# WEIYI TANG

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## EDUCATION

**University of Pennsylvania** ***Philadelphia, PA***

Candidate for Master of Science in Engineering: Electrical Engineering, GPA: 3.97/4.0 *Aug 2018-May 2020*

Related courses: Machine Perception, Compute Vision, Deep Learning, Autonomous Racing, Model Predictive Control.

**Hunan University** ***Changsha, China***

Bachelor of Engineering: Electrical Engineering and Automation, GPA: 3.6/4.0 *Sept 2014-June 2018*

## WORK EXPERIENCE

**Kod-Lab (Upenn GRASP Lab)**, Graduate Research Assistant ***Philadelphia, PA***

- Used multiple **VL53L0X** (distance sensor) to measure the velocity of Minitaur leg. *Spring 2019-Present*
- Utilized C++ with Arduino IDE to control **Minitaur** leg to perform different gaits via **ODrive** motor controller.
- Joined **NSF project** "Collaborative Robotic Systems for Geosciences Field Research" to operated **X-Rhex** robot with Minitaur leg which was used as force sensor to provide preliminary map of soil erodibility.
- Applied **Reinforcement Learning** to a single leg of a direct-drive robot like Minitaur to learn a reactive controller.

## PROJECTS

**Robot Vision:** Learning Predictive Models from Observation and Interaction

- Utilized RoboNet to allow manipulation to learn dynamics models and inverse model via observation images.
- Applied dynamics and inverse model to RRT algorithm to predict next image with avoiding obstacles.

**F1/10 Autonomous Racing:** Reactive Method, Scan Match, RRT* and Obstacle-Dependent Gaussian Potential Field

- Utilized ROS(C++) to allow car use Point-To-Line ICP and follow the gap algorithm to avoid obstacles.
- Utilized **SLAM**: Google Cartographer to locate car, then utilized Practical Filter to collect waypoints.
- Designed algorithm: pure pursuit as global planner and **RRT*** as local planner to have end-to-end race.

**Computer Vision:** Image Stitching and Optical Flow

- Utilized Harris method to extract feature points and Used Adaptive Non-maximal suppression to pick feature points, then matched them by Descriptor, next applied **RANSAC** and computed Homograph matrix to transfer images.
- Applied the **Kanade-Lucas-Tomasi** tracking procedure to track the features and plotted bounding box by using Similar Transformation.

**Robot Obstacle Avoidance Project:** Obstacle Avoidance Using Model Predictive Control

- Utilized MATLAB to form path to avoid obstacles (**A star**, **Dijkstra** Path Planning and **Potential Field Method**).
- Formed cost function with **Control Lyapunov Function** as terminal cost to construct a MPC controller to track the trajectory formed by different tracking method.

**Deep Learning:** Fully Automated Deep Learning System For Bone Age Assessment

- Utilized Image Processing Technology, **SingleShot MultiBox Detector (SSD)** and **Mask R-CNN** to remove annotation markers and background border from image.
- Fed processed pictures to **GoogLeNet** with **Transfer Learning** to predict the age of bone.

## TECHNICAL REPORTS

**Weiyi Tang**, Sonia Roberts, Daniel E. Koditschek. *Control and Design of an Open-Source Two-Degree-of-Freedom Hopper.*

## SKILLS

Model Predictive Control, Adaptive Control, Robotics, Motion Planning, Machine Perception, Computer Vision, Deep Learning, Reinforcement Learning, Analog/Digital Circuits, Power Electronics.

**Programming:** C/C++, Python, Java, MATLAB, GAMS, Assembly language, Mathematica.

**Tools and OS:** ROS, PyTorch, TensorFlow, OpenCV, OpenAI, SolidWorks, Arduino, Latex, Microsoft Office, Ubuntu.