# Malik Saad Sultan

## Curriculum Vitae

**Present Address:**
*Hong Kong Applied Science and Technology Research Institute Company Limited*
*3/F, Photonics Centre, 2 Science Park East Avenue Hong Kong Science Park, Shatin, Hong Kong*
*+852 - 5530 7949*
*engr.saadsultan@gmail.com*
*maliksaadsultan@astri.org*


Malik Saad Sultan is a Associate Principal Engineer at ASTRI Company Ltd, Hong Kong's largest R&D center. With a passion for innovation and exceptional capabilities in computer vision and AI, Saad has earned multiple awards throughout his remarkable career, including the Best Employee Award in 2022. As a Projects Lead and Senior Researcher, he has led teams to deliver innovative systems for biometric recognition, environment sensing, and computer-aided diagnosis.

## Experience

2019

**Associate Principal Engineering – Software System (AI)**

**Projects Lead at ASTRI LTD**
**www.astri.org**

- Multimodal Transformer Architectures Unify Text and Visual Modalities Through Cross-attention Mechanisms.
- Development of Biometric Recognition System.
  - Face (2D & 3D), Iris, Palm Print, Palm Vein, Gait.
- Development of Smart External Sensing System.
  - People/Vehicle Detection & Counting on a Construction Site.
  - Personal Protective Equipment Compliance Check on a Construction Site.
  - Pose Estimation & Behaviour Analysis of Worker.
- Development of Smart Internal Sensing System.
  - Eye-Gaze Tracking in Near-Eye Head-Mounted Displays.
  - Iris Recognition in Near-Eye Head-Mounted Displays.
- Development of Biometric Sensing Fusion systems for AR/VR (Head Mounted Display).
- Development of Seamless Multi-Factor Human Centric Sensing Fusion system.
- Hand Gesture Recognition for Head-Mounted Display for AR Applications.
- Dynamic Vision Sensing System with Static Capturing Mode for Privacy Preserved behaviour analysis.

2014
2018

**Senior Researcher – Medical Image Processing**

**Projects Lead at Neadvance LTD**
**www.neadvance.com**

- Computer Aided Diagnosis System for Rheumatoid Arthritis (Musculoskeletal Ultrasound)
  - Image Denosing, Segmentation (Bones, Joint Capsule, Tendon), Feature Extraction and Classification (Mild, Moderate, Severe).
- Computer Aided Diagnosis System for Rheumatic Heart Diseases (Echocardiography Images – Including Doppler)
  - Image Denosing, Segmentation and Tracking (Heart Valves, Chambers, Walls, Regurgitation Jet of Blood), Feature Extraction and Classification (Mild, Moderate, Severe).

2010
2013

**Researcher – Robotic Vision**

**Projects Lead at Beijing Institute of Technology**
**www.bit.edu.cn**

- 3D Pose Estimation of the Robotic Arm for the Drawing Robot
  - Camera Calibration, Object Identification, Pose Estimation (Localization).
- Outdoor Vehicle Localization using Active Landmarks
  - Camera Calibration, Landmark Identification, Pose of Vehicle reference to the landmarks (localization), Shortest Possible Path to destination.

## External Supervisor

2021
2023

**Hong Kong Metropolitan University**, *Department of Electronic Engineering and Computer Science, School of Science and Technology*

## ASTRI's Intern Student Supervisor

2020
2022

**Emerging Sensing and Display Technology**, *IOTSAI ASTRI*

## Educational Background

2020

**Applied Behaviour Analyst (Autism therapy)**, *Registered Behavior Technician Course, Autism Partnership Foundation*

2014
2018

**PhD in Computer science**, *Faculty of Computer Science, University of Porto* (FCUP), Porto, Portugal

2010
2013

**MS in Mechatronics**, *Beijing Innovation Center for Intelligent Robots and Systems, Beijing Institute of Technology* (BIT), Beijing, China

## Thesis

### PhD Thesis

**TITLE** Diagnosis of Rheumatic Heart Disease Based on Ultrasound Videos

**ADVISOR** Prof. Miguel Tavares Coimbra

**CO-ADVISOR** Dr. Manuel João Ferreira

**FUNDING AGENGY** Funded by a project (Ref: NORTE-01-0247-FEDER-003507-RHDecho), under the PORTUGAL 2020 Partnership Agreement, through the European Regional Development Fund (ERDF) and Fundação para a Ciência a e Tecnologia (FCT-MAPi) under the grant no: PD/BD/105761/2014.

### MSc Thesis

**TITLE** 3D Visual Positioning System for Vehicles Using Infrared Landmarks and Dual Perpendicular Cameras

**ADVISOR** Prof. Huang Qiang

**CO-ADVISOR** Prof. Chen Xiaopeng

**FUNDING AGENGY** Funded by a China Scholarship Council, the National Natural Science Foundation of China under Grant no. 60925014 and 61273348 and Beijing Science Foundation under Grant no. 4122065

## Awards & Distinctions

2022 **Outstanding Employee Award**

2020–2022 **Consecutive 3 Years Best Team Award**, *ASTRI – CTO/IOTSAI/ESDT*

2014 **Secured FCT-MAPi Grant for PhD**

2014 **Secured RHEUMUS Research Project Grant**

2010 **Secured Chinese Scholarship Council (CSC) Grant for Master Degree**

2013 **Excellent Student Award from International Student Centre (ISC), 1st Prize**

2013 **Distinguished Student Award from Beijing Institute of Technology (BIT), 1st Prize**

## Research & Development Interests

- Artificial Intelligence (deep learning) Based Systems
- Augmented and Virtual Reality
- Smart Surveillance Systems
- Smart Biometric Systems
- Healthcare Applications
- Autonomous Vehicle
- Autism Intervention
- Robotics

## Languages

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|---|---|---|
| Urdu | Native | |
| English | Official Language | |
| Mandarin Chinese | Fluent | *1 Year Language Course at BIT, Beijing, China* |
| Portuguese | Basic Fluency | |

## Skills

| | |
|---|---|
| Programming | OpenCV, MATLAB, Python, PyTorch, Tensorflow |
| Project Management | Activity and Resource Planning, Organizing and Motivating a Project Team, Controlling Time Management, Ensuring Customer Satisfaction, Analyzing and Managing Project Risk, Monitoring Progress |

## Publications

## Patent

**US, China Patent** (2022) Alwin Tam, **M.S. Sultan**, Xiuling Zhu, Kenny Chan, "**An Artificial Intelligent Action Recognition Dynamic Vision Sensing System with Static Capturing Mode via Optical Approach**"(Submitted)

## Journal publication

**IEEE JBHI** Impact factor 5.772 SJR Q1 (2018) **M.S. Sultan**, N. Martins, E. Costa, D. Veiga, M.J. Ferreira, S. Mattos, M. Coimbra, "**Virtual M-Mode for Echocardiography: A New Approach for the Segmentation of the Anterior Mitral Leaflet**", (early access publication) in IEEE Journal of Biomedical and Health Informatics (DOI: 10.1109/JBHI.2018.2799738)

**IEEE JBHI** Impact factor 5.772 SJR Q1 (2017) N. Martins, **M.S. Sultan**, D. Veiga, M.J. Ferreira, F. Teixeira, M. Coimbra, "**A New Active Contours Approach for Finger Extensor Tendon Segmentation in Ultrasound Images using Prior Knowledge and Phase Symmetry**", (early access publication) in IEEE Journal of Biomedical and Health Informatics (DOI: 10.1109/JBHI.2017.2723819)

**Advances in Multimedia** (2015) N. Qadeer, D. Hu, X. Liu, S. Anwar, **M.S. Sultan**, "**Improving Shape Retrieval by Integrating AIR and Modified Mutual NN Graph**",Advances in Multimedia, (DOI:10.1155/2015/372172)

## Book Chapter

**Springer CCIS** (2017) **M.S. Sultan**, N. Martins, E. Costa, D. Veiga, M.J. Ferreira, S. Mattos, M. Coimbra, "**Tracking Anterior Mitral Leaflet in Echocardiographic videos using Morphological Operators and Active Contours**", Communications in Computer and Information Science, Biomedical Engineering Systems and Technologies, 881, Chapter 9, (DOI:10.1007/978-3-319-94806-5_9)

## Conference publication

**IEEE ENBENG** (2019) E. Costa, N. Martins, **M.S. Sultan**, D. Veiga, M.J. Ferreira, S. Mattos and M.T. Coimbra, "**Mitral Valve Leaflets Segmentation in Echocardiography using Convolutional Neural Networks**", in Proc. IEEE 6th Portuguese Meeting on Bioengineering (ENBENG), Lisbon, Portugal, Feb 2019.

**IEEE EMBC** (2018) **M.S. Sultan**, N. Martins, E. Costa, D. Veiga, M.J. Ferreira, S. Mattos and M.T. Coimbra, "**A New Method for the Anterior Mitral Leaflet Segmentation in Echocardiography Videos using the Virtual M-mode Space**", in Proc. IEEE EMBC, Honolulu, Hawaii, Jul 2018.

**IEEE EMBC** (2018) L. Pires, **M.S. Sultan**, N. Martins, E. Costa, D. Veiga, M.J. Ferreira, and M.T. Coimbra, "**Extracting Thickness Profiles of Anterior Mitral Leaflets in Echocardiography Videos**", in Proc. IEEE EMBC, Honolulu, Hawaii, Jul 2018.

**IEEE EMBC** (2018) N. Martins, **M.S. Sultan**, D. Veiga, M. Ferreira, Miguel Coimbra, "**Fully Automatic Finger Extensor Tendon Segmentation in Ultrasound Images of the Metacarpophalangeal Joint**", in Proc. IEEE EMBC, Honolulu, Hawaii, Jul 2018.

**IEEE BHI (2018)** N. Martins, **M.S. Sultan**, D. Veiga, M. Ferreira, Miguel Coimbra, "**Joint Capsule Segmentation in Ultrasound Images of the Metacarpophalangeal Joint using a Split and Merge Approach**", in Proc. IEEE BHI, Nevada, USA, March 2018.

**IEEE EMBC (2017)** **M.S. Sultan**, N. Martins, E. Costa, D. Veiga, M. Ferreira, S. Mattos, and M. Coimbra, "**Tracking Large Anterior Mitral Leaflet Displacements by Incorporating Optical Flow in an Active Contours Framework**", in Proc. IEEE EMBC, Jeju Island, South Korea, Jul 2017, (DOI: 10.1109/EMBC.2017.8037548)

**BIOSTEC (2017)** **M.S. Sultan**, N. Martins, E. Costa, D. Veiga, M. Ferreira, S. Mattos, and M. Coimbra, "**Real-time Anterior Mitral Leaflet Tracking using Morphological Operators and Active Contours**", in Proc. Int. Joint Conf. on Biomedical Engineering Systems and Technologies, BIOSTEC, Porto, Portugal, Feb 2017, (DOI: 10.5220/0006244700390046)

**BIOSTEC (2017)** E. Costa, N. Martins, **M.S. Sultan**, D. Veiga, M. Ferreira, S. Mattos, and M. Coimbra, "**A Preliminary Approach for the Segmentation of Mitral Valve Regurgitation Jet in Doppler Ecocardiography Images**", in Proc. Int. Joint Conf. on Biomedical Engineering Systems and Technologies, BIOSTEC, Porto, Portugal, Feb 2017, (DOI: 10.5220/0006248900470054)

**WCPCCS (2017)** E. Costa, D. Veiga, N. Martins, **M.S. Sultan**, M. Ferreira, M. Coimbra and S. Mattos, "**Doppler echocardiography for subclinical rheumatic heart disease evaluation of a computerised diagnosis of the mitral valve apparatus**", 7th World Congress of Pediatric Cardiology & Cardiac Surgery, Vol. 27, P2077, July 2017, (DOI:10.1017/S104795111700110X)

**IEEE EMBC (2016)** **M.S. Sultan**, N. Martins, D. Veiga, M.J. Ferreira, and M. Coimbra, "**Tracking of the Anterior Mitral Leaflet in Echocardiographic Sequences using Active Contours**", in Proc. IEEE EMBC, Orlando, USA, Aug 2016, (DOI: 10.1109/EMBC.2016.7590889)

**IEEE EMBC (2016)** N. Martins, **M.S. Sultan**, D. Veiga, M.J. Ferreira, and M. Coimbra, "**Segmentation of the metacarpus and phalange in musculoskeletal ultrasound images using local active contours**", in Proc. IEEE EMBC, Orlando, USA, Aug 2016, (DOI: 10.1109/EMBC.2016.7591627)

**BIOSTEC (2016)** **M.S. Sultan**, N. Martins, D. Veiga, M. Ferreira, M. Coimbra, "**Automatic segmentation of extensor tendon of the MCP joint in ultrasound images**", in Proc. Int. Joint Conf. on Biomedical Engineering Systems and Technologies, BIOSTEC, Rome, Italy, Feb 2016, (DOI: 10.5220/0005692500710076)

**IEEE EMBC (2015)** J. Oliveira, C. Oliveira, B. Cardoso, **M.S. Sultan**, M. Coimbra, "**A multi-spot exploration of the topological structures of the reconstructed phase-space for the detection of cardiac murmurs**", in Proc. IEEE EMBC, Milan, Italy, Aug 2015, (DOI: 10.1109/EMBC.2015.7319319)

**IEEE EMBC (2015)** **M.S. Sultan**, N. Martins, M. Ferreira, M. Coimbra, "**Segmentation of Bones and MCP Joint Region of the Hand from Ultrasound Images**", in Proc. IEEE EMBC, Milan, Italy, Aug 2015, (DOI: 10.1109/EMBC.2015.7319023)

**IEEE ICMA (2013)** **M.S. Sultan**, X.g Chen, G. Ma, J. Xue, W. Ni, T. Zhang, W. Zhang, "**Hand-eye 3D pose estimation for a drawing robot**", in Proc. IEEE ICMA,Takamatsu, Japan, Aug 2013, (DOI: 10.1109/ICMA.2013.6618105)

**IEEE ROBIO (2013)** G. Ma, H. Qiang, Z. yu, X. Chen, L. Meng, **M.S. Sultan**, W. Zhang, Y. Liu, "**Hand-eye servo and flexible control of an anthropomorphic arm**", in Proc. IEEE ROBIO, Shenzhen, China, Dec 2013, (DOI: 10.1109/ROBIO.2013.6739667)

**IEEE ROBIO (2013)** **M.S. Sultan**, X. Chen, N. Qadeer, T. Zhang, H. Qiang, "**Vision guided path planning system for vehicles using infrared landmark**", in Proc. IEEE ROBIO, Shenzhen, China, Dec 2013, (DOI: 10.1109/ROBIO.2013.6739455)

**IEEE ICMA (2012)** A. Yasin, Q. Huang, Q. Xu, **M.S. Sultan**, "**Humanoids Robot Push Recovery through Foot Placement**", in Proc. IEEE ICMA, Chengdu, China, Dec 2012, (DOI: 10.1109/ICMA.2012.6282737)