Peter Zheng

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Education

PhD in Aerial Robotics, Imperial College London **Oct 2017 – Nov 2022**
Micro Integrated Quadrotor Robots for Forest Applications
Fully-funded scholarship, 6 publications in Nature Scientific Reports, RA-L/IROS, RoboSoft etc.

MEng in Aeronautical Engineering, Imperial College London **Oct 2013 – June 2017**
First class honors, 3^{rd} year aerial construction group project received the Best Innovation Prize from industry panel

Employment History

Graduate Teaching Assistant, Imperial College London **Sept 2018–March 2019**
Supervised 30-student teams on creating a TOF obstacle avoidance system, taught multicopter PID control

Engineering Intern, SkyCity Robotics Ltd, UK **July 2016 – July 2017**
Lead two colleagues in designing the mechatronics of a tethered window cleaning robotic demonstrator for a start-up

Commercial Research Projects

Modular tree climbing robot (Ongoing)
- Design and manufacture modular multi-DOF articulated tracked robot to climb and access tree canopies
- Developed algorithm (C++) for I2C slave-master identification when combining multiple modules
- Designed custom PCB (Fusion 360) for embedded electronics, motor drivers, and SMD components
- Novel suspension and revised PCB improved ground clearance by 100% whiles reducing the robot's size by 20%

Academic Research Projects

Supervised learning with drone sounds and flight odometry for obstacle detection (Ongoing)
- Develop deep learning models (PyTorch) to predict noise intensity from drone commands with onboard microphone
- Studied analytical models to inform drone design and maximize signal-to-noise ratio
- Achieved 99% prediction accuracy in sound intensity using proprietary neural network architecture

Tilting rotating measuring ring quadcopter (Ongoing)
- Designed and built a multi-body drone that measures tree diameter using its tilting protective ring
- Modeled the drone with real-life constraints (Python) to optimize flight controller placement
- Proposed algorithm to simplify multi-variate design trade-off problems by finding universal trends, reducing a 10-dimensional study to 3-dimensional

Integrated metamorphic quadcopter structure with tendon-driven actuation for perching
- Designed articulated drone arms (Creo) capable of sustaining in-flight loads and deforming to perch on trees.
- Developed cable drive gear system with 3D printed metal components
- Analytical and numerical modeling (MATLAB) of the morphing arm and motor dynamics for parametric studies.
- Converted 3D plastic printing manufacturing processes to laser cut and pressed composite sandwich, increasing component production yield by 80%, reducing manual manufacturing time by 50%, and increased part performance.
- Designed state machine to autonomously detect contact with tree branches and perch.

Synchronised multi-axial tilting rotor quadcopter
- Develop the mechatronics and gimbal mechanism to synchronously tilt four rotors in both roll and pitch axis
- Developed the control allocator algorithm to enable thrust differential compensation at hardware tilt limit

Offboard radio controlled autonomous flight system using motion capture
- Developed an offboard autonomous flight system (ROS) that outputs the command to the robot via RC radio.
- Adapted open-sourced MPC packages for aggressive trajectory flight
- The system mitigated the cost of integrating flight computers. Used on 5 published works with aerial robots weighing from sub-100g to 2kg.

Skills and Interests

Languages:	English (Native), Mandarin (Native), Cantonese (Native)
Technical Skills:	Adobe CC apps, C++, Creo Parametric/Simulate, Fusion 360, G-code (Marlin 2/RepRap) Linux, MATLAB/Simulink, Python, PyTorch, ROS, Solidworks
Hobbies:	Basketball, badminton, tennis, music production, board games, reading