

# CISCOR AUTONOMOUS GROUND VEHICLE

## GROUP 10



February 12, 2012

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# ACKNOWLEDGMENT

## Project Sponsor



- Center for Intelligent Systems, Control, and Robotics (CISCOR)

## Project Advisors

- Dr. Oscar Chuy
- Dr. Emmanuel Collins

# PRESENTATION OVERVIEW

- Brief project overview
- Locomotion manipulation update
  - Current Progress
  - Modification (if applicable)
  - Pending work
- Sensor mounting update
- Overall project status

# PROJECT NEED

- Currently there is no off road vehicle platform for autonomous research and design in CISCOR's inventory

# PROJECT GOAL

- Modify an existing all terrain vehicle (ATV) to be capable of full autonomous movement by designing, researching and manufacturing components to allow unmanned locomotion control

# PROJECT VEHICLE NAME

G. O. L. I. A. T. H.

**Gas Operated Land Intelligent All Terrain Vehicle**



# LOCOMOTION OVERVIEW

Four main locomotion mechanisms on GOLIATH

- 1) Steering
- 2) Braking
- 3) Gear Selection
- 4) Throttle





# GEAR SELECT OVERVIEW

## System Objective

- System will provide the ability to select all 5 gears

Park, Reverse, Neutral, Low, High



Shift Arm

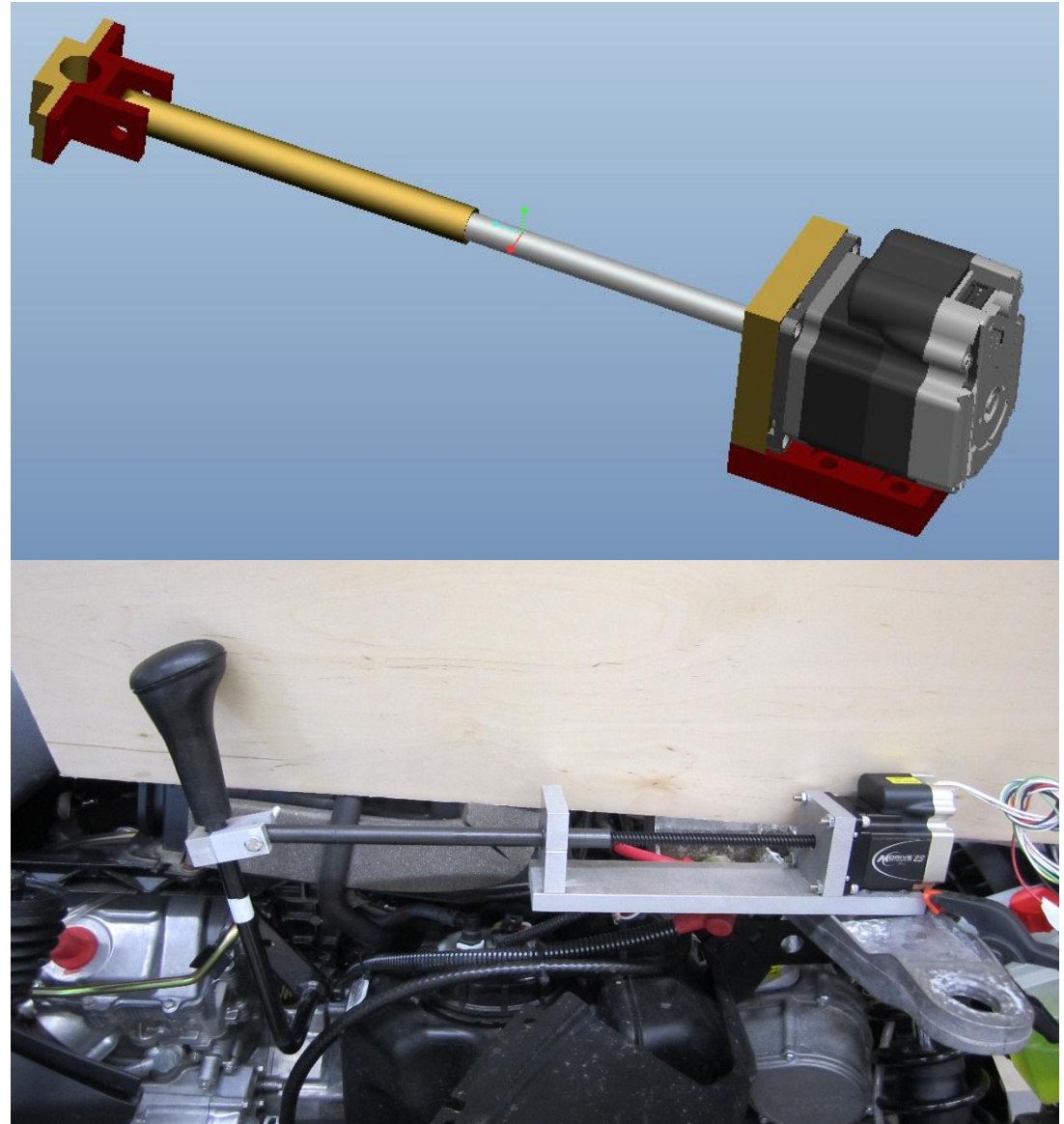
# GEAR SELECT UPDATE

## Current Progress:

- Actuator has been delivered and mounted
- Actuator has met and exceeded project parameter's test conditions
- Mount has been manufactured

## Revisions made:

- Added new support block to reduce shaft deflection





# GEAR SELECT UPDATE CONT.

Pending work:

- Permanently mount actuator
- Modify plastic covering



# FINAL STEERING OVERVIEW

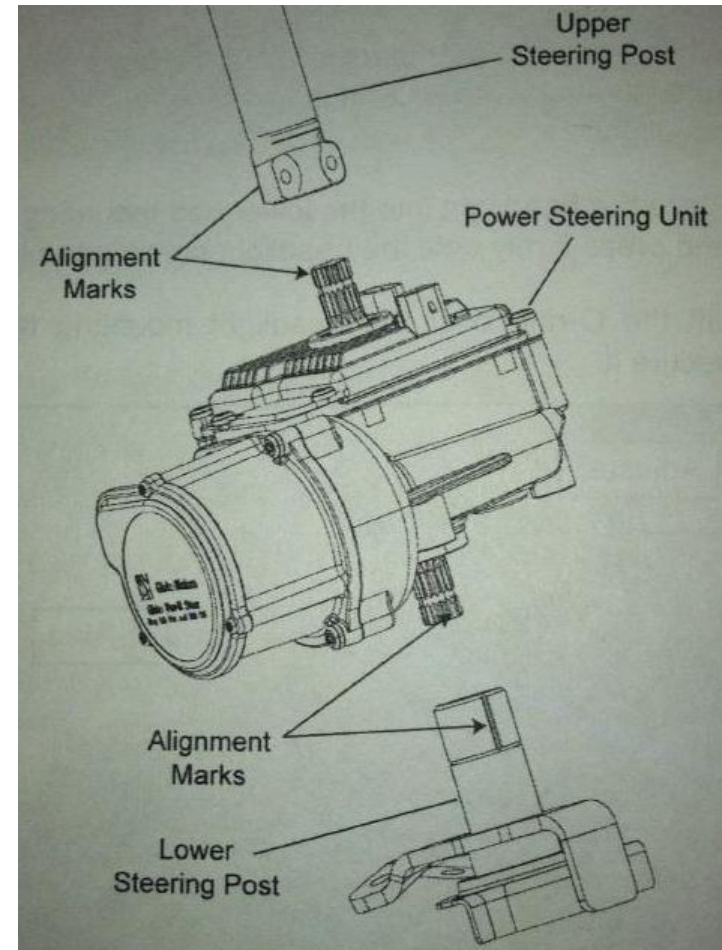
## System Objectives

- System will be able to operate with full turning range
- System will be able to withstand feedback from terrain
- System will provide sufficient output power for turning at any speeds and on any terrain



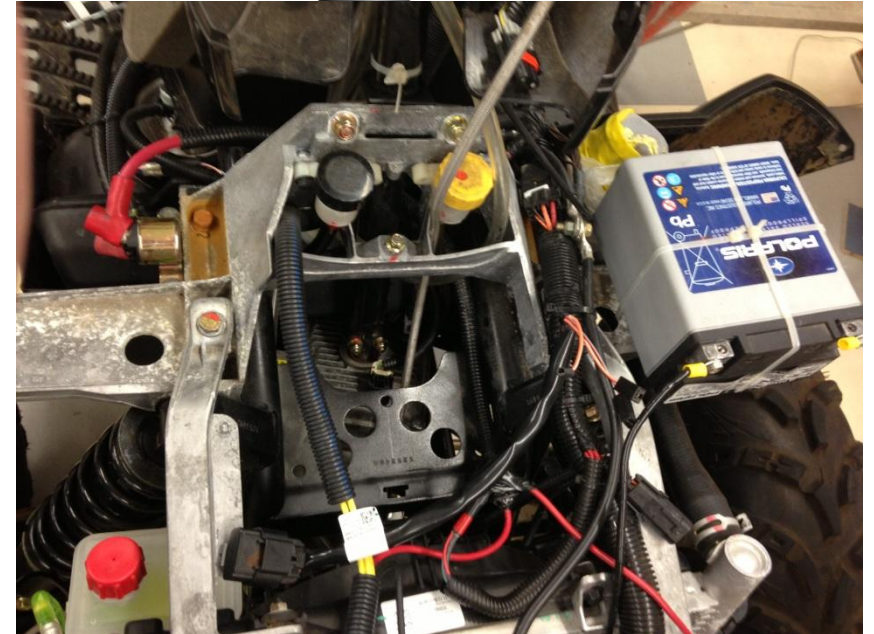
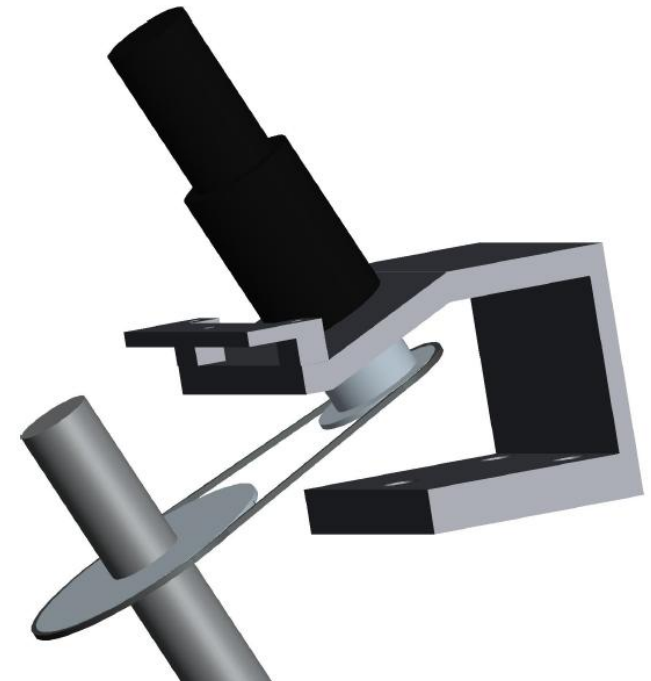
# STEERING UPDATE

- Complete design change
- Previous design was a programmable power steering unit
- Primary reasons for design change:
  - Price of unit exceeded budget
  - Lead time far exceeded allowable time frame



# STEERING UPDATE CONT.

- New design will utilize a chain drive system
- Sprockets attach to both the output shaft of motor and steering column
- Powered by a Maxon 150W DC motor
- Utilizes industrial grade chain, sprockets, mounting and collar material



# STEERING UPDATE CONT.

## Current Progress:

- Chain and sprockets have been delivered
- Main mount material ordered
- Collar for sprocket attachment is currently being manufactured
- Maxon motor is ready for installation

## Pending work:

- Machine main mount upon delivery of raw material
- Mount design to GOLIATH
- Conduct performance trials



# FINAL THROTTLE OVERVIEW

## System Objectives

- System will be precise and responsive
- System will utilize full throttle travel range





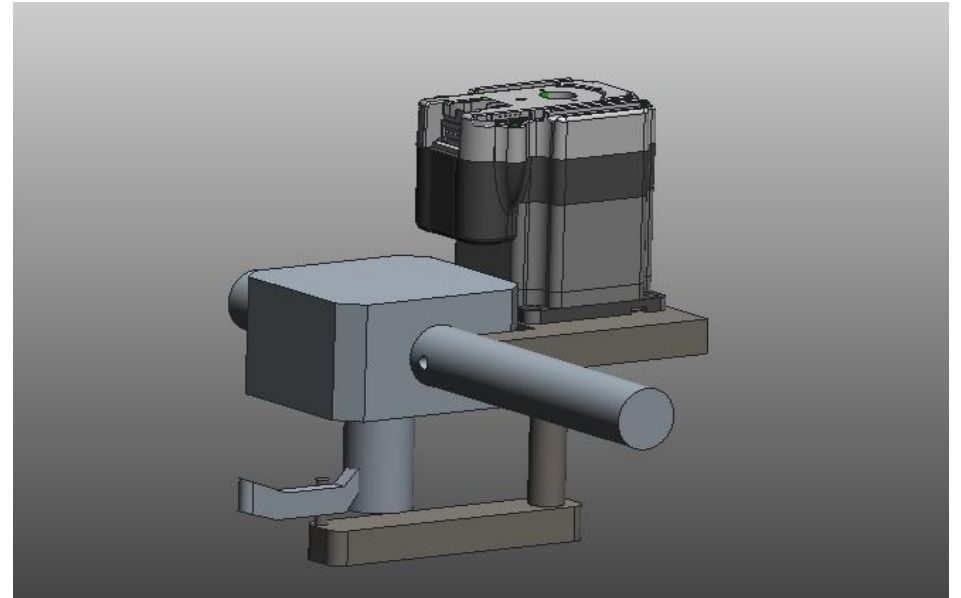
# THROTTLE UPDATE

## Current Progress:

- Actuator has been delivered and mounted
- Actuator has met and exceeded project parameter's test conditions
- Mount has been manufactured

## Revisions made:

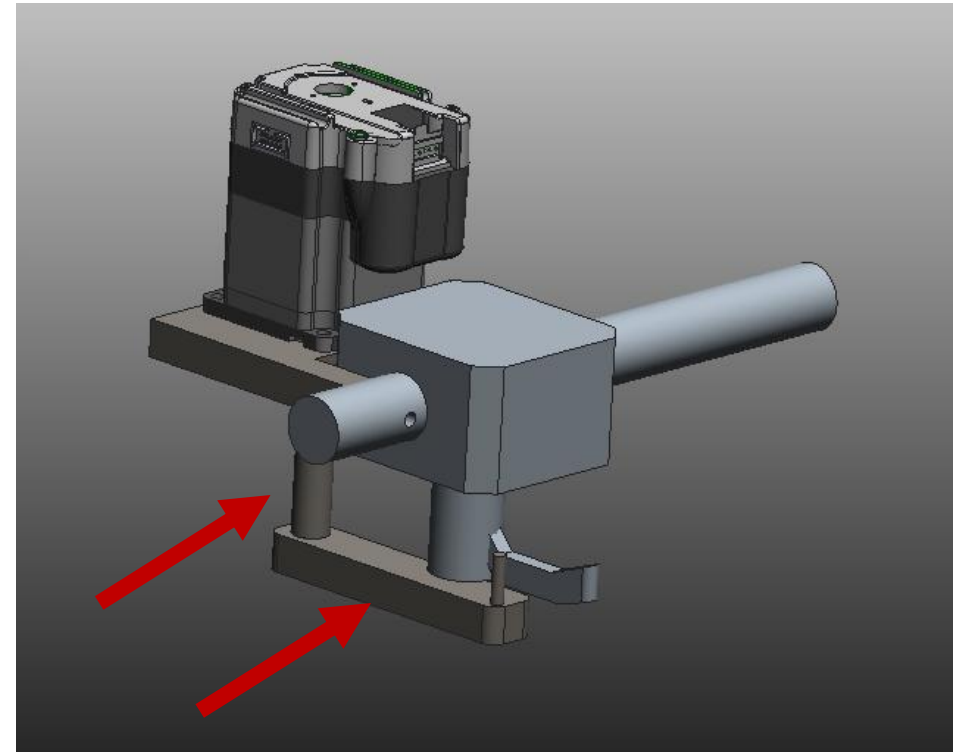
- None



# THROTTLE CONTINUED

Pending work:

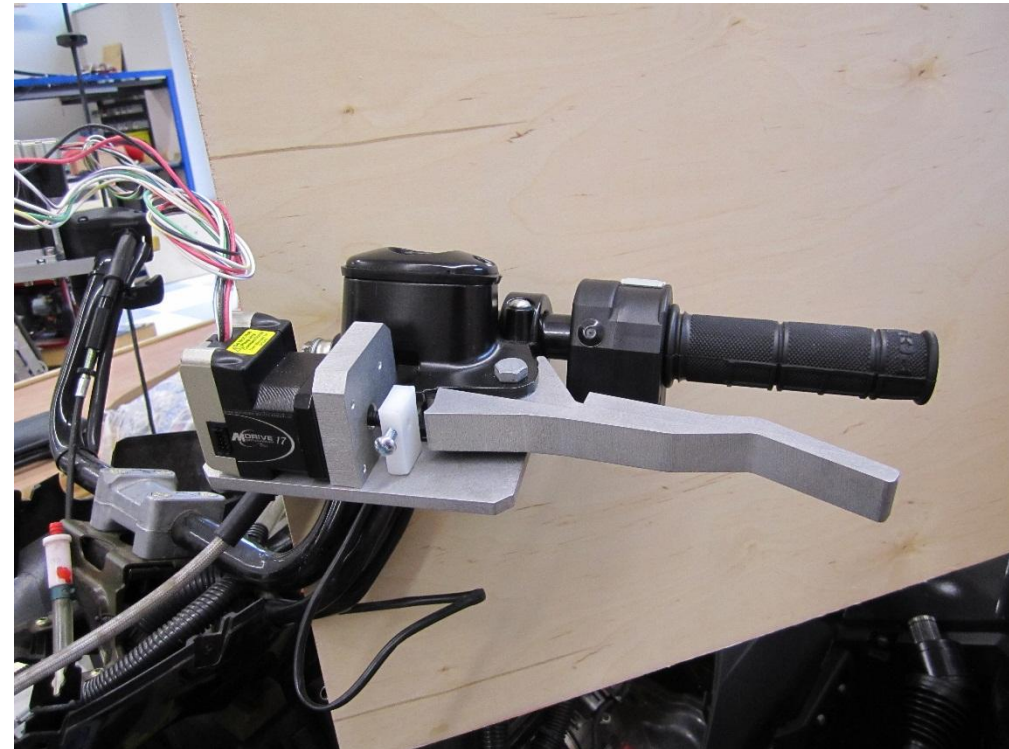
- Mount shaft extender
- Mount throttle actuator
- Manufacture motor enclosure



# BRAKING DESIGN OVERVIEW

## System Objectives

- System will have the same response time for braking as a human would
- System will be able to hold a braking position
- System will be able to utilize full braking range



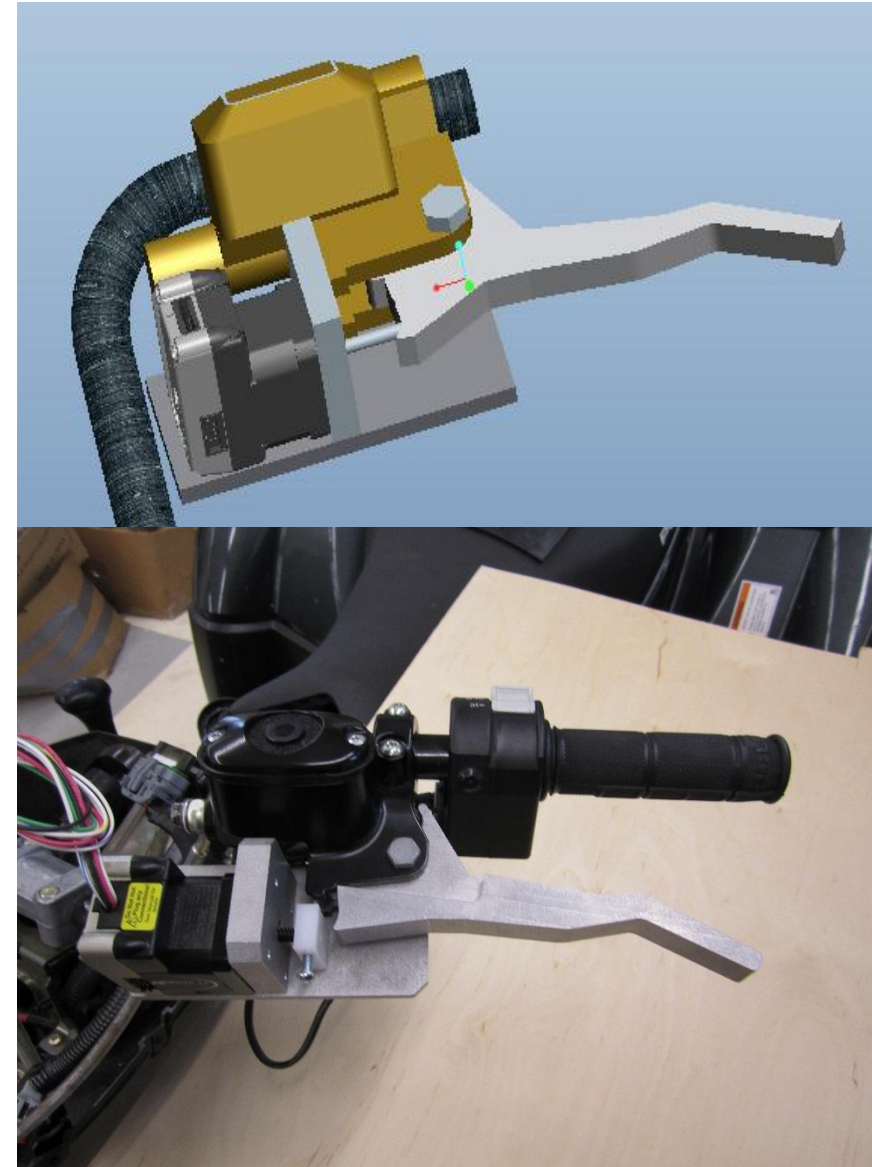
# BRAKE UPDATE

## Current Progress:

- Actuator has been delivered and mounted
- Actuator has met and exceeded project parameter's test conditions
- Mount has been manufactured

## Revisions made:

- Added plastic push block for added contact surface area and load transmission



# BRAKE UPDATE CONT.

Pending work:

- Remanufacture push block
- Permanently mount actuator
- Manufacture protective housing
- Install pressure transducer





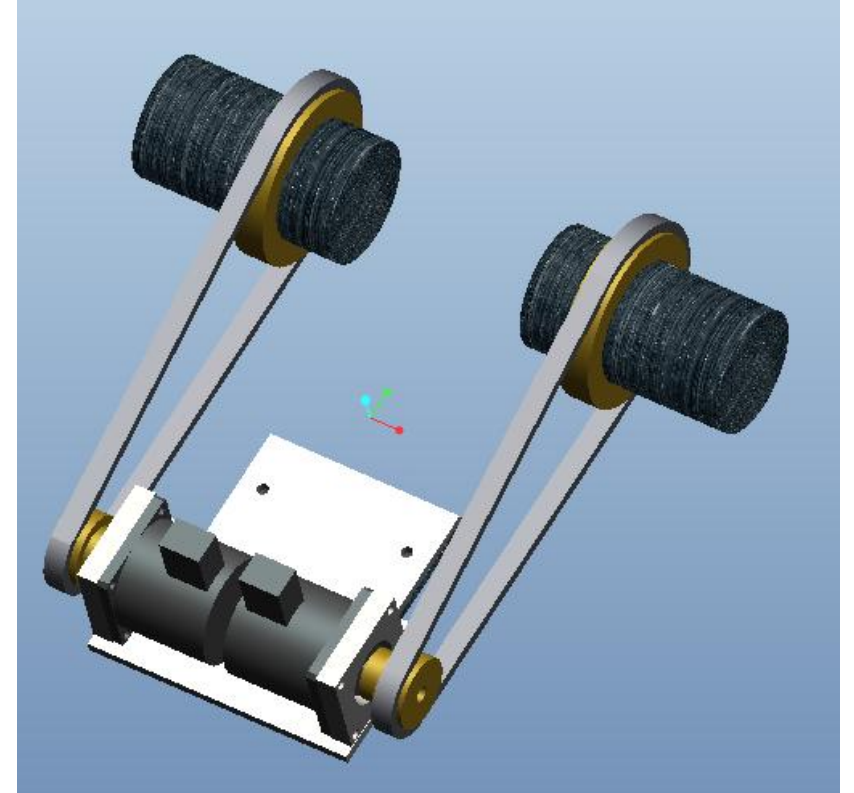
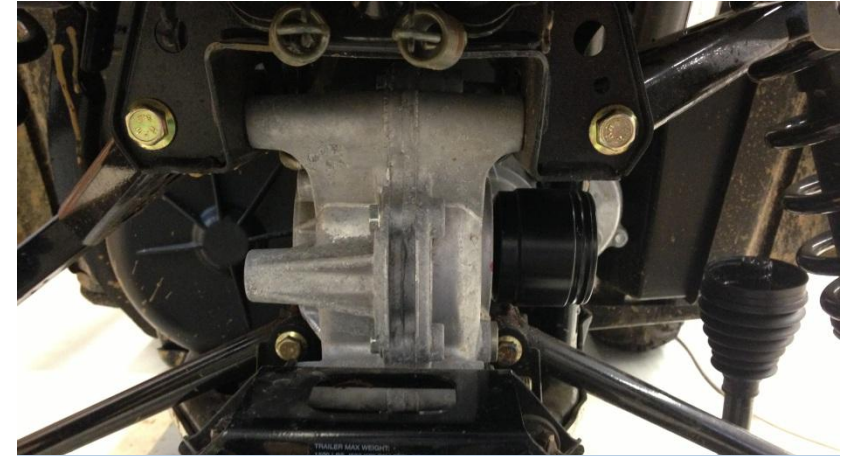
# SENSOR MOUNTING UPDATE

## Current progress:

- Encoders have been purchased
- Encoder mounting design finalized
- Supplement material has been ordered
  - Pulleys
  - Timing Belts

## Pending work:

- Machine base mount plate
- Mount encoders





# CURRENT PROJECT STATUS

- Major locomotion components have been delivered and tested
- 3 out of 4 locomotion motor mounts are machined
- Encoders and supplement parts have been ordered
- Project is proceeding as scheduled

## Overall Pending Project Work:

- Wire actuator to on-board batteries
- Design computer mounts
- Test encoders upon installation

**QUESTIONS?**



# ADDITIONAL SLIDES

# ENCODER

- Encoder Products Company: Model 725 - I

## Specifications

- Industrial Housing
  - Flex Mount Coupler
- IP67 Seal
- Resolution: 30,000 Cycles/Revolution
  - 120,000 Counts/Revolution
  - Speed: Up to 3,000 RPM



# TESTING OF ACTUATORS

