

Huang, Bo-Ruei

EDUCATION

National Taiwan University – B.S. in Mechanical Engineering (Aug. 2017 – Current)

Academic Performance: Overall GPA: 4.03/4.30; Major GPA: 4.03/4.30, Rank 13/186

Relevant Courses: Robust Control; Stochastic Control; Computer Vision; System Identification; Data Structures and Algorithms; Viscous Flow; Advanced Heat Transfer; Aviation Safety with Case Studies; Flying Machines

SKILLS

Computer Languages and Environments: Python, C/C++, Matlab, ROS(1/2), Linux(Ubuntu)

Embedded System: Keil uVision, ARM GCC Toolchain, OpenOCD, STM32F1/F4, Arduino

CFD: Ansys Fluent, OpenFOAM(dsmcFoam+)

Language: TOFEL: 101 | GRE: 320, AW: 3

EXPERIENCE

Undergraduate Research Project – Computational Fluid Dynamics

Mar. 2020 – Present

Fluid Physics Lab

National Taiwan University

- Simulated the time evolution of a H_2 bubble when a shock wave passes through it using dsmcFoam+. We expected this simulation will reveal the influence of different fuel injector parameter to the combustion efficiency.
- Used Rankine-Hugoniot equations to estimate required flow properties before/after the shockwave and set up the boundary and initial condition.
- Built and ran the test case as well as a convergence test to validate those simulation result. I also ensured that the shockwave speed is same as my prior calculation.

Internship – Assistance Engineer

Jun. 2021 – Present

FARobot, Inc.

New Taipei City, Taiwan (R.O.C)

- Enhanced the autonomous mobile robot docking system which positions the charging station by QRCode array. The precision is thus crucial because the electrode on the charging plate is only few centimeters widths.
- Built a circumcenter estimator that can detect the circumcenter of the QRCode array, and calculated the transition quaternion between frames to detect the robot motion.
- Took advantage of position and its transition data to filter out undesired outliers by setting thresholds, thus reduced the range of error distribution by 50 percent.

Internship – Assistance Engineer

Aug. 2020 – May. 2021

ADLINK Technology Inc.

New Taipei City, Taiwan (R.O.C)

- Evaluated the performance of microROS middleware on freeRTOS and a STM32F4 chip. We hoped to determine the potential of deploying this environment to the company's products.
- Designed a micro-ROS node that could perform round trip test and record latency data as well as memory usage data with respect to different topic size.
- Found the middleware have linear memory usage and latency as the message size through the topic increases. The information will be important when deploying this moddleware onto resource limited environment,

Electronic Group Leader

Sep. 2018 – Aug. 2020

Formula SAE Racing Team

National Taiwan University

- Led a 6 people team to build the safety circuit, the sensor network and the data acquisition program on the FSAE vehicle.
- Aimed to provide sensor data including pedal input, inertial measurement unit data and GPS location to the motor controller and for afterward analysis.
- Used Raspberry Pi, Arduino and STM32 for data acquisition system which collects over 2 hundreds of sensor data per second via CANBUS.
- Linked GPS data and accelerometer together in Matlab so that driver and teammates can discuss the performance in certain part of the track.

PROJECTS

Computer Vision Course | Python(OpenCV)

Mar. 2021 – Jun. 2021

- Completed the Video Frame Interpolation project that required us to produce intermediate frames between 2 adjacent frame.
- Used PWCnet optic flow to determine intermediate frame pixel value and used consistency check to build occlusion map for each intermediate frame.
- Implemented various algorithms includes Harris Corner; Joint Bilateral Filter; kNN; CNN network; Homographic Estimation; RANSAC; Stereo-Matching

Robust Control Course | Matlab

Mar. 2021 – Jun. 2021

- Designed a robust controller for RC airplane pitch dynamics.
- Derived the 2nd-order transfer function and essential constants such as equivalent damping coefficient for pitch dynamics, then designed a controller by using Matlab Robust Control Toolbox and above transfer function.
- Simulated the controlled system and showed that it can stabilize pitch angle whose center of gravity can have uncertainties of 65mm along longitudinal axis.

AWARDS

Drone Innovation and Application Competition

Taipei, Taiwan(R.O.C)

Taipei Computer Association

Dec. 2020 – Jul. 2021

- Proposed an autonomous aircraft that can carry a 10kg workload and have a flight range of 15km.
- Designed a tandem wing tailsitter whose lift-drag ratio calculated by ANSYS was low enough to fulfill the requirement. We also aimed at improving resistance against side wind during its take-off and landing phase.
- Proposed a control strategy that required our drone to face the wind in a lowest drag orientation and verified its performance using SIMULINK. The system will converge in a 10m/s 15 degree side wind.
- High Distinction Award (top 5 over 67 teams)