Russell Buchanan

russell@robots.ox.ac.uk
raabuchanan Russell Buchanan

Education

DPhil Engineering Science — *Oct 2019 – Present*
University of Oxford — *Oxford, United Kingdom*

MSc of Robotics, Systems and Control — *Sep 2016 – Dec. 2018*
ETH Zürich (Swiss Federal Institute of Technology in Zürich) — *Zürich, Switzerland*

B.Eng Electrical Engineering — *Sep 2012 – May 2016*
McGill University — *Montréal, Canada*

Work Experience

Research Engineer — *Jan. 2019 - Sep 2019*
Robotics Engineering for DARPA SubT Challenge — *ETH Zürich*
Robotic Systems Lab — *Zürich, Switzerland*

- Multiple sensor timing synchronization.
- Embedded systems programming.
- Whole-body planning algorithms for legged robots.

Research Assistant — *Oct. 2016 - Mar. 2017*
Software Engineering for Quadruped Robot ANYmal — *ETH Zürich*
Robotic Systems Lab — *Zürich, Switzerland*

- Multiple sensor timing synchronization.
- Embedded systems programming.
- Implemented CAN bus on PX4 system with Nuttx RTOS.
- Designed an Xbee radio wireless communication ROS package in C++.

Software Engineering Intern — *Jun. 2017 - Dec. 2017*
ABB — *Baden, Switzerland*

- Created web-based interface in Python and JavaScript.
- Designed hardware and software tests for an embedded FMCW radar platform.
- Researched and implemented signal processing and motion tracking algorithms.

Research Experience

Master Thesis: Legged Robot Navigation in Confined Spaces
Supervisors: Navinda Kottege, Tirthankar Bandyopadhyay, Marco Hutter
Data61 Robotics and Autonomous Systems Group
Jan. 2018 - Sep. 2018
CSIRO Data61
Brisbane, Australia

- Created 3D mapping system to identify free space in confined environments.
- Designed trajectory optimization planners for legged robots to adapt posture.
- Performed experimentation and validation with various legged robots and distance sensors.

Semester Thesis: Visual-Inertial SLAM for Micro Aerial Vehicles
Supervisors: Inkyu Sa, Zachary Taylor, Roland Siegwart
Autonomous Systems Lab
Feb. 2017 – Jun. 2017
ETH Zürich
Zürich, Switzerland

- Created visual-inertial implementation of ORB_SLAM2 for ROS.
- Validated design on multiple MAVs with state-of-the art visual-inertial sensors.
- Showed improved tracking over the standard pure visual implementation.

Project Manager: Autonomous Underwater Vehicle
Student Design Team
McGill Robotics
Sep. 2013 – Aug. 2016
McGill University
Montréal, Canada

- Leader of over 70 students in designing an AUV for the RoboSub Competition
- Manager of a two year engineering project with a budget of over $50 000 CAD.
- Implemented a 6DoF PID controller in ROS and Python.
- Finalist, placing 7th out of 48 international teams as well as 2nd place technical report.

Bachelor Honours Thesis: Infrared-Based Landing System for Autonomous Quadrotor
Supervisor: Meyer Nahon
Aerospace Mechatronics Lab
Jan. 2014 - Dec. 2015
McGill University
Montréal, Canada

- Designed infrared camera system to track IR LEDs for autonomous landing.
- Implemented PnP solution for tracking IR points on an Arduino microcontroller.
- Integrated with Simulink LQR controller for autonomous landing on moving platform.

DAAD RISE Research Intern
Embedded Wireless Communication for Multiple Quadcopters
Chair of Systems Theory and Control Engineering
Jun. 2015 - Aug. 2015
Universität des Saarlandes
Saarbrücken, Germany

- Development of Xbee radio network for up to 10 autonomous multirotor vehicles.
- Modified an existing C API to stream motion capture data between on-board microcontrollers and a base station PC.

Publications

- R. Buchanan, T. Bandyopadhyay, M. Bjelonic, L. Wellhausen, M. Hutter, N. Kottege. "Walking Posture Adaptation for Legged Robot Navigation in Confined Spaces", *IEEE Robotics and Automation Letters*, vol 4, no. 2, pp. 2148-2155, April, 2019.

Skills

Software	C++, Python, ROS, Linux, Javascript, Matlab.
Embedded Systems	PX4 stack, NuttX, FreeRTOS, Arduino.
Hardware	Cameras, RGBD, LIDAR, IMU, embedded electronics.