



# SEENIVASAN LALITHKUMAR

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## EDUCATION

### Doctor of Philosophy (PhD), Biomedical Engineering

 2019 – Ongoing  National University of Singapore, Singapore

- AI-assisted scene understanding in robotic surgery.

### B.Eng. (Hons) Electrical Engineering

 2016 – 2019  National University of Singapore, Singapore

- Design Centric Programme
- CAP: 3.94 / 5.0
- Student Exchange Programme at **Tampere University of Technology**, Finland.

### Diploma in Mechatronics

 2010 – 2013  Temasek Polytechnic, Singapore

- Diploma with Merit and Diploma plus in Life Sciences Fundamentals

## PUBLICATIONS

### Key Highlights

- Seenivasan, L., Islam, M., Krishna, A. K., & Ren, H. (2022). Surgical-vqa: Visual question answering in surgical scenes using transformer. In *International conference on medical image computing and computer-assisted intervention* (pp. 33–43). Springer.
- Seenivasan, L., Islam, M., Ng, C.-F., Lim, C. M., & Ren, H. (2022). Biomimetic incremental domain generalization with a graph network for surgical scene understanding. *Biomimetics*, 7(2), 68.
- Seenivasan, L., Islam, M., Xu, M., Lim, C. M., & Ren, H. (2022). Task-aware asynchronous multi-task model with class incremental contrastive learning for surgical scene understanding. (Accepted in IJCARs), *arXiv preprint arXiv:2211.15327*.
- Seenivasan, L., Mitharan, S., Islam, M., & Ren, H. (2022). Global-reasoned multi-task learning model for surgical scene understanding. *IEEE Robotics and Automation Letters*.
- Islam, M., Seenivasan, L., Ren, H., & Glocker, B. (2021). Class-distribution-aware calibration for long-tailed visual recognition. *UDL Workshop, International Conference on Machine Learning*.
- Islam, M., Seenivasan, L., Ming, L. C., & Ren, H. (2020). Learning and reasoning with the graph structure representation in robotic surgery. In *International conference on medical image computing and computer-assisted intervention* (pp. 627–636). Springer.
- Xu, M., Seenivasan, L., Yeo, L. L. L., & Ren, H. (2020). Stent deployment detection using radio frequency-based sensor and convolutional neural networks. *Advanced Intelligent Systems*, 2(10), 2000092.

## LIFE PHILOSOPHY

*“Follow your passion and it’s no longer work”*

## AWARDS

### National University of Singapore

- Outstanding Undergraduate Researcher Prize AY2017/2018
- FoE 32nd INNOVATION & RESEARCH AWARD (2018)

### Temasek Polytechnic

- Singapore Manufacturing Federation Metal, Machinery & Engineering Industry Group Project Prize 2013
- Commendation Award for Major Project 2013
- CCA Merit Award in Leadership 2013
- Director's List Award 2013
- Director's List Award 2012

### National Service, Singapore Police Force

- Commander's Outstanding Performance Award 2015
- Sword Of Merit, Police Officer Cadet Course 2014

## CITATION METRICS

Citations : 47

H-index : 4

i10-index : 1

(As of Jan 2023)

## SKILLS

Python

PyTorch

OpenCV

C / C++

Gazebo simulator

ROS

LabVIEW

Verilog

microcontroller programming

CAD Design

Mechanical Prototyping

## LANGUAGES

English

Tamil



- Ren, H., Chen, C. X., Cai, C., Ramachandra, K., & Lalithkumar, S. (2017). Pilot study and design conceptualization for a slim single-port surgical manipulator with spring backbones and catheter-size channels. In *2017 IEEE International Conference on Information and Automation (ICIA)* (pp. 499–504). IEEE.

## 👥 Collaborations

- Huailmé, A., Harada, K., Nguyen, Q.-M., Park, B., Hong, S., Choi, M.-K., ... Dou, Q., et al. (2022). Peg transfer workflow recognition challenge report: Does multi-modal data improve recognition? *arXiv preprint arXiv:2202.05821*.
- Nwoye, C. I., Alapatt, D., Yu, T., Vardazaryan, A., Xia, F., Zhao, Z., ... Wang, H., et al. (2022). Cholectriple2021: A benchmark challenge for surgical action triplet recognition. *arXiv preprint arXiv:2204.04746*.
- Pang, W., Islam, M., Mitheran, S., Seenivasan, L., Xu, M., & Ren, H. (2022). Rethinking feature extraction: Gradient-based localized feature extraction for end-to-end surgical downstream tasks. *IEEE Robotics and Automation Letters*, 7(4), 12623–12630.
- Lal, R., Swaminathan, R., Seenivasan, L., Qiu, L., & Ren, H. (2021). Scoopnet: 6dof pose estimation pipeline for origami-inspired worm robots. In *2021 IEEE International Conference on Development and Learning (ICDL)* (pp. 1–6). IEEE.
- Seenivasan, L., Bai, F., Ji, M., Gu, X., Tse, Z. T. H., & Ren, H. (2020). Shape tracking of flexible morphing matters from depth images. *IEEE Sensors Journal*, 21(6), 8234–8244.

## EXPERIENCE

### Research Engineer

#### National University of Singapore

📅 Dec 2020 – Ongoing 📍 Singapore

- Manage and lead projects with research interns

### Engineering Manager

#### Aitech Robotics And Automation Pte Ltd

📅 Aug 2019 – Jul 2020 📍 Singapore

- Lead and manage the R&D department
- Technical adviser & Design overall system architecture

### Software Engineer (Part-time), R&D Department

#### Aitech Robotics And Automation Pte Ltd

📅 Jun 2016 – Jul 2019 📍 Singapore

### Associate Engineer, R&D Department

#### Aitech Robotics And Automation Pte Ltd

📅 Jan 2016 – Jun 2016 📍 Singapore

- Develop robotic solutions in the Robot Operating System (ROS)
- Develop autonomous navigation stack (robot localization, navigation and obstacle avoidance)

### Temp Technical Support Officer

#### Temasek Polytechnic

📅 Oct 2013 – Jan 2014 📍 Singapore

- Involved in a research project in developing an indoor micro-aerial vehicle with autonomous navigation features without the aid of GPS

## NATIONAL SERVICE



### Assistant Superintendent of Police Reservist

📅 2021 – ongoing 👤 Singapore Police Force



### Inspector Reservist

📅 2016 – 2021 👤 Singapore Police Force



### National Service Inspector Active

📅 2014 – 2016 👤 Singapore Police Force

## LEADERSHIP

### Vice-Captain, Touch Rugby

📅 2018 – 2019 🏠 NUS Raffles Hall

### Captain, Touch Rugby

📅 2017 – 2018 🏠 NUS Raffles Hall

### Quartermaster, Temasek Polytechnic International Students Group

📅 2012 – 2013 🏠 Temasek Polytechnic

### Member, Scouts

📅 2007 – 2009 🏠 Vel's Vidyashram

## CO-CURRICULAR

### Touch Rugby

📅 2016 – 2019 🏠 NUS Raffles Hall

### Softball

📅 2016 – 2019 🏠 NUS Raffles Hall

### Board of Photography

📅 2017 – 2018 🏠 NUS Raffles Hall

### Temasek Polytechnic International Students Group

📅 2010 – 2013 🏠 Temasek Polytechnic

## PERSONAL INTEREST

