Sheng-Cheng 'Benson' Lee

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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)

Research Interest

Robotics, Localization, Perception, Multi-robot Navigation, Education

Award

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

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

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. Using 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, connecting skeleton information calculated by Kinect to dynamixel manipulator. As a high school student, I've learn a lot knowledge about math, coding and hardware.

- **Phonebot (2018)**
  Poster: Link

  Phonebot is a brand new concept which intends to change the relationship between human and robot. Robot is always a high-end technology who is hard to learn and difficult to get familiar to. Our team wish to build a cheap, lightweight and easy-to-use robot controlled by normal mobile phone. In this project, we design a 3D-printable structure equipped with Matrix-MINI, an arduino based board design by Matrix Corp. With the connection via bluetooth, it is easier and more straight forward to control a robot without learning many skills.

Unknown Environment Localization System (2019)

Poster: [Link]

Simultaneous localization and mapping(SLAM) is always a big issue in robot controll. 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 a raspberry pi along with a wide angle camera, xBee in use of communication, and an UWB device to provide accurate localization result.

By detecting AprilTag with camera on RPi and localize the UWB tag, we should decrease the error of SLAM and improve the efficiency of map exploring. The concept and research is still being verified in DARPA SubT Challenge.

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

Report: [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 can't 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

Duckiebot, Super Duckiebot, Anchor-ball Robot, Matrix KNR Robot, ROBOTIS Dynamixel Manipulator

Technical Skills

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

Middleware for Robotics: Robot Operation System (ROS)

Libraries and Toolbox: OpenCV, GitHub

Embedded Devices: Arduino, Raspberry Pi, NVIDIA Jetson Nano, ESP8266

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

Relavent Coursework

Introduce to Computer Science, Java Programing, Object-Oriented Programing, Automatic Control System, Digital Signal Processing, Principle of Microcomputer.