2018 ROBOT ALL★STARS

Georgia Tech

Powered Knee-Ankle Prosthesis

WALKER
Coaches: Aaron Young, Jonathan Camargo-Levya, and Krishan Bhakta

Stats: The device has actuated joints that provide powered assistance up to 105 Nm of torque at the knee and ankle. It also has a passive degree of freedom (DOF) for ankle inversion/eversion. Walker includes 2 powered DOFs at the knee and ankle and a passive DOF at the ankle. The device is able to provide up to 105 Nm and has 3 IMU sensors, 5 encoders, and a 6-DOF load cell. The robotic device costs roughly $16,500 in materials.

Hometown: Exoskeleton and Prosthetic Intelligent Controls (EPIC) Lab

Fun Fact: Students like to walk on the device using an iWalk system that lets them feel as if they are missing a leg and have a robotic replacement.
Unpowered Elastic Ankle Exoskeleton
**Coach:** Greg Sawicki

**Stats:** A fully-portable, lightweight passive-elastic, spring-clutch system offloads the calf muscles when the foot is on the ground during walking, running, or jumping. The exo-tendon on the device recycles energy from one step to the next and acts to reduce the demand on the user’s calf muscles working as biological clutches “under the skin” in the interaction with the Achilles tendon.

**Hometown:** Human Physiology of Wearable Robotics (PoWeR) Lab

**Fun Fact:** First unpowered exoskeleton to break the “metabolic cost barrier.” That is, no other device has reduced the “gas-mileage” of a human below normal during walking or running without the aid of a motor and/or batteries.
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Mapping Mobile Robot GROMI

Geogia Tech
Coach: Yong K. Cho

Stats: GROMI uses laser scanning, visual sensing, and thermal sensing to provide context-aware, 3D workspace visualization to field robots and remote operators in real time. The device improves perception and situational awareness for efficient control and collaboration among robots.

Hometown: Robotics & Intelligent Construction Automation (RICAL) Lab

Fun Fact: GROMI’s equipped LiDAR sensors can scan objects at a range of 80 m and display the point cloud in real time.
MINIR-II Deep Brain Tumor Remover
**Coaches:** Jaydev P. Desai, Xuefeng Wang, and Shing Shin Cheng

**Stats:** MRI compatibility of the robotic system allows the device to be operated intraoperatively during a neurosurgical procedure. The flexible, three-segmented robot provides dexterity and compliant interaction with soft tissues, and allows for the removal of a brain tumor using bipolar cautery probes and suction tube.

**Hometown:** Medical Robotics and Automation (RoboMed) Laboratory

**Fun Fact:** Most parts of the robotic device are 3D-printed, allowing customization based on patient needs and conditions.
Machine Learning Robot
Coaches: Gennaro Notomista, Motoya Ohnishi, Pietro Pierpaoli, Siddharth Mayya, Maria Santos, Li Wang, Kyle Slovak, and Magnus Egerstedt

Stats: The Brushbot drives on brushes using vibrating motors. The vibrations generated by the motors make the brushes act like springs that randomly push the robot around.

Hometown: GRITS Lab (Georgia Robotics and Intelligent Systems Lab)

Fun Fact: The Brushbot is like a Zamboni on Georgia Tech’s Robotarium, where it is used to clean the arena and to catch and rescue broken robots.
Crop Monitoring Robot

TARZAN
**Coaches:** Jonathan Rogers and Ai-Ping Hu

**Stats:** Tarzan swings over crops, capturing images of plants that can be analyzed with machine-learning algorithms to detect diseases or other stresses before spreading.

**Hometown:** Georgia Tech iREAL Lab & Georgia Tech Research Institute

**Fun Fact:** The robot is appropriately named after the iconic Tarzan fictional character raised in the jungle by great apes. Someday Tarzan (the robot) might function as a mobile scarecrow to recognize, track, and drive off pests or predators in authentic crop settings.
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Georgia Tech

Autonomous UAV Test Bed TIGERSHARK
**Coaches:** Warren Lee and Breneman Whitfield

**Stats:** TigerShark serves as a test bed for autonomous UAV research and airborne sensor research. It sports an 80 pound payload capacity and is equipped with an autopilot and mission computer, making it capable of collaborative multi-aircraft operations.

**Hometown:** Aerospace, Transportation, and Advanced Systems (ATAS) Lab in the Georgia Tech Research Institute (GTRI)

**Fun Fact:** Georgia Tech is the first university to own and operate the TigerShark.
Prentice Mobile Manipulator Research Platform
**Coach:** Sonia Chernova

**Stats:** As a mobile manipulator, Prentice has a Holonomic base, a Kinova 7-DOF Jaco-2 arm on a vertical linear actuator, a Kinect RGB-D camera on a pan-tilt mount, and an Hokuyo laser. Two onboard computers, as well as a network of offboard computers, provide the brains for the robot.

**Hometown:** Robot Autonomy and Interactive Learning (RAIL) Lab

**Fun Fact:** Prentice loves the song “Eye of the Tiger” and plays it often. Last year, the robot unsuccessfully tried to hang ornaments on a Christmas tree, but managed to successfully interrupt 92 students while they were playing with building blocks to better learn when people prefer to be interrupted.
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Intrepid Terrestrial Explorer

MUDDYBOT
**Coaches:** Benjamin McInroe and Dan Goldman

**Stats:** With an armspan of 55 cm, the robot uses its powerful servo-driven flippers and tail to climb sandy slopes, mimicking the first steps of Devonian-era vertebrates on land. MuddyBot’s modular 3D-printed body allows researchers to test hypotheses about the evolution of legged locomotion by recreating the gaits of these extinct terrestrial walkers in the lab.

**Hometown:** Complex Rheology and Biomechanics (CRAB) Lab

**Fun Fact:** MuddyBot’s morphology is inspired by the mudskipper fish, a living relative of extinct early terrestrial vertebrates. MuddyBot has taught researchers that the tail may have been a critical component for these ancient animals to adapt to life on land.
Construction Site Surveillance Robot

BATBOT

2018 ROBOT ALL☆STARS

Georgia Tech
Coaches: Alireza Ramezani (Cal Tech), Soon-Jo Chung (Cal Tech), and Seth Hutchinson (Georgia Tech)

Stats: Bat Bot weighs less than 100 grams, can flap its wing as fast as ten times per second, and has a specially fabricated flexible membrane wing that mimics bat wing behavior during flight.

Hometown: Coordinated Science Lab

Fun Fact: Bat Bot recently appeared in the exhibition “Animals. Respect/Harmony/Subjugation” in the Museum für Kunst und Gewerbe in Hamburg, Germany, alongside works by artists such as Albrecht Dürer.