Development of Hardware and Actuator Components for Modular Tetrahedral Truss Robots

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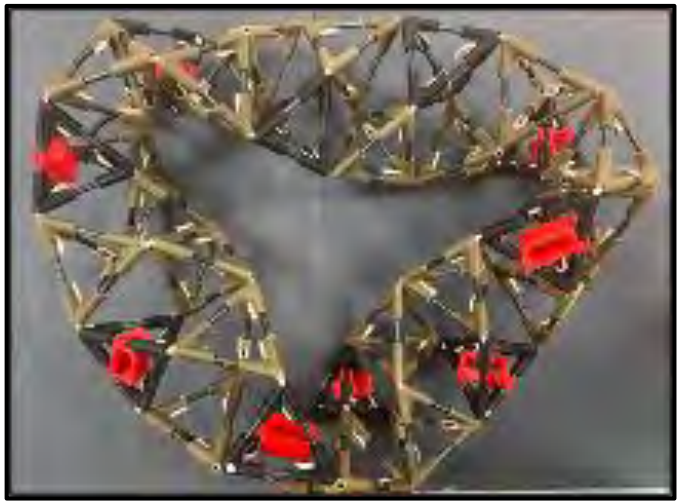
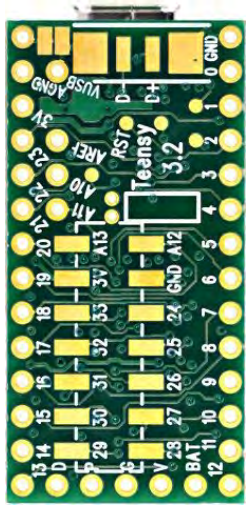
Trussbot Development

Prototype Characteristics
• Modular Robotic System • Compliant Joints • Movement Pattern

Project Aims
• Weight Reduction • Mounting electronics • Creating breakout board



Designing Microcontroller Mount



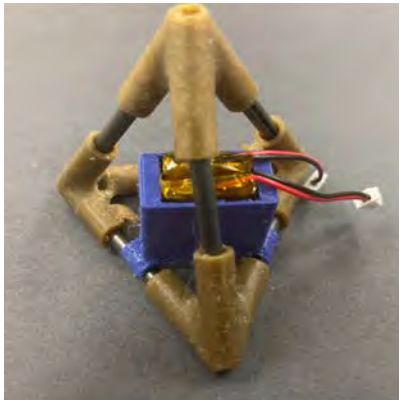
Teensy 3.2 Microcontroller
• 34 Digital, 21 Analog • 1.7” X 0.7” X 0.2” • Reset button, silver port

Design Considerations
• Microcontroller dimensions • Tetrahedral unit movement • 3D slicing/ printing settings

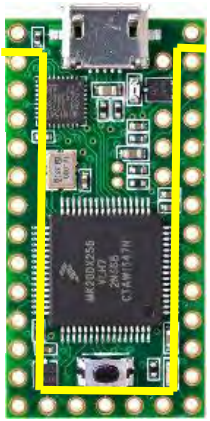
Designing Battery Mount

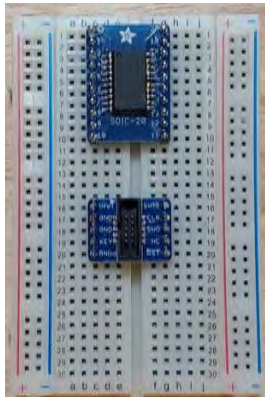
Lithium Ion Polymer Battery
• 3.7 Voltage Battery • Larger: 0.5” X 1.2” X 0.15” • Smaller: 0.6” X 0.6” X 0.2”

Design Considerations
• Battery power • Removal process • Wire Access



Designing Breakout Board



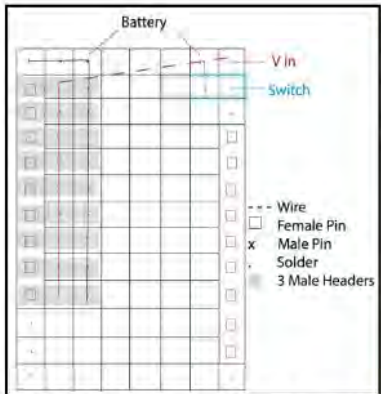


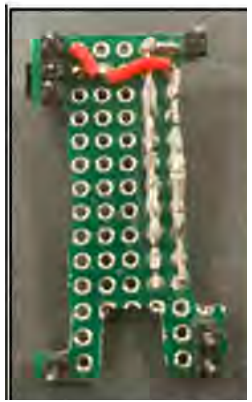
Servo Motors

- 10 servo motors in *Trussbot*
- Voltage, Digital, and Ground pins
- Modified by adding resistors and potentiometer wire

Breakout Board Requirements

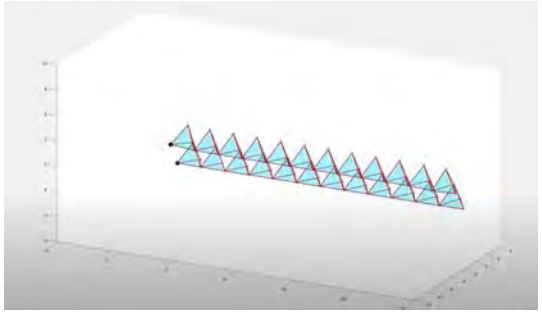
- 10 digital, analog, voltage, & ground pins.
- Fit pins for switch and battery.
- Attach to microcontroller

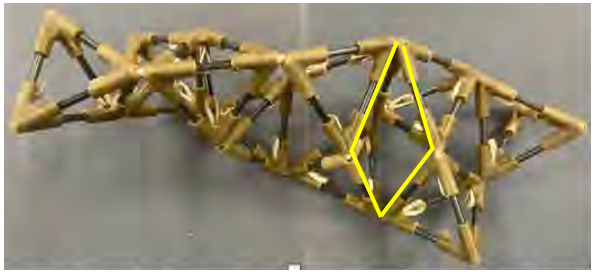




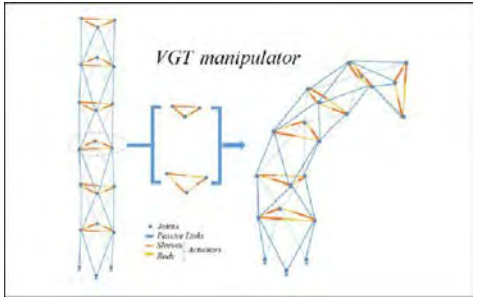
Future of Tetrahedral Truss Modular Robotics

Robotic Arm Option
• Long chain robotic arm • Grasper and short arm





Future Impact
• Variable Geometry Truss Alternative • Construction equipment • Exploration of tight spaces



Inverse kinematics of asymmetric octahedral variable geometry truss manipulator with obstacle avoidance through inexact interior point optimization, Zhao, Hu

Design and analysis of a deployable tetrahedron-based mobile robot constructed by Sarrus linkages, Liu, Yao

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