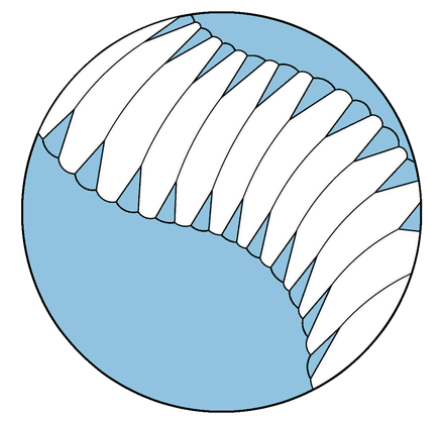




WPI

# GeCKO: General Purpose Continuum Kinematically Adaptable Origami Robot

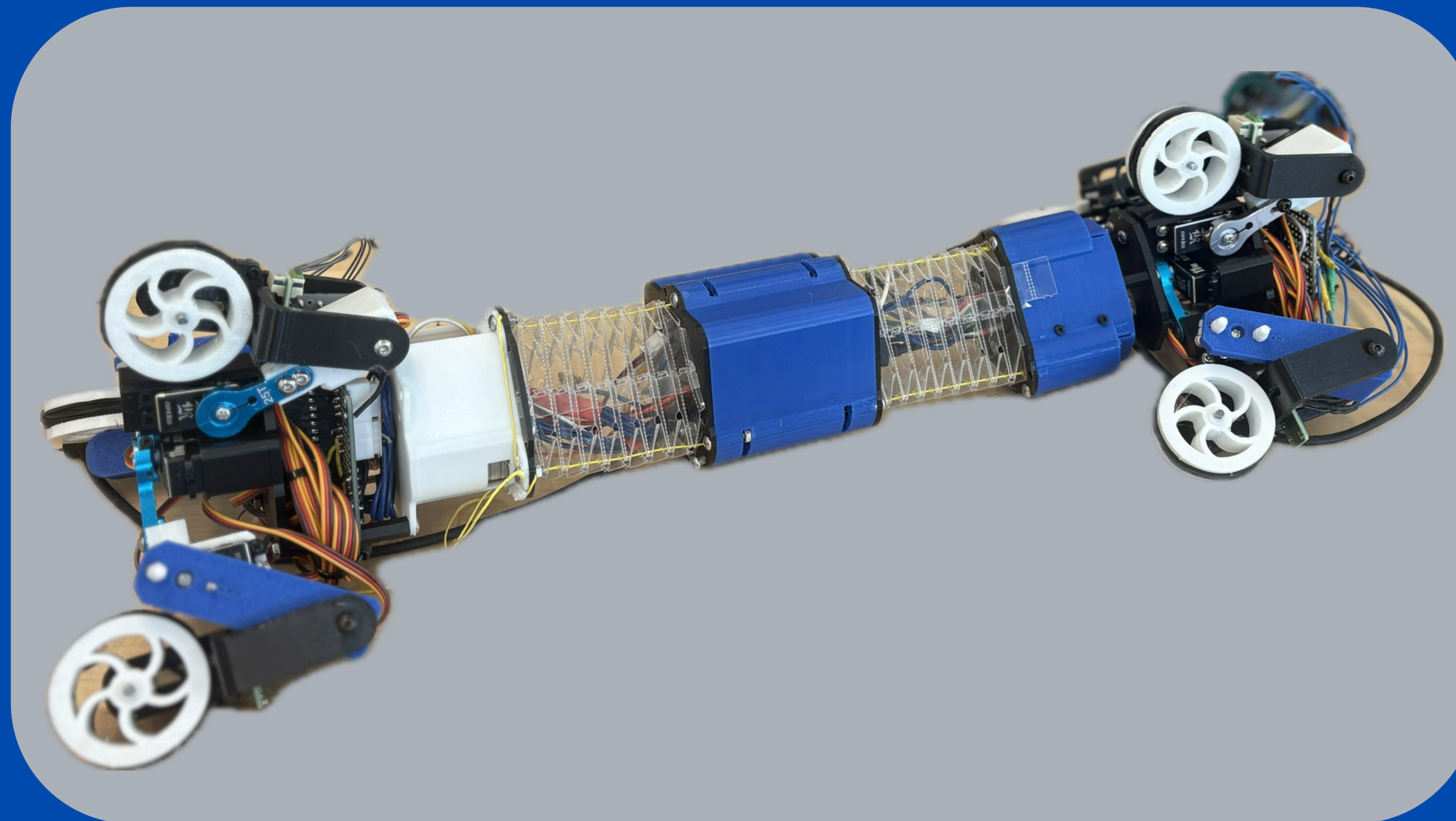


SOFT  
ROBOTICS  
LAB

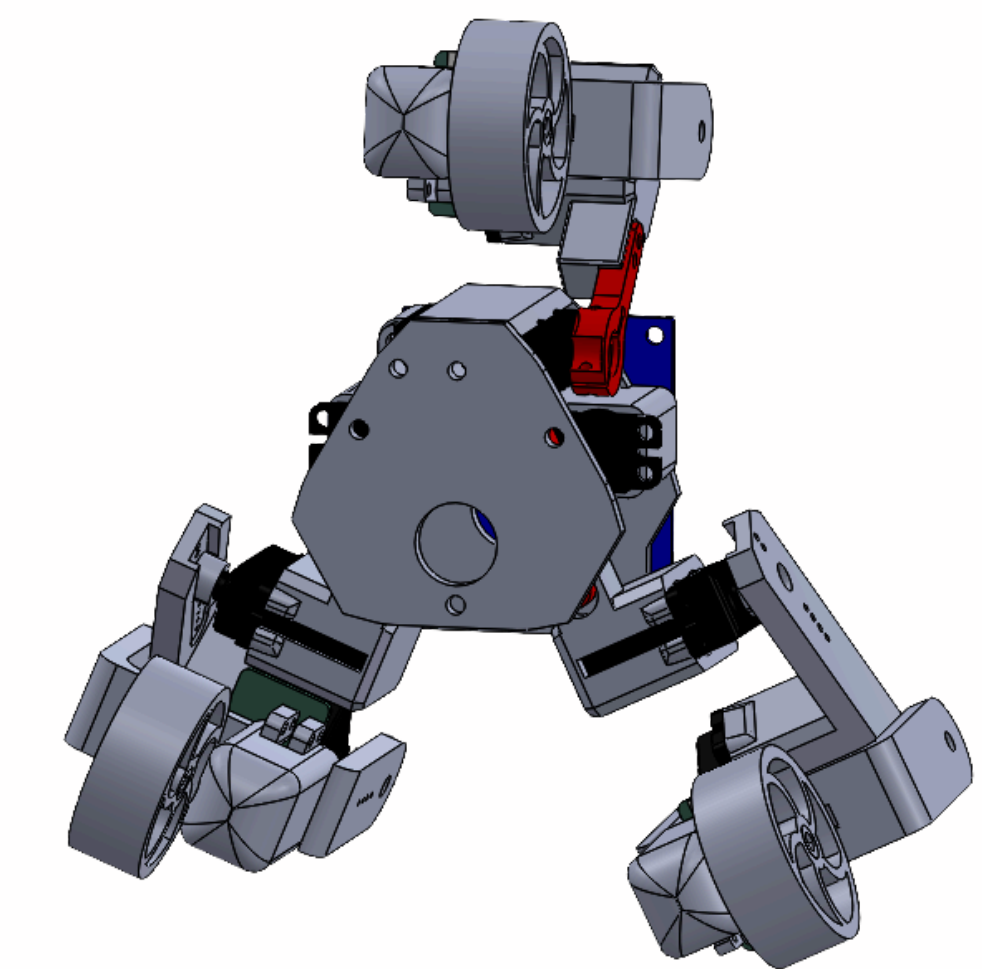
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## Background

The deformable and highly adaptive nature of continuum robots lends itself well to navigating highly constrained environments. This has applications in numerous fields, such as pipeline inspection & maintenance, extraterrestrial cave exploration, and search & rescue missions. Building on the work of previous continuum mobile robots from the Soft Robotics Lab, GeCKO aims to create a robotic platforms capable of adapting to a number of possible environments, from pipe systems to outdoor terrain.

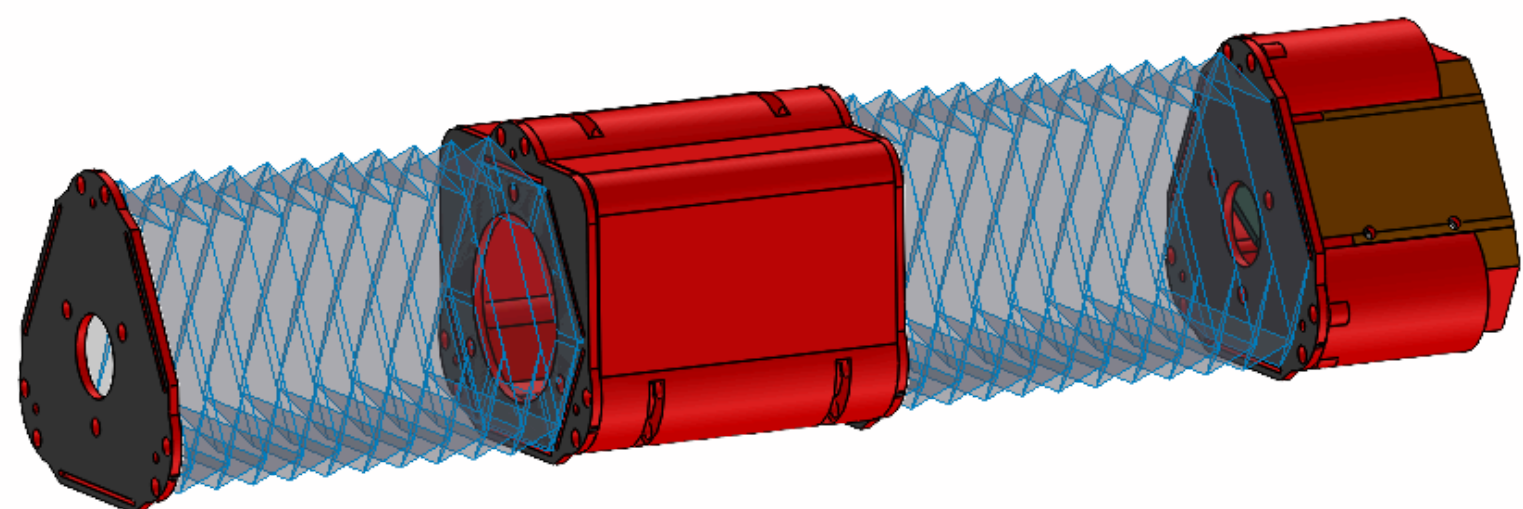


## Leg Modules



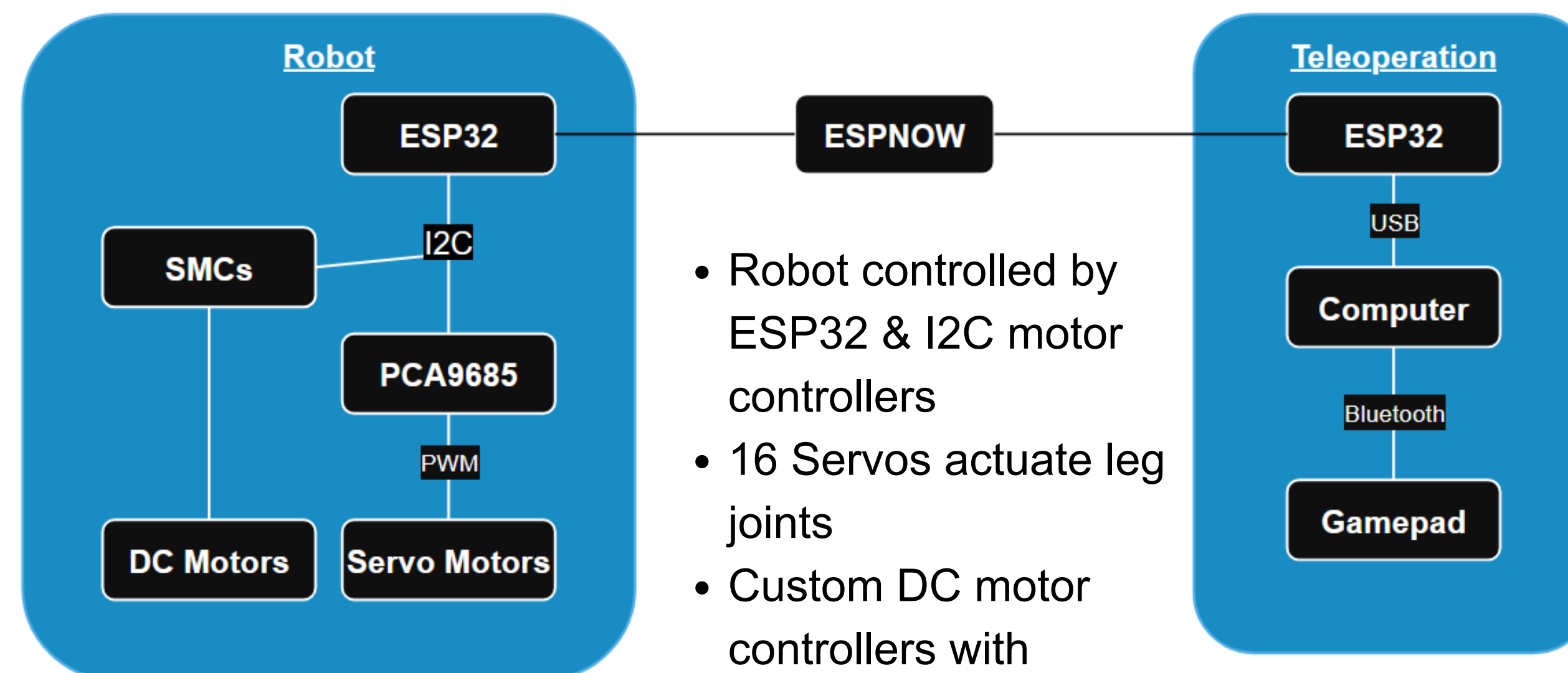
- Tripodal design can achieve radially symmetric positioning to navigate pipe systems
- 3-DOF lower legs allow full function as wheeled quadruped when on ground
- Compliant wheels increase grip and allow navigation of vertical pipes

## Continuum Body



- Triangular accordion-like origami modules created from laser-cut PET plastic
- Winch module individually actuates cables along each vertex
- body curvature magnitude, direction, and arc length controllable based on cable length
- Inverse Kinematics based on Piecewise Constant Curvature model
- Allows navigation of complex environments

## Electronics



- Robot controlled by ESP32 & I2C motor controllers
- 16 Servos actuate leg joints
- Custom DC motor controllers with encoders allow position & velocity control of wheels & winch

## Future Improvements

- Add IMU sensors to allow for accurate state estimation & stability control
- Implement walking gaits for quadruped configuration
- Integrate more sensors (camera, LIDAR, etc.) to enable perception & mapping of environments