# Sheng-Cheng ‘Benson’ Lee

Phone: +886 926789484

Address: No. 47, Ln. 186, Fuhua St., Zhongli Dist.,
Taoyuan City 320, Taiwan (R.O.C.)

Email: bensonpuppy1997@gmail.com

GitHub: https://github.com/biomotion

## Education

**B.S.** in Electrical and Computer Engineering,

National Chiao Tung University (NCTU), Taiwan.(Sep. 2016 ~ Jun. 2020)

**M.S.** in Electrical and Control Engineering,

National Chiao Tung University (NCTU), Taiwan.(Sep. 2020 ~ present)

Advisor: Chieh-Chih Wang

## Employment

**Autonomous Driving Vehicle Team**, Industrial Technology Research Institute

## Teaching

**Teaching Assistant**, Introduction to Artificial Intelligence, National Chiao Tung University (2019)

**Teaching Assistant**, AI Driving Olympics Summer School, Duckietown Taiwan (2018)

## Research Interest

Robotics, Robot Localization, Multi-robot Navigation, Robotics Education, Enbedded System

## Award & Competition Experience

Top 24, IRHOCS Robot Challenge: Robot Bowling, Taiwan (2014)

No. 1, 2014 Robot Battle League: Tangled Fight, SKS, Taiwan (2014)

UAV Lead, DARPA Subterranean Challenge: Team NCTU (2019 - 2020)

## Projects

- **Dynamixel Manipulator Controlled by Motion Sensing with Microsoft Kinect (2014)**

  Video: Link

  This project tries to establish a better interface between human and manipulators. With use of Kinect motion sensor, a body-controlled interface is introduced. People can manipulate a robot arm simply using their own arms. The interface is construct with NI LabVIEW, passing skeleton information calculated by Kinect to Dynamixel manipulator. As a high school student, I had learned a lot of knowledge about math, coding and hardware.

- **Unknown Environment Localization System (2019)**

  Poster: Link

  Simultaneous localization and mapping (SLAM) is always a big issue in robot control. This project is about the concept of improving the SLAM result by deploying anchor nodes into an unknown environment. Anchor Ball is an active, intercommunicative Landmark, which contains an embedded computer along with a wide-angle camera, xBee in use of communication, and an Ultra-Wide Bandwidth (UWB) Antenna to provide accurate localization result.

  By detecting AprilTags with camera and localize the UWB tag, we are able to decrease the accumulating error of SLAM and improve the efficiency of map exploring. The concept is still being verified in DARPA SubT Challenge.

- **Nuclear Disaster Strain Robot (2019)**

  Report: Link, Video: Link

  Nowadays, more and more robots are capable with a lot of skills, e.g. self-driving, cooking, guiding...etc. While people try to equipped them with skills which we all can do, few people think about to have them achieve some mission people cannot do. Nuclear Disaster Strain Robot (NDSR) is a project trying to extend the ability of robot, making them explore into the area where is destroyed with a nuclear disaster.

  NDSR combines two technologies, which is localization and perception. Using NVIDIA Jetson Nano as compute central, we mount a depth camera to detect artifacts in the ruined city and a UWB localization device to acquire the location information.

## Robot Used

- Luxgen S3, data collection vehicle with cameras, lidars and a scanning radar mounted on
- Clear Path Husky UGV, a medium size robot development platform
- Duckiefloat, a self-made helium blimp designed for long operation time
- Anchor-ball Robot, a ball like robot used for unknown environment exploration and localization

## Technical Skills

Programming Language: C/C++, Python, MATLAB, Java, JavaScript, LabVIEW, Verilog

Middleware for Robotics: Robot Operation System (ROS)

Embedded Devices: Arduino, Raspberry Pi, NVIDIA Jetson Nano/TX2/Xavier, ESP8266
Xilinx zc702, Microtime PXA270

Other Skills: 3D Printing and modeling, Solidworks, Rhinoceros

Sensors: Velodyne Lidars(VLS129, HDL32), Ouster Lidar OS-1 128, Navtech CIR204-H Radar

## Relavent Coursework

Object-Oriented Programing, Automatic Control System, Digital Signal Processing, Linear System Theory, Principle of Microcomputer, Microcomputer Systems and Lab, Self-Driving Cars