

# TARUN PUNNOOSE

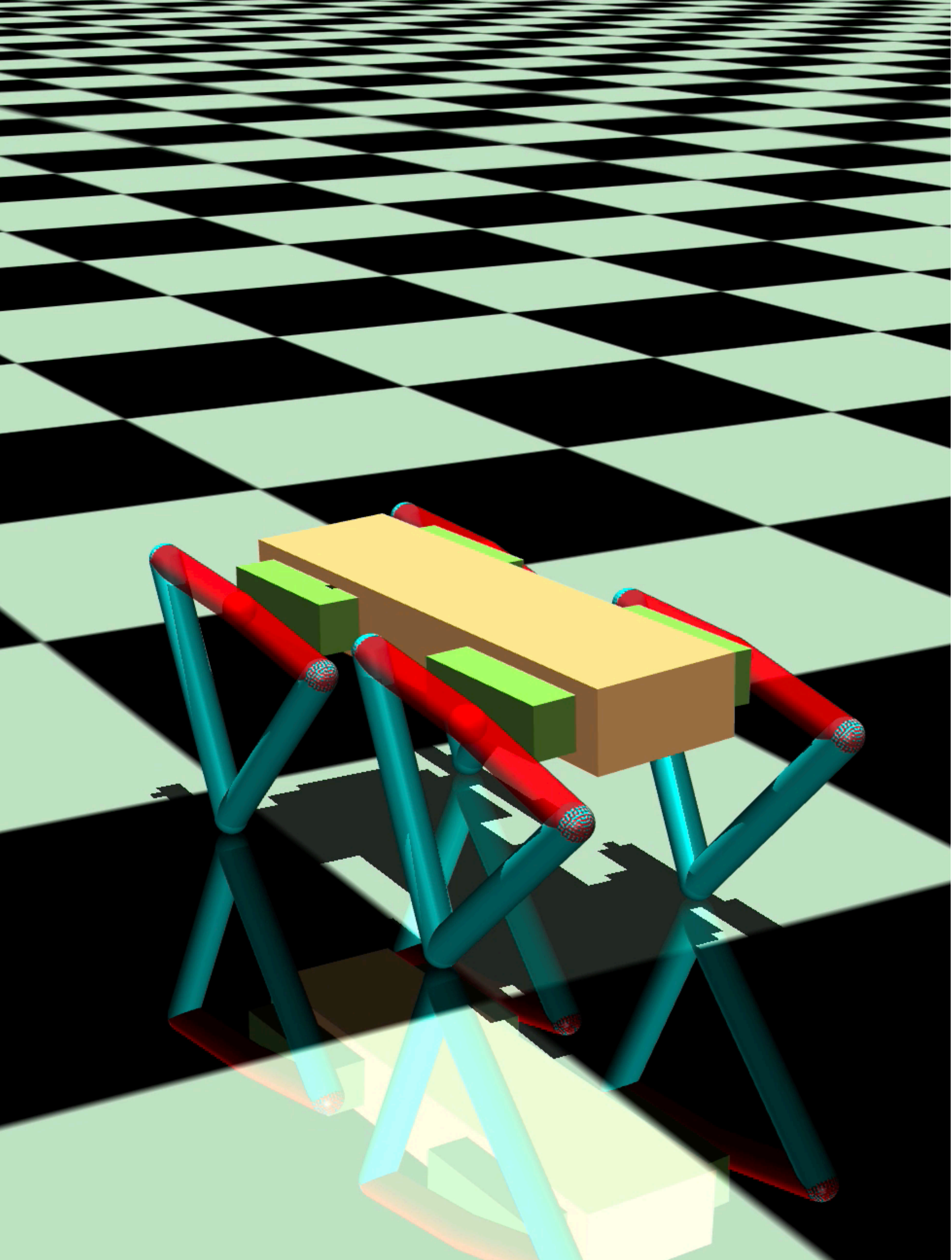
ENGINEERING PORTFOLIO

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# ABOUT ME

- **Master's student in Electrical Engineering at Stanford**
- **Interested in robotics, control, optimization, and energy**
- **Seeking summer internship opportunities in above areas**





# MPC FOR LEGGED ROBOTS

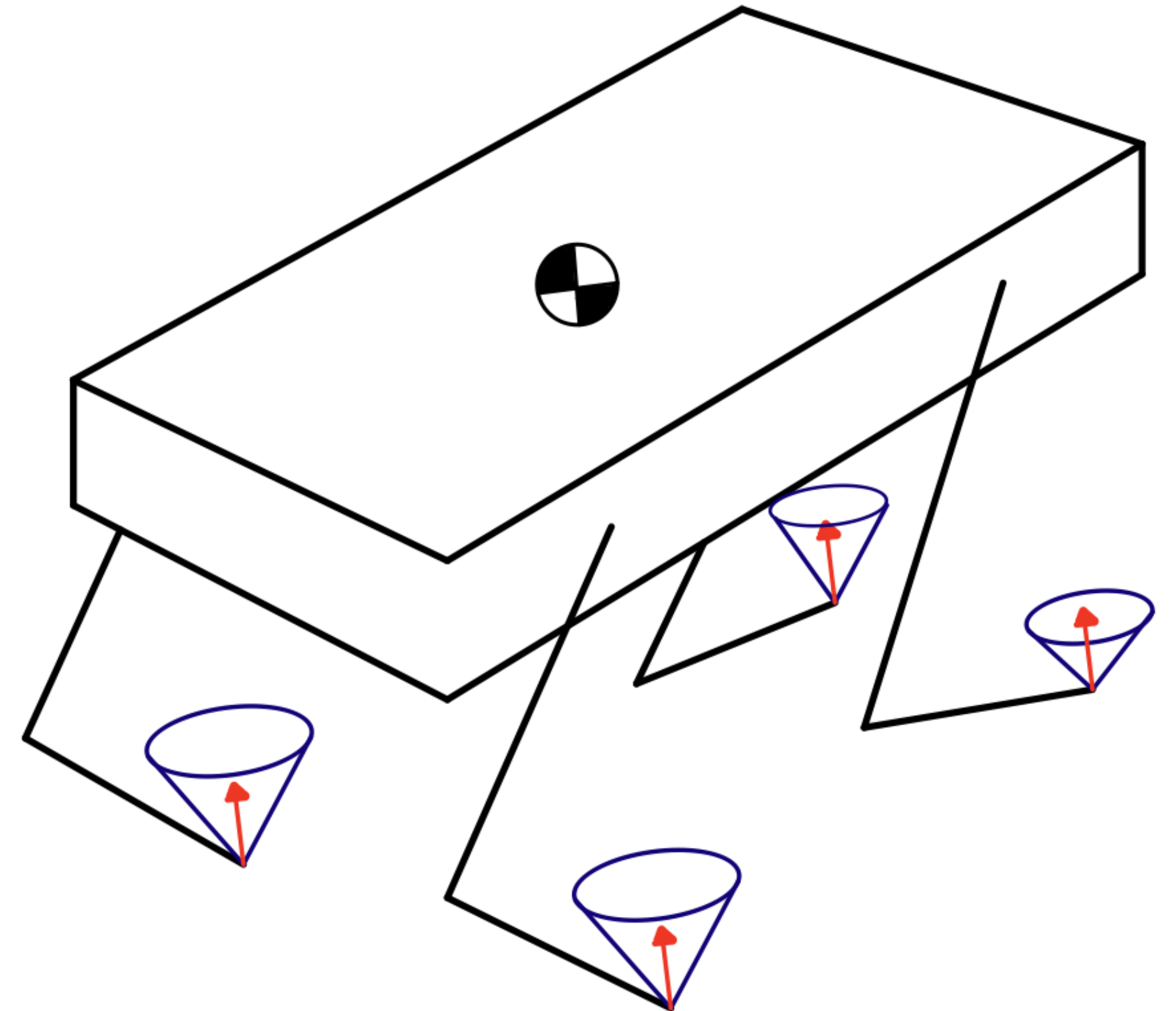
RESEARCH WITH ROBOTIC EXPLORATION LAB

- Solves using an iLQR based trajectory optimization
- Uses a variety of reduced order models to improve computation time
- Currently experimenting with making higher fidelity models more tractable for real time application
- Implemented in MuJoCo simulations

# ALTRO-C: A FAST SOLVER FOR CONIC MPC

PAPER SUBMITTED TO ICRA 2021

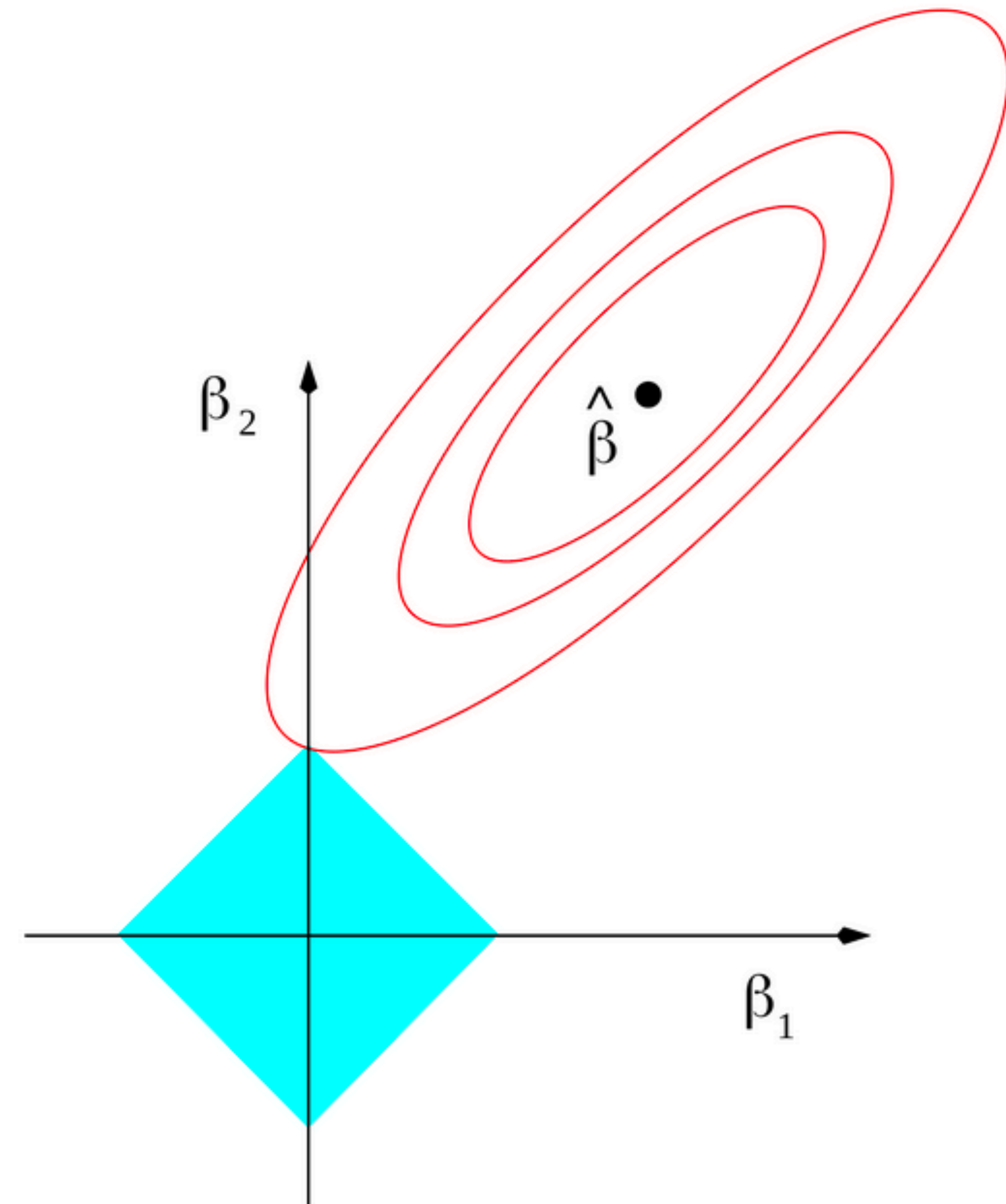
- An iLQR based trajectory optimization solver that uses an Augmented Lagrangian to handle constraints
- Easy specification of linear, convex trajectory optimization problems
- Makes modifications to original ALTRO solver to handle second order cone constraints



# GROUP LASSO REGULARIZATION FOR TRAJECTORY OPTIMIZATION

## CLASS PROJECT FOR CONVEX OPTIMIZATION II

- Uses a group lasso penalty to induce group sparsity in controls
- Uses ADMM with closed form proximal operators and iLQR to take advantage of problem structure
- Applied to the satellite rendezvous problem with linear Clohessy-Wiltshire dynamics
- Results in sparse thruster firings



# STATE ESTIMATION FOR LEGGED ROBOTS

RESEARCH WITH ROBOTIC EXPLORATION LAB

- Developed EKF and UKF based state estimation algorithms
- Used leg kinematic information with outlier detection to account for slipping
- Tested in a closed loop MuJoCo simulation with MPC controller

