

YUNKAI CUI

(215)-459-2511 , yunkai@seas.upenn.edu
4228 Chestnut Street, Philadelphia, PA 19104
Personal Page: www.edwardcui.com

EDUCATION

University of Pennsylvania, SEAS, Philadelphia, PA

Expected: May 2014

Master of Science in Engineering in Robotics, SEAS

Current GPA: 3.93/4.0

Master's thesis topic: Environment based task generalization and understanding for modular robot reconfiguration

Shanghai Jiao Tong University, Shanghai, China

June 2013

Bachelor of Science in Mechanical Engineering, Honor Class

GPA: 3.54/4.3 (**Major Ranking:5/127**)

· SJTU-Penn "3+2" Exchange Submatriculation Program (Selected:2/40)

RESEARCH EXPERIENCE

S.M.O.R.E.S Modular Robot Platform

Apr. 2013 - Present

NSF funded research topic cooperating with Hadas's group at Cornell University

Modlab, Penn

- Studying the possible structure of Task Definition Language (TDL) for modular robot task specification, understanding and execution by adapting concepts from CMU model
- Establishing a math model for clustering tasks of modular robots based on parametric task descriptions
- Designing algorithm to achieve supervised classification of tasks to understand, label and generalize them
- Developing method to generate reconfiguration solution based on the generalized tasks and environment constraints, and to achieve optimization
- Designing an optimizer for planar motion of differential drive modules while considering the effect of dynamics
- Building simulation engine for modular robot based on GAZEBO and coding the public libraries
- Working on the hardware and simulation integration by embedding ROS

Image Segmentation Based on Vectorized Pixel Color

Oct. 2013 - Present

Independent project

GRASP, Penn

- Developing a method to group similar pixels along the edges found by a weaker edge detector based on cosine similarity of the color vector
- Applying the L2 norm of the differential fields of neighbor pixels to build segment boundaries
- Optimizing the computational cost by valid approximation and vectorization

PennApps Hackathon

Jan. 2013

Largest worldwide college hackathon, lead Developer

SEAS, Penn

- Best OpenTok app winner
- Designed a system structure that allowed users to remotely control robots through TCP/IP protocol
- Programmed the robots, wireless controller, server and communication protocol between the server and robots

Self-adaption Solar Battery Modular Mobile Vehicle

Aug. 2012 - Jun. 2013

A National Natural & Science Foundation of China funded project, core member

Robotic Institute, SJTU

- Redesigned mechanical structure of modular mobile robot powered by self-adaption solar voltage battery panel
- Developed an upgraded version of potential field algorithm for path planning and obstacle avoiding by introducing an inertia factor
- Created a new type of optical communication port between different modules driven by CAN bus protocol
- Applied distributed scheme for the software layer of the control system

SJTU Freescale Cup Intelligent Car Racing Team
Team for the most famous engineering competition in China

Dec. 2009 - Aug. 2011
Cyber Vehicle Group, SJTU

- First Prize winner of Eastern China
- Developed a special arrangement of self-inductance sensors that could effectively detect the shape of the magnetic field
- built a magnetic field description model base on Biot-Savart Law
- Optimized control algorithm for coupled dynamic system of car and reduced computational cost

PUBLICATIONS IN PROCESS

Working with Dr. Mark Yim, "A Task Understanding and Generalization Scheme for Modular Robot" (Master's thesis)

Working with Dr. Jean Gallier, "Planar Motion Optimization for Differential Drive Robots, a Dynamics Approach"

HONORS AND AWARDS

Dean's List, SEAS, Penn	2012 - 2013
Excellent Undergraduate Student Creative Project Award, SJTU	Apr. 2012
Shanghai Jiao Tong University-Tyco International Scholarship	Dec. 2011
Government Award for Excellent College Student Creative Projects, Shanghai	Sept. 2011
Excellent Volunteer and Week Star in Shanghai EXPO	Oct. 2010
First Prize winner in 26th CPhO (Chinese Physics Olympiad)	Mar. 2009
Gold Medal Winner, 15th Hope Cup National Mathematics Contest, China	Nov. 2005

PRESENTATIONS

PennApps Top 20 Demonstration, 2013 Spring

Irvine Auditorium, University of Pennsylvania, Philadelphia, PA Jan. 2013

- The hardware and software structure of the "Skynet" remote robot arena network

WORK HISTORY

Research Assistant

Modlab, GRASP lab, University of Pennsylvania Apr. 2013 - Present

- Supervised by Dr. Mark Yim, working on general modular robot topics

Teaching Assistant

MEAM 520, Introduction to Robotics, SEAS, Upenn Aug. 2013 - Present

Teaching Assistant

CIS 515, Fundamentals of Linear Algebra and Optimization, SEAS, Upenn Aug. 2013 - Present

PROFESSIONAL AFFILIATIONS

Institute of Electrical and Electronics Engineers (IEEE) Student Member

EXTRACURRICULAR ACTIVITIES

Co-founder of planpri.com, a plan sharing and activities organizing system (offline) Spring 2012

Associate Supervisor and Manager of Student Gymnasium, SJTU Spring 2010 - Spring 2012

Youth Scientist Fellow of Shenyang Academy of Sciences, Liaoning, China Spring 2009

TECHNICAL STRENGTHS

Programming	C++, C, Matlab, Python, JavaScript, SQL, PHP, HTML, CSS, Linux, Latex
Libraries & APIs	GAZEBO, OpenGL, jQuery, Node.js, Oracle
Designing	Solidworks, Siemens NX, AutoCAD, Altium Designer, Simulink, Labview, Qt
Fabrication	Laser-Cutting, Manual Machining, Electronics/Soldering, Table Saw, Drill Press