

# Joseph Gardner

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## Personal Profile

Enthusiastic and ambitious MEng electronic engineering graduate with a strong interest in software engineering, with experience primarily in robotics and embedded electronics. Also interested in applying mathematics and theoretical knowledge to practical problem solving. Have a considerable amount of experience working on collaborative and independent projects in these fields and am highly motivated to apply my skills to a role in industry.

## Skills

- **C/C++/Python:** Proficient in C++. Programmed for real-time software problems in C++ and occasionally C for embedded systems, using microcontroller breakout boards such as ARM Mbeds or Arduinos, as well as experience with programming for sensor fusion with IMUs and RGB-D cameras. Project experience with utilising the robot operating system (ROS) with both Python and C++ for real-time multitasking in robotic systems. Some experience with the TensorFlow and OpenCV libraries for implementing computer vision tasks such as hand gesture tracking.
- **Digital signal processing & MATLAB:** Experienced in MATLAB, coded using it for many courses and labs including implementing standard FIR/IIR filters, adaptive filters and other signal processing techniques.
- **Mathematics:** Extensively used various techniques throughout projects, including: Linear algebra and 3D transforms, kinematics, state estimation methods, optimisation, signal processing, deep learning (for computer vision). Used the Eigen C++ library extensively. Always interested to learn more techniques and their applications.
- **Hardware:** Multitude of experience designing simple circuits and PCBs, both analogue and digital. In addition a large number of projects and coursework throughout university involved circuit debugging through use of oscilloscopes or spectrum analysers. Good soldering skills.
- **Foreign Languages:** German (intermediate - advanced), Japanese (intermediate)
- **Other skills:** Linux, Git, GCC toolchain, ROS, sensor fusion, Microsoft office, LaTeX, driving licence (UK - clean)

## Engineering Projects

**4<sup>TH</sup> YEAR SENSOR FUSION FOR BALANCE CONTROL IN BIPEDAL ROBOT (SOLO) | OCT 2019 - AUG 2020 | IMPERIAL COLLEGE LONDON**

**Awaiting grade**

- Developed a state estimation algorithm for pose tracking in a novel bipedal robot which instead of knee joints has prismatic (sliding) joints.
- Incorporated both inertial (from an IMU) and visual (from an RGB-D camera) data into a Kalman filter, running in real-time over ROS, providing a visualisation of the local environment and path of the robot with point clouds and markers (in simulation due to COVID-19).

**3<sup>RD</sup> YEAR SPINE MOTION TRACKING SHIRT (GROUP PROJECT) | APR - JUN 2019 | IMPERIAL COLLEGE LONDON**

**Grade - 70%**

- Designed and constructed a prototype of wearable device to enable the recording of spinal movement unobtrusively, permitting the user to view a generated 3D model in real-time.
- Developed as a cheaper alternative to current optical methods.
- Championed embedded software to fuse sensor data from 3 separate sensors and transmit across Bluetooth classic to both a laptop and mobile phone app.

- Additionally, planned the layout of the hardware to ensure the project was robust and easy to use.

## **2<sup>ND</sup> YEAR MEDICAL DRONE ARM (GROUP PROJECT) | OCT 2017 – MAY 2018 | IMPERIAL COLLEGE LONDON**

**Grade – 74%, won first prize for best 2<sup>nd</sup> year project**

- Collaborated in a team of 7 to design and build a prototype of a medical delta robot arm attachment for a drone.
- Formulated and tested circuits on breadboards and stripboards as well as debugged any hardware issues so that the system components worked together coherently.

## **Education**

### **MENG ELECTRICAL AND ELECTRONIC ENGINEERING | 2016-2020 | IMPERIAL COLLEGE LONDON**

**Grade - 2:1**

*Modules include:* 4<sup>th</sup> year: Human-Centred Robotics, Adaptive Signal Processing and Machine Intelligence, Estimation and Fault Detection, Computer Vision, Digital Image Processing. 3<sup>rd</sup> year: Real-Time DSP, Embedded Systems.

### **A LEVELS AND GCSES | 2009-2016 | KING EDWARD VI CAMP HILL SCHOOL FOR BOYS**

*A2 levels:* Maths (A\*), Physics (A\*), German (A), *AS level:* Music (B)

*GCSEs:* 10 A\*- Cs, including 8 A\*s

## **Experience**

### **BARTENDER | AUG 2017, AUG 2018 | HAP RECRUITMENT**

- Extremely high-pressure and fast-paced environment at two major UK music festivals requiring constant attention, speed, accuracy, teamwork and provided excellent customer service to the general public.

## **Personal Projects, Interests and Activities**

### **Personal Projects**

- Currently working on a personal project: an oscillator synthesiser module with a unique touchscreen-based interface. Working towards selling the product with an independent business - currently in the process of transferring the design from breadboard to PCB.
- Researching visual SLAM (simultaneous localisation and mapping) to get a better understanding of this more advanced field for future robotics work.

### **Interests**

- Passion for music (both composition and live playing). Play guitar in free time, strongly interested in music synthesis - currently building a modular synthesiser.

### **Activities**

- Volunteered for National Citizen Service (2015) where during the 3-week programme I worked in a group at a retirement home as well as created a campaign to promote awareness of a charity.

References available on request