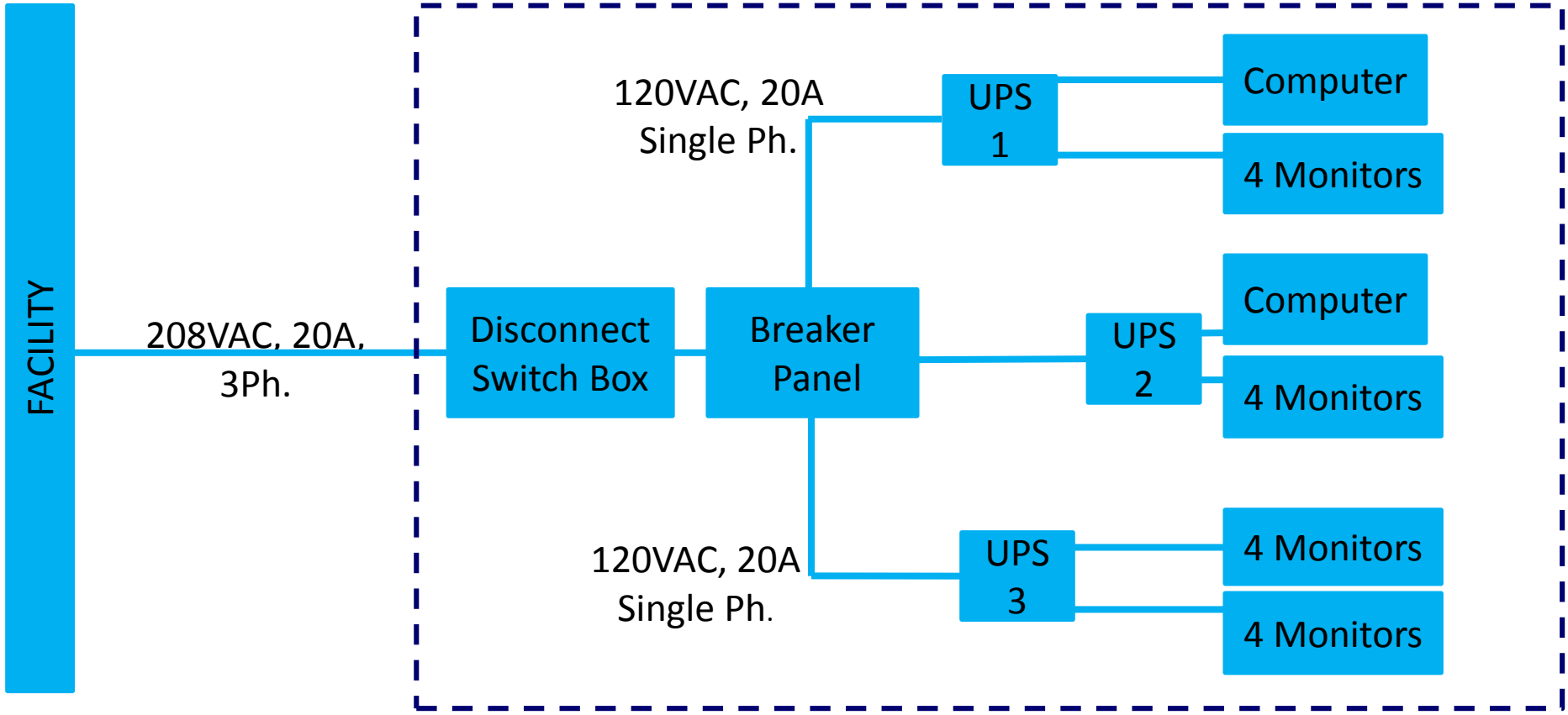
- Break down of power on three breakers
- Breaker selection based on data is 20A
- Wire size per National Electric Code is 12AWG solid core copper wire

	Hardware	Max Power (W)	Quantity	Wattage (W)	Current (A)
Circuit 1	Monitor	200	4	800	7
	Computer	1100	1	1100	9
			TOTAL	*1900*	*16*

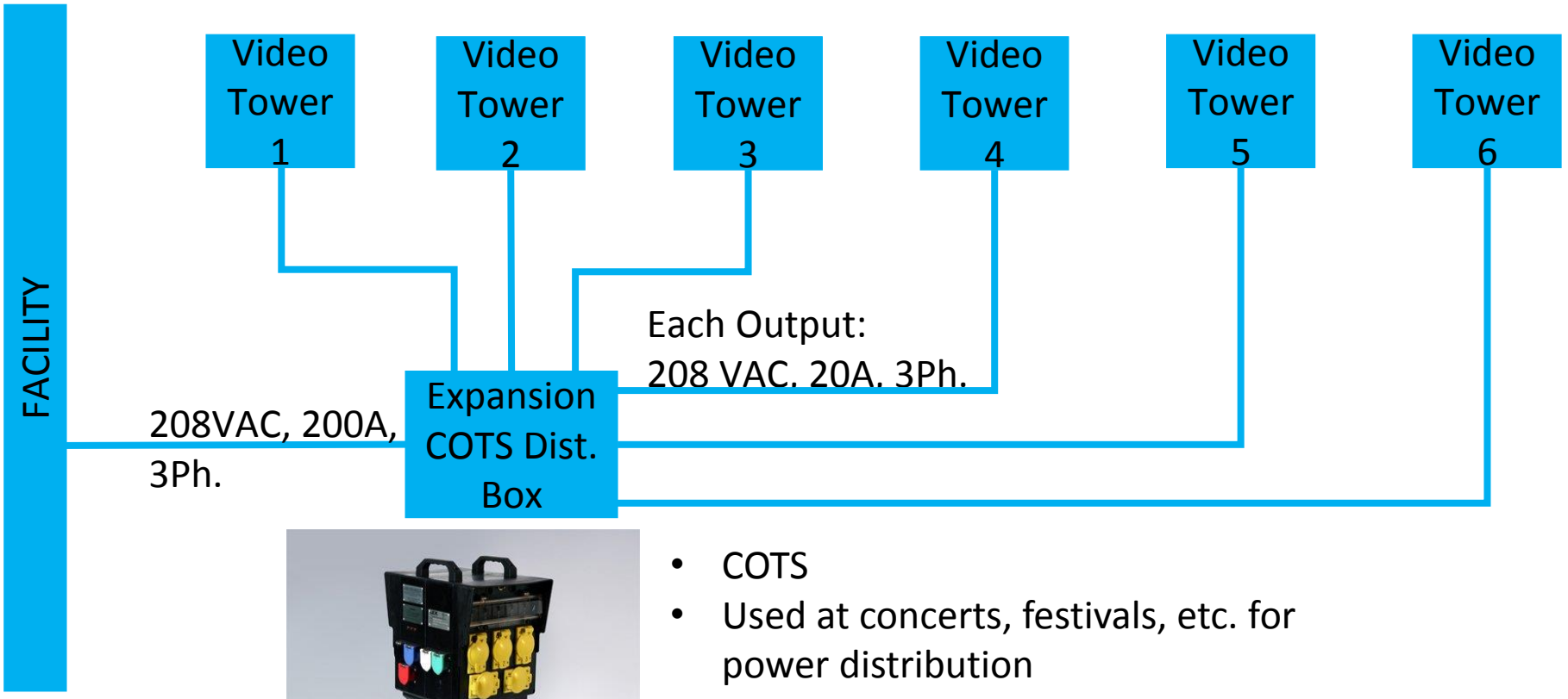
	Hardware	Max Power (W)	Quantity	Wattage (W)	Current (A)
Circuit 2	Monitor	200	4	800	7
	Computer	1100	1	1100	9
			TOTAL	*1900*	*16*

	Hardware	Max Power (W)	Quantity	Wattage (W)	Current (A)
Circuit 3	Monitor	200	8	1600	14
	Computer	1100	0	0	0
			TOTAL	*1600*	*14*

Block Diagram: One Video Tower



Block Diagram: Multi Video Towers



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- COTS
- Used at concerts, festivals, etc. for power distribution
- Available for purchase

Service Robot Project

Goal:

- Build, program, and demonstrate a working service type robot
- Future usage in a new ER5 education outreach program

- Used VEX robotics kit to design service bot
- Tested different software to program the robot
- Programmed bot with RobotC software
- Demonstrated service bot to Office of Education at JSC

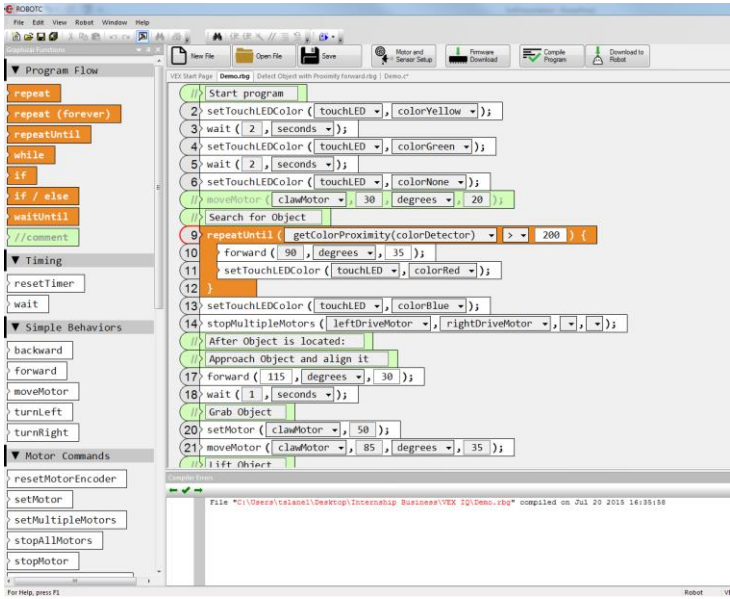
Software: RobotC

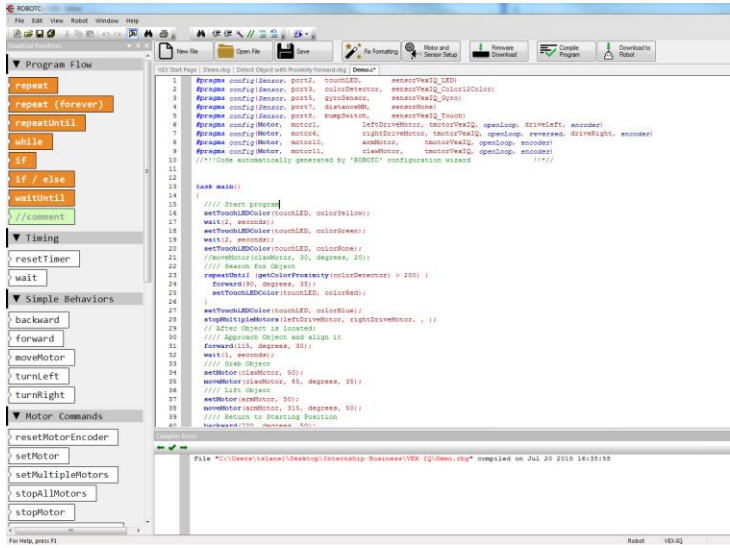
Advantages

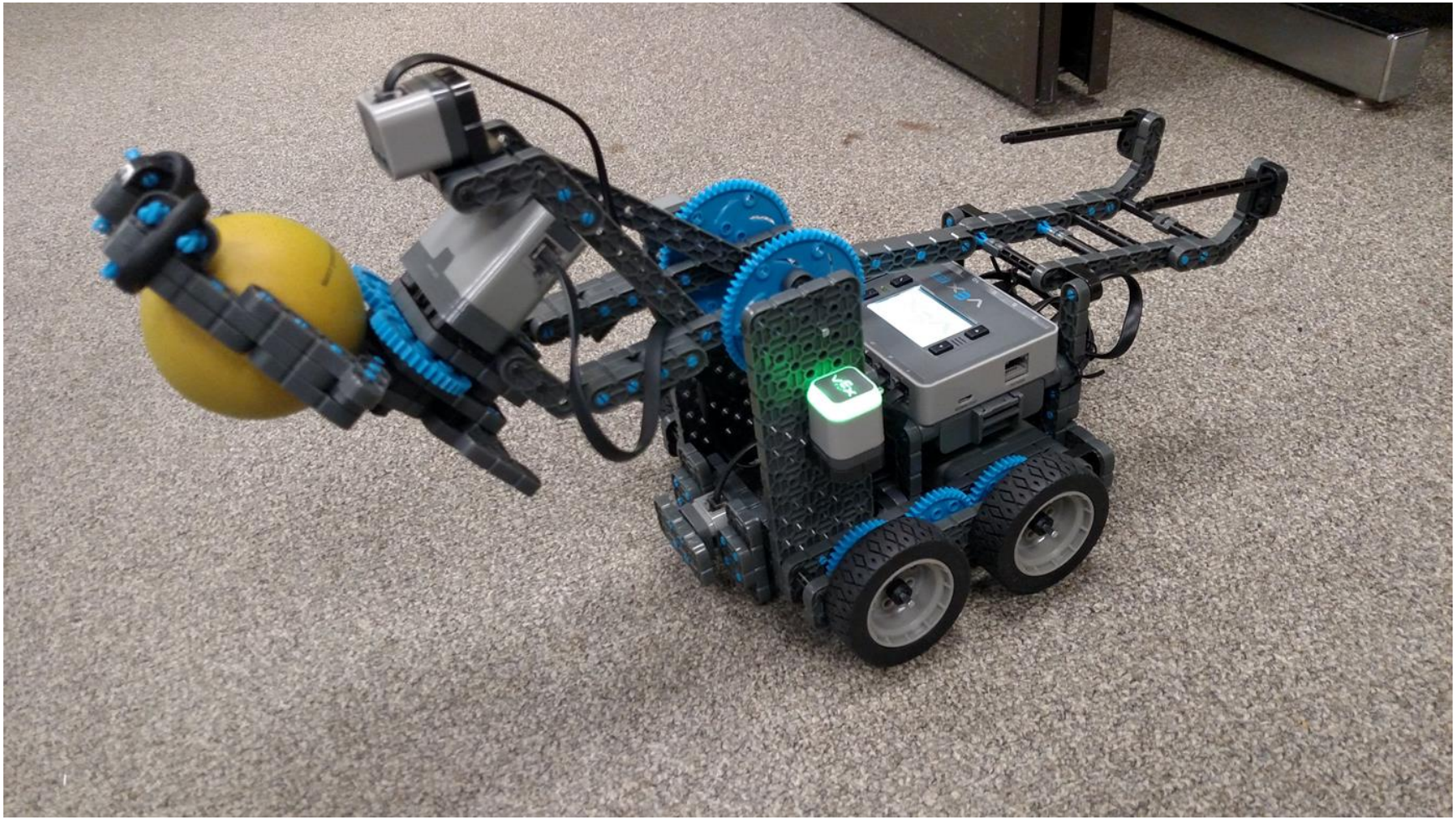
- Simple Visual Programming Language (VPL) blocks
- Generates C code from the VPL blocks of code
- Drag and drop features all C code generation
- Real-time debugging features
- Multiple programs in one slot of robot brain

Disadvantages

- Some code writing experience is needed







Takeaways

- Altium Software
  - Block diagrams for power distribution
- VEX Software
  - Modkit
  - RobotC
  - EasyC
- Networking at JSC
  - Interns and Co-ops
  - Coworkers and other employees
- Formal presentation of results
- Prioritizing and time management
- Working in a team setting
- Attended lectures and tours

Future Plans

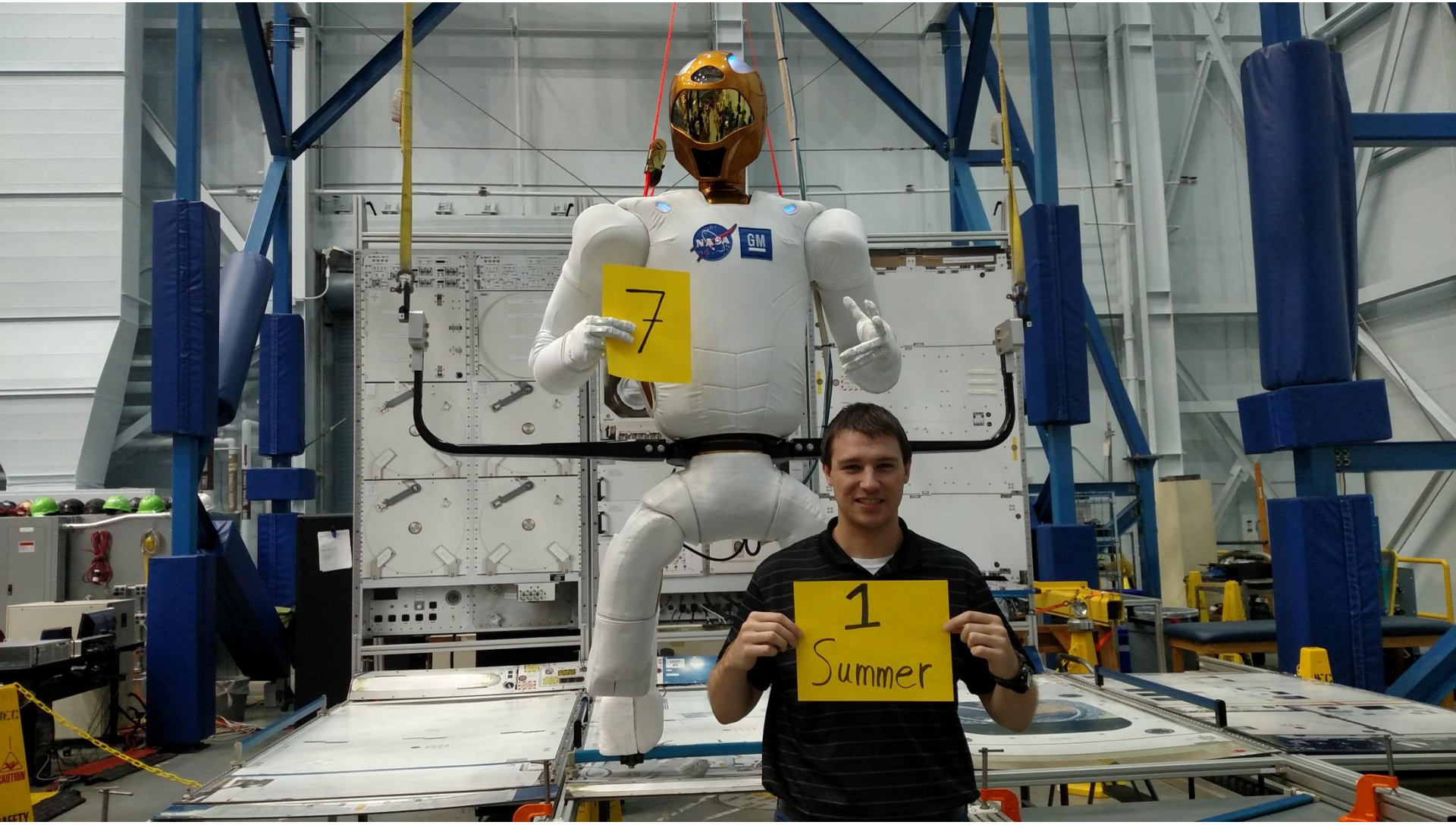
- Apply for more opportunities at NASA - JSC
- Full time positions at JSC or contracting companies
- Possibly more schooling after Master's degree

THANK YOU!

Caitlin Nolby

Marissa Saad

North Dakota Space
Grant Consortium

Questions

How long have you been at NASA R2?