






# Janith Petangoda

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 janithpet


 janithpet

 London, UK

## # Professional Experience

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### Applied Mathematician; Machine Learning, Finance, and Analog Computing


Signaloid Limited 

Apr 2024 – present  
Cambridge, UK

**Skills:** C, Go, Rust, Python, Quantitative Finance, Uncertainty Quantification, Monte Carlo methods, Analog Computing


- Made mathematical and technical improvements to Signaloid's uncertainty-tracking microarchitecture.
- Applied Signaloid's technologies to Machine Learning and Finance.
- Developed an improved processor representation that enabled uncertainty tracking in new applications.

### Research Associate in Probabilistic Computing


Physical Computation Laboratory , University of Cambridge

Apr 2022 – Apr 2024  
Cambridge, UK

**Skills:** C, Go, Python, OCaml, Verilog, Automation scripting (Make), Processor design, Uncertainty Quantification, Gaussian Processes, Bayesian Neural Networks, Monte Carlo methods, Embedded Systems, PyTorch, TensorFlow



- Wrote research papers (see Publications section).
- Designed and implemented an extensible tensor operation and automatic differentiation framework in C for use in embedded systems.
- Wrote a SDK for running uncertainty-tracking experiments on the Signaloid Cloud Compute Engine .
- Wrote firmware for flash storage on embedded systems.
- Collaborated on topics including Control Theory (handling uncertainty in closed-loop control) and Materials Science (Lagrangian modelling of dislocation dynamics).

### Research Student Placement

PROWLER.io (now SecondMind Labs) 

Aug 2018 – May 2019  
Cambridge, UK


**Skills:** PyTorch, Python, Multi-task Reinforcement Learning, Deep Learning, Variational Inference

- Devised and implemented multi-task RL models using PyTorch.
- Wrote a paper: Disentangled Skill Embeddings for Reinforcement Learning .
- Gave an oral presentation  at the Learning Transferrable Skills workshop at NeurIPS 2019.

## Education


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### PhD in Computing: On the Structure of Learning and Transfer in Machines

Imperial College London; Supervised by Prof. Marc Deisenroth 

Oct 2017 – Jun 2022  
London, UK

**Skills:** Reinforcement Learning, Gaussian Processes, Differential Geometry, Linear Algebra, Measure Theory, Transfer Learning, Multi-task Learning, Meta Learning, Deep Learning, PyTorch, Tensorflow, JAX


- Introduced a differential-geometric first-principles theory of learning and transfer in machines. 

### MEng in Aerospace Engineering (First Class Honors)

University of Sheffield

Sep 2013 – Jun 2017  
Sheffield, UK

**Skills:** Control Theory, Thermodynamics, Fluid Dynamics, Aerodynamics, Machine Learning, Materials Science, Electrical and Electronic Engineering, Differential Equations, Linear Algebra, Finite Element Methods, Computational Fluid Dynamics

- Thesis  (supervised by Prof. Neil Lawrence) explored the use of Model-based Reinforcement Learning for control of a simulated robotic system.

## Skills

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**Software Engineering:** {High-level, Low-level} programming, Git, GitHub, LaTeX, Scripting, Docker, GCP.

**Research:** Machine Learning, Differential Geometry, Probability, Linear Algebra, Science Communication.

**Machine Learning:** Deep Learning, Gaussian Processes, Reinforcement Learning, {Multi-task, Meta, Transfer} learning.


## Programming Languages

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
### Python

Deep understanding of core language, Machine Learning frameworks (NumPy, PyTorch, Tensorflow), web frameworks.

### Go

Developed a SDK for interacting with the Signaloid Cloud Compute Engine API , other automation tools.

### Minor Experience


**Rust:** Created an automation tool that generates API endpoints on GCP with GitHub integration. Contributed to Meilisearch .

**Web/Cloud:** Designed and built websites for UCL-ELLIS (paid) and Farming on Crutches (not paid). Built backend REST API on GCP.

### C

Architected and developed a Machine Learning framework and wrote firmware for embedded systems.

### OCaml

Completed Advent of Code (2023) problems and wrote a build-utility tool. Wrote parser for annotating CV. Contributed to the OCaml compiler .

## Notable Projects

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- Gaussian Process Predictions with Uncertain Inputs Enabled by Uncertainty-Tracking Processor Architectures** [↗](#) Nov 2023 – Dec 2024  
Cambridge, UK  
*Accepted at MLCNP Workshop at NeurIPS 2024* [↗](#)
- Skills:** *Gaussian Processes, C, Python, Uncertainty Quantification, Monte Carlo methods, Microprocessor design*
- Formulated a method using an uncertainty-tracking microprocessor to efficiently compute the Gaussian Process predictive posterior distribution on uncertain inputs.
  - Code can be found on GitHub [↗](#).
- The Monte Carlo Method and New Device and Architectural Techniques for Accelerating It** Jan 2023 – Dec 2023  
Cambridge, UK  
*To be submitted*
- Skills:** *C, Go, Python, Uncertainty Quantification, Monte Carlo methods, Microprocessor design*
- Conceived a unified view of the Monte Carlo method.
  - Designed, implemented, and analysed experiments that compared Monte Carlo methods to automatic uncertainty quantification using an uncertainty-tracking microprocessor.
- Arbiter [↗](#) : A unit testing framework for C** Oct 2023 – present  
Cambridge, UK  
*Available on GitHub* [↗](#)
- Skills:** *C*
- Wrote Arbiter [↗](#), a simple-to-use lightweight unit testing framework written in C for C.
- Pascal [↗](#) : A tensor operation and automatic differentiation framework in C** Dec 2022 – present  
Cambridge, UK  
*Available on GitHub* [↗](#)
- Skills:** *C, Python, NumPy, Automatic Differentiation, SIMD*
- Wrote Pascal [↗](#), a tensor operation and automatic differentiation framework written in C.
  - Written to be easy-to-use, be easily extensible, and compile to a low-memory-footprint binary.
  - Tested possible SIMD optimisations.
- On the structure of learning and transfer in machines** [↗](#) May 2021 – Jun 2022  
London, UK  
*PhD Thesis*
- Skills:** *Reinforcement Learning, Differential Geometry, Measure Theory, Transfer Learning, Multi-task Learning, Meta Learning, Deep Learning*
- Developed a differential-geometric first-principles theory of learning and transfer in machines.
  - Presented a poster [↗](#) at the Mathematics of Machine Learning Symposium 2020 [↗](#).
- Disentangled Skill Embeddings for Reinforcement Learning** [↗](#) Aug 2018 – May 2019  
Cambridge, UK  
*Research Student project at PROWLER.io*
- Skills:** *Python, PyTorch, Reinforcement Learning, Transfer Learning, Variational Inference, Machine Learning*
- Developed a multi-task RL model for disentangling known structure in the rewards and dynamics spaces.
  - Gave an oral presentation [↗](#) at the Learning Transferrable Skills workshop at NeurIPS 2019.
- Development of Machine Learning based controller for problems of control** [↗](#) Sep 2016 – Apr 2017  
Sheffield, UK  
*MEng dissertation (Supervisor: Prof Neil D. Lawrence [↗](#))*
- Skills:** *Python, Reinforcement Learning, Gaussian Processes, Robotics*
- Refer to the Education section (MEng) for details.
- Documented experience and progress of the project on blog posts [↗](#).
- Sheffield Eco Motorsports** [↗](#) Sep 2015 – Apr 2017  
Sheffield, UK  
*Co-founder and Technical Director of University engineering team*
- Skills:** *Technical Director, Leadership and Team Management, Fund raising, Gaussian Processes, DC Motor design, Materials Science and Manufacturing*
- Founded (obtained funding, recruited team, etc) and led a student engineering team [↗](#) to compete at the Shell Eco Marathon [↗](#).
- Documented 2 years of experience founding and leading the team on a blog post [↗](#).
  - Gave a public presentation on the car at the Sheffield Festival of Science and Engineering 2017.
- Electronic Analogues of Regulatory Networks in Biological Systems** [↗](#) Jun 2015 – Jul 2015  
Sheffield, UK  
*Sheffield Undergraduate Research Experience project*
- Skills:** *Dynamical Systems, Genetic Regulatory Systems, Analog Computing, Analog Electronics design*
- Engineered analog circuits that simulate genetic regulatory systems (supervised by Prof Nick Monk)
- Presented a poster [↗](#) at the Physics of Living Matter 2016 symposium.

## 📚 Publications

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- Sensitivity Analysis of the Laser Power Control System to Measurement Noise in SLS 3D Printers** [↗](#) 2025  
*H Toshi, J Petangoda, C Samarakoon, P Stanley-Marbell (ArXiv)*
- Gaussian Process Predictions with Uncertain Inputs Enabled by Uncertainty-Tracking Processor Architectures** [↗](#) 2024  
*J Petangoda, C Samarakoon, P Stanley-Marbell (MLCNP Workshop at NeurIPS 2024)*
- On the structure of learning and transfer in machines** [↗](#) 2022  
*J Petangoda; (PhD Thesis)*
- Learning to Transfer: A Foliated Theory** [↗](#) 2021  
*J Petangoda, MP Deisenroth, and NAM Monk; (Under review at JMLR)*
- GENNI: Visualising the Geometry of Equivalences for Neural Network Identifiability** [↗](#) 2020  
*D Lengyel\*, J Petangoda\*, et al; (DiffGeo4DL Workshop at NeurIPS 2020: poster presentation) [↗](#)*
- A Foliated View of Transfer Learning** [↗](#) 2020  
*J Petangoda, NAM Monk, and MP Deisenroth; (ArXiv)*
- Disentangled Skill Embeddings for Reinforcement Learning** [↗](#) 2019  
*J Petangoda, S Pascual-Diaz, V Adam, P Vrancx, and J Grau-Moya; (Learning Transferable Skills Workshop, NeurIPS 2019: oral presentation) [↗](#)*