Shanhe (William) Wang

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EDUCATION

M.S., Robotics	Northwestern University, Evanston IL	GPA 3.89	Dec 2018
B.S., Mechanical Engineering	University of California Berkeley, Berkeley CA	GPA 3.57	May 2014

SKILLS & KNOWLEDGE

- Programming Languages: Python, C/C++, MATLAB
- Software: ROS, Gazebo, Git, Linux, LabView, SolidWorks LaTeX
- Knowledge: Visual Servoing, Forward/Inverse Kinematics, Dynamics, Feedback Control System, Point Cloud Precessing, Computer Vision, Deep Learning, Data Structures, Mechatronics

PROJECTS (Portfolio Website *willshw.me*)

Visual Servoing for Objects without Prior Models, *Northwestern University, IL* Sep 2018 - Dec 2018
Implementing visual servoing on a robotic arm for grasping an object without a prior geometric model

- Applied position-based visual servoing control schemes to Kinova Mico robotic arm
- Fused object detection and tracking to improve tracking robustness and enable dynamic assignment of objects of interest
- Located an object and segmented its point cloud from raw RGBD sensor data
- Estimated a pre-grasping pose for a dynamic object using point cloud alignment and particle filter

Robot Automated Proprietary Camera Rig Calibration, *Northwestern University, IL* Apr 2018 - Jun 2018
Developed software to automate calibrations of camera rigs for Intelligent Flying Machines in Chicago

- Programmed UR3 robot to automate extrinsic and intrinsic calibrations of camera rigs deployed in warehouses
- Developed and refined proprietary camera calibration pipeline to enhance usability and calibration accuracy
- Optimized image data processing to locate camera rotational center at subpixel accuracy
- Generated maps for calibrated cameras to improve localization and estimation
- Integrated the calibration software into a ROS package and documented the usage of the ROS package

Autonomous Ball-in-a-maze Puzzle Solving Robot, *Northwestern University, IL* Sep 2017 - Dec 2017
Collaborated with 4 teammates to program a Sawyer robot to solve a ball-in-a-maze puzzle quickly and reliably

- Designed search algorithm for a global path plan and dynamic local path for the robot to roll a ball to a goal point
- Implemented joint velocity controllers to track a target pose of the maze attached to robot end-effector for controlling ball's rolling motion
- Responsible for integration of teammate's software capabilities into a single software pipeline enabled by ROS

WORK EXPERIENCE

Research Engineer Jul 2014 - Jul 2017
University of Southern California Institute for Creative Technologies, Los Angeles CA

- Developed xCapture, a network-based camera software system that can control a large number of cameras and manage image data to provide centralized camera management and simplify capture sessions; the system was adopted by AR industry partner
- Programmed xCapture in C++ using multithreading, socket programming, OpenCV and FFmpeg to provide live-view of all cameras, acquire raw image data, process raw image data, data playback and focus peaking assistance
- Streamline tasks on the xCapture server, such as data management, camera control message broadcasting, system logging, etc. using Python, Bash, and PHP scripts
- Researched and prototyped the virtual head-mounted camera (VHC), and published the project in ACM SIGGRAPH 2015 Emerging Technologies, "Virtual Headcam: Pan/tilt Mirror-based Facial Performance Tracking"
- Implemented autofocus function and high precision motor controller on VHC to enable high-performance tracking and clear image data acquisition

PUBLICATION

X. Yu, **S. Wang**, J. Busch, T. Phan, T. McSheery, M. Bolas, P. Debevec, "Virtual Headcam: Pan/tilt Mirror-based Facial Performance Tracking" in *ACM SIGGRAPH 2015 Emerging Technologies*