Cover Letter

I am an image data scientist with a multidisciplinary background. As a PhD computer science researcher, I worked on complex challenging problems on healthcare imaging data. These required mathematical and computational modelling and engineering solutions. The PhD was followed by two full-time research positions at a cardiac surgical lab at Imperial and then at a world-renowned imaging and robotics lab at King's College London. Both have been based in NHS hospitals and working closely with clinical practitioners such as doctors and radiologists.

I gained over 10 years experience in image data science, cardiac data, medical imaging, devices, AI and biomedical applications. I have strong interpersonal skills obtained by working in teams with researchers of diverse backgrounds, maintaining international collaborations, and supervising junior researchers. Currently, I am a senior researcher at King's College London where I usually lead or co-lead on various projects.

I have demonstrated excellent communication and presentation skills. I have supervised 42 short term projects with students and 18 more longer term projects, coaching and motivating colleagues towards completion. This is the best part of my current role, where I am able to share insights and experience on technical problems in my area of expertise and advise junior researchers. I deliver talks to present my ideas on a regular basis at large meetings and conferences. Most recently, I have organised international data challenge workshops in Barcelona, Nice and Athens, engaging with international collaborators and colleagues. Also, recently I completed a course on leadership.

I have been actively involved on commercial projects through private consulting. I have worked closely with stakeholders and managing directors, shaping their vision and bringing their ideas to life. Together we created software products that have made businesses more efficient and profitable.

I am looking for a Lead or Senior data scientist role in an established and forward-looking company where I can use my problem solving skills on exciting and diversified projects. My quantitative skills and multidisciplinary background will allow me to work in different industries and sectors such as finance, government, healthcare, telecom, biotechnology, retail, etc. I am very excited about data science and AI. Over the next five years, I am looking to become an expert, and a leader and motivate teams of researchers, engineers and scientists.

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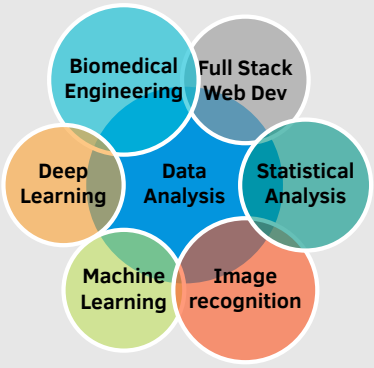
Skills

Overview



Programming

$0\ LOC$ $100K\ LOC$

C++ • PHP • Python

JS • SQL • MATLAB

Pandas • Keras • VTK

Awards

2017 – EPSRC early career scientist fellowship top 10 finalist for £1m

2016 – Journal of Cardiovascular Imaging highly cited research award

2015 – Imperial College Honorary Lecturer

2014 – Medical Engineering UK best paper poster

2012 – Hamlyn Robotics UK best paper poster

1998 – University of Toronto Scholar award

Education

2005 - 2009 **PhD. Computer Science** — Imperial College London

2004 - 2005 **MSc. Advanced Computing** (Distinction) — Queen Mary, U. of London

1998 - 2002 **BSc. Computing & Mathematics** — University of Toronto, Canada

Experience

2010 - Present **Research Fellow** — King's College London

- Senior researcher role in image data analytics research. Making predictions from 3D imaging data using ML and AI. Visualising 3D data, gaining new insights with statistical analysis.
- Expert knowledge of scientific research in this domain, published over 50 papers and presented at several scientific meetings. Managing peer-review process and handling tight deadlines.
- Co-chaired and organised 3 international data challenges at premier medical imaging conferences
- Designed software for NHS research units in Leeds & London.
- Commercialisation of technology used for implanting cardiac pacemakers with Siemens Healthcare
- Long track record of project supervision: 42 individual projects and 18 BSc student projects (13/18 obtained a 1st grade).

2007 - Present **Full Stack Development Consulting** — Karim Consulting LTD

- Architect and full-stack developer of a London agency's cloud-based CRM system in PHP/MySQL (≈30,000 lines of code)
- Work closely with stakeholder and MD of the company on strategic roadmaps for CRM

2009 - 2010 **Research Associate** — Imperial College London

- Designed a technique to classify dead tissue from images, work was published as scientific article and cited 73 times on Google Scholar

2007 - 2008 **Software Developer Intern** — Ernst and Young London

- Member of infrastructure team, building plug-ins and deploying for EY global. Continued employment after internship. Declined offer of further employment to complete PhD.

2006 **Game QA analyst Intern** — Glu Mobile Gaming

2003 - 2004 **Lecturer in Mathematics** — Primeasia university, Bangladesh

- 1st and 2nd year university-level calculus. Youngest lecturer in university. Resigned from post to pursue further study.

2002 - 2003 **Java developer** — BEA Weblogic Dubai

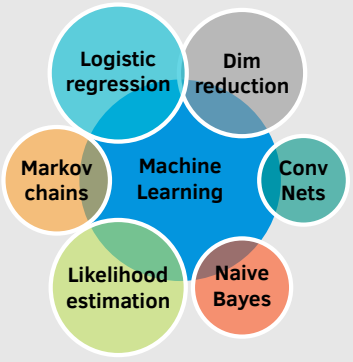
- JSP and Servlets development. Sun Java certified programmer

Publications

Journals	28 publications, 8 as first author, 4 as second
Conference	22 proceedings, 9 as lead author
Abstracts	24 clinical abstracts, 14 as first, second or lead author
Summary	Published 50 articles in 10 years. 23 highly influential citations
Full list	Google scholar , Semantic Scholar , PubMed , ResearchGate , ORCID , Publons

Technical

Modelling experience



Talks

Recent only

2018 – Prediction of pacing sites for cardiac pacemakers, IEEE EMBC, *USA*

2017 – Visualisation and uncertainty in whole-heart modelling, Zuse Maths Inst., *Berlin*

2017 – Problem solving using biomedical imaging analysis, EuroSciCon, *UK*

2015 – Data analytics and visualisation in interventional cardiac MRI, SCMR, *France*

2015 – Quantification algorithms to assess heart attacks from imaging, Hounsfield Lectures, *UK*

Editorial

J. of Healthcare Engineering	Editorial board
Asian J. of Info. Technology	Editorial board
Trans. Pattern Analy. & Mach. Intel.	Reviewer
Sensors	Reviewer
IEEE Trans. Medical Imaging	Reviewer

Teaching

Supervised theses (recent)

2017 – Model-based image analysis of cardiac wall thickness using measurements from CT

2017 – Image processing algorithms for measuring wall thickness in CMR

2016 – Tissue contact force sensing in uni and multi-directional catheters

2016 – Robotic ablation catheter - experimentations on precision and control

2016 – Validation of an adapted Cosserat rod model for contact force estimation

2016 – Ablation path trajectories of a robotic catheter inside a heart phantom

Years 2012 - 2016, 12 theses were supervised

Projects in industry and academia

2016 - 18 **Surgical guidance for pacemaker implantation** — Siemens

Designed and wrote software to obtain live cardiac tissue information from imaging and projection onto a map. Also built a decision support system for surgeons to use this information and implant pacemakers in the patient's heart. First built as a prototype with Siemens Healthcare and later translated into a commercial system. Work to appear in the press on Bioscience Today news.

2018 **Neural networks to learn radiologist's annotations** — MedcAI UK

Supervised a summer student to design a neural network that learns manual image annotations of radiologists. The network was trained on over 10,000 annotations. It took part in an international challenge held in MICCAI 2018, Granada, Spain, and came as one of top 5 algorithms. An online portal where this neural network can be run without any knowledge or experience of AI has been developed.

2017 **Augmented reality in museums** — Gordon museum of Pathology

Wrote full stack software of an augmented reality (AR) platform. The AR app runs on hand-held devices and is able to recognise 34 specimens in the museum and displays an AR layer with additional content. The system is in use regularly by visitors helping them explore the museum in a completely different way.

2013 - 18 **Curating cardiac imaging data** — National Institute for Health Research

Undertook a 5-year effort with international collaborators to collect well-curated MRI and CT imaging data. On these datasets, benchmarks were established for algorithm accuracy. Designed a system for algorithm evaluation and made the data open source. I co-chaired meetings held in Nice (2012), Barcelona (2013) and Athens (2016) to discuss outcomes of these initiatives.

2016 **Responsive design and RESTful APIs** — De Silva Tutors UK

Re-designed website with a new responsive design. Also re-wrote a number of its API in PHP, JS and SQL following a new RESTful architecture. Wrote new modules to integrate Google maps search for its clients and tutors. A new CV search implemented with with Elastic search engine. This boutique tutoring agency is one of the largest in London with over 100 tutors and 1000 clients in its books.

2013 **Dimensionality reduction of 3D data visualistions** — Wellcome Trust

An ambitious project of my research lab to create the first 2D flat map of the heart, allowing an instant single shot view of 3D cardiac data. As lead in this project, a practical solution was engineered using spatial dimensionality reduction technique, implemented in C++ and demonstrated with live surgical data feed for clinical use. The technique, now pubished in *Karim et al. Computerized Med. Img. Graphics, 2014*, has highly influenced research work in UPF Barcelona

Community engagements

2018	Science exhibition	Sutton Grammar School
2016	Science careers for school children	Sutton Grammar School
2015	Science careers for school children	Sutton High School
2014	Biomedical engineering careers	Sutton Grammar School
2011	Enganging the public in scientific research	London ExCeL Centre

Publications list

(† - as first author, ‡ - as second author, * - as last author, IMP - Journal impact factor)

Journal articles:

J28. †Algorithms for left atrial wall segmentation and thickness - evaluation on an open-source CT and MRI image database, **Medical Image Analysis**, 2018. (IMP=4.5)

J27. A work flow to build and validate patient specific left atrium electrophysiology models from catheter measurements, **Medical Image Analysis**, 2018. (IMP=4.5)

J26. The optimization of post-ablation atrial scar imaging: a cross-over study, **J. of Cardiovascular Magnetic Resonance**, 2018. (IMP=4.7)

J25. The reproducibility of late gadolinium enhanced imaging of post-ablation atrial scar: a cross-over study, **J. of Cardiovascular Magnetic Resonance**, 2018. (IMP=4.7)

J24. †°Left atrial voltage, circulating biomarkers of fibrosis, and atrial fibrillation ablation. A prospective cohort study, **PLOS One** (*accepted*), (° - joint first authorship) (IMP = 2.9)

J23. Standardised Unfold Mapping: A technique to permit left atrial regional data display and analysis, **J. of Interventional Cardiac Eletrophysiology** 50(1), 2017 (IMP=1.5)

J22. A planning and guidance platform for cardiac resynchronisation therapy, In **IEEE Transactions Medical Imaging** 36(11), 2017 (IMP=3.9)

J21. Real time X-MRI guided left ventricular lead implantation for targeted delivery of cardiac resynchronization therapy, in **JACC: Clinical Electrophysiology**, *(in press)*

J20. †°Intra-cardiac and peripheral levels of biochemical markers of fibrosis in patients undergoing catheter ablation for atrial fibrillation, **Europace** 19(12), 2017 (° - joint first authorship) (IMP=3.7)

J19. ECG imaging of ventricular tachycardia: evaluation against simultaneous non-contact mapping and CMR derived grey zone. **Medical & Biological Engineering & Computing** 55(6), 2017 (IMP=1.8)

J18. Biophysical modelling predicts ventricular tachycardia inducibility and circuit morphology: A combined clinical validation and computer modelling approach, **J. of Cardiovascular Electrophysiology** 27(7), 2016 (IMP=3.1)

J17. †Evaluation of state-of-the-art segmentation algorithms for left Ventricle infarct from late Gadolinium enhancement MR images, **Medical Image Analysis**, Vol. 30. pp 95-107, 2016. (IMP=4.5)

J16. ‡3-DOF MR-Compatible Multi-Segment Cardiac Catheter Steering Mechanism **IEEE Transactions on Biomedical Engineering** 63(11), 2016. (IMP=2.3)

J15. ‡A Randomised Prospective Mechanistic CMR Study Correlating Catheter Stability, Late Gadolinium Enhancement and 3-Year Clinical Outcomes in Robotically-Assisted versus Standard Catheter Ablation. **Europace** 17(8), 2015. (IMP=3.7)

J14. The Effect of Contact Force in Atrial RF Ablation: Electroanatomical, CMR and Histological Assessment in a Chronic Porcine Model, **JACC Clinical Electrophysiology** 1(5), 2015.

J13. Benchmark for algorithms segmenting the left atrium from 3D CT and MRI datasets. In **IEEE Transactions on Medical Imaging**, 2015. (IMP=3.4)

J12. Interventional CMR in Electrophysiology - Advances towards clinical translation. **Circulation: Arrhythmia & Electrophysiology** 8(1), 2015. (IMP=4.5)

J11. Repeat Left Atrial Catheter Ablation: Cardiac Magnetic Resonance Prediction of Endocardial Voltage and Gaps in Ablation Lesion Sets. **Circulation: Arrhythmia & Electropysiology** 8(2), 2015. (IMP=4.5)

J10. †A method to standardise quantification of left atrial scar from delayed-enhancement MR images. **IEEE Translational Engineering in Health and Medicine** Vol. 2, 2014. (IMP=1.0)

J9. †Surface Flattening of the Human Left Atrium and Proof-of-Concept Clinical Applications. **Computerized Medical Imaging and Graphics** 38(4), 2014. (IMP=1.6)

J8. †°Quantitative Magnetic Resonance Imaging Analysis of the Relationship between Contact Force and Left Atrial Scar Formation after Catheter Ablation of Atrial Fibrillation. **J. of Cardiovascular Electrophysiology**, 2014 (° - joint first authorship). (IMP=3.1)

J7. A novel skeleton based quantification and 3D volumetric visualization of left atrium fibrosis using Late Gadolinium Enhancement Magnetic Resonance Imaging. **IEEE Transactions in Medical Imaging**. 2014. (IMP=3.4)

J6. Multimodality imaging for catheter ablation of atrial fibrillation. Is it still necessary? **The International Journal of Cardiology** 175(3), 2014. (IMP=4.0)

J5. Cardiac magnetic resonance and electroanatomical mapping of acute and chronic atrial ablation injury. a histological validation study. **European Heart Journal** 35(22), 2014. (IMP=15.0)

J4. †Evaluation of current algorithms for segmentation of scar tissue from late Gadolinium enhancement cardiovascular MR of the left atrium. **J. of Cardiovascular Magnetic Resonance**. 2013. (IMP=4.7)

J3. Automated analysis of atrial late gadolinium enhancement imaging correlates with endocardial voltage and clinical outcomes: a two-center study. **Heart Rhythm Journal** Vol. 10(8), 2013. (IMP=5.0)

J2. Native T1 mapping in differentiation of normal myocardium from diffuse disease in hypertrophic and dilative cardiomyopathy. **In JACC: Cardiovascular Imaging** 2013. (IMP=6.7)

J1. ‡Acute Pulmonary Vein Isolation Is Achieved by a Combination of Reversible and Irreversible Atrial Injury **Circulation: Arrhythmia & Electrophysiology**, 2012. (IMP=4.5)

Conference proceedings:

C22. *Convolutional neural networks for segmentation of the left atrium from gadolinium enhancement MRI images, **Proceedings of MICCAI-STACOM, Granada, Spain**, 2018

C21. †Image data analysis for quantifying scar tissue transmurality in cardiac resynchronisation therapy, **Proceedings of the IEEE Eng. in Med. and Bio., Hawaii, USA**, 2018

C20. ‡Cardiac NET: Segmentation of the left atrium using Segmentation of left atrium and proximal pulmonary veins from MRI using multi-view convolution neural networks. **Proceedings of MICCAI, Toronto, Canada**, 2017

C19. ‡A platform for quantifying atrial structure remodelling, **Proceedings of Computers in Cardiology, Germany**, 2017

C18. †Segmentation Challenge on the Quantification of Left Atrial Wall Thickness. **Proceedings of MICCAI-STACOM, Athens, Greece**, 2016

C17. †Left Atrial Segmentation from 3D Respiratory- and ECG-gated Magnetic Resonance Angiography, **Proceedings of FIMH Workshop, Maastricht, The Netherlands**, 2015

C16. ‡Tension sensing for a linear actuated catheter robot, **Proceedings of Intel. Robotics and Appl. meeting**, 2015

C15. Interactive visualization for scar transmurality in cardiac resynchronization therapy, **Proceedings of SPIE Medical Imaging**, San Diego, USA, 2016.

C14. ‡Statistical Model of Paroxysmal Atrial Fibrillation Catheter Ablation Targets for Pulmonary Vein Isolation, **Proceedings MICCAI-STACOM**, 2015

C13. ‡Catheter contact force estimation from shape detection using a real-time Cosserat rod model, **Proceedings of IEEE Intelligent Robots and Systems,** 2015.

C12. Left Atrial Segmentation Challenge: A Unified Benchmarking Framework, **Proceedings of MICCAI-STACOM**, 2014

C11. †Infarct Segmentation Challenge on Delayed Enhancement MRI of the Left Ventricle, **Proceedings of MICCAI-STACOM, Nice, France**, 2012

C10. †Infarct Segmentation of the Left Ventricle Using Graph-Cuts, **Proceedings of MICCAI-STACOM), Nice, France**, 2012

C9. ‡Cardiac Unfold: A Novel Technique for Image-Guided Cardiac Catheterization Procedures,**Proceedings of Information Processing in Computer-Assisted Interventions (IPCAI)**, 2012

C8. †Validation of a Novel Method for the Automatic Segmentation of Left Atrial Scar from Delayed-Enhancement Magnetic, **Proceedings of MICCAI-STACOM,**2011

C7. †Automatic Segmentation of Left Atrial Scar from Delayed-Enhancement Magnetic Resonance Imaging, **Proceedings of Functional Imaging and Modeling of the Heart (FIMH) 2011**

C6. †Mapping Contact Force during Catheter Ablation for the Treatment of Atrial Fibrillation, **Proceedings of Functional Imaging and Modeling of the Heart (FIMH) 2011**, Lecture Notes in Computer Science, Volume 6666, pp 302-303.

C5. †Automatic Segmentation of Left Atrial Geometry from Contrast-Enhanced MRI using a Probabilistic Atlas, **In Proceedings of MICCAI-STACOM**, 2010

C4. †Left atrium pulmonary veins: segmentation and quantification for planning atrial fibrillation ablaton. **Proceedings SPIE Medical Imaging, 2009**

C3. †Automatic extraction of the left atrial anatomy from MR for atrial fibrillation ablation, **Proceedings of IEEE International Symposium on Biomedical Imaging (ISBI)**, Boston, USA, 2009.

C2. †Left Atrium Segmentation for Atrial Fibrillation Ablation, **Proceedings of SPIE Medical Imaging, San Diego, 2008**.

C1. †Automatic Segmentation of the Left Atrium. **Proceedings of Medical Image Understanding and Analysis Conference (MIUA)**, Abersytwyth, Wales, 2007.

Abstract & short papers:

A24. *Validating scar quantification for guiding cardiac resynchronisation therapy, in **Institute of Physics and Engineering in Medicine MEIBioeng** meeting, 2017

A23. *Model-based image analysis of left atrial wall thickness using direct measurements from CT, in **Institute of Physics and Engineering in Medicine MEIBioeng** meeting, 2017

A22. ‡Motion correction using hierarchical local affine registration improves image quality and myocardial scar characterisation from T1 maps acquired with MOLLI. In **Society of Cardiovascular Magnetic Resonance (SCMR) meeting** meeting, 2013

A21. ‡Simultaneous non-Contact mapping fused with CMR derived grey zone to explore the relationship with ventricular tachycardia substrate in ischaemic cardiomyopathy, In **Society of Cardiovascular Magnetic Resonance (SCMR)** meeting 2013

A20. ‡Quantitative magnetic resonance imaging analysis of the relationship between contact force and left atrial scar formation after catheter ablation of atrial fibrillation in late-breaking clinical trials at **Heart Rhythm Society** meeting, 2013

A19. †Left atrium surface flattening for assisting guidance in catheter ablation procedures, at **Hamlyn Symposium on Medical Robotics**, 2012

A18. ‡MR-Compatible autonomous catheterization Robot with unfolded navigational maps (best poster prize), at **Hamlyn Symposium on Medical Robotics**, 2012

A17. Acute Atrial Ablation Injury Is Better Visualised By Late Gadolinium Enhancement Than T2-weighted Magnetic Resonance Imaging, at **Heart Rhythm Society**, 2012

A16. Late Gadolinium Enhancement Magnetic Resonance Imaging Prediction Of Gaps In Atrial Ablation Lesions, at **Heart Rhythm Society**, 2012

A15. †An automatic segmentation algorithm for improved visualization of atrial ablation lesions using magnetic resonance imaging. In **Society of Cardiovascular Magnetic Resonance** (SCMR) meeting, 2011

A14. †Evaluation of a rapid quantification algorithm for delayed enhancement mri following left atrial ablation. In **Heart Rhythm Society**, 2011

A13. †Magnetic resonance imaging analysis of tissue-contact force following catheter ablation for paroxysmal atrial fibrillation. **Heart Rhythm Society** meeting, 2011

A12. Novel dual inversion recovery pre-pulse imaging technique improves post ablation cardiac MR scar visualization. **Heart Rhythm Society** meeting, 2012

A11. Automated analysis of atrial delayed-enhancement cardiac mri correlates with endocardial voltage, In **Heart Rhythm society** 2011

A10. Acute atrial ablation injury is better visualised by late gadolinium enhancement than t2-weighted magnetic resonance imaging. In **Heart Rhythm Society** meeting, 2012

A9. ‡Interstitial oedema, delayed enhancement and recurrences following catheter ablation in paroxysmal AF: how are they related? In **Heart Rhythm Society** meeting, 2011

A8. ‡Assessment of left atrial injury by cardiac MR: a randomised prospective comparison of robotic versus manual AF ablation. In **Heart Rhythm Society** meeting, 2011

A7. Acute pulmonary vein isolation lesions consist of interstitial oedema and tissue necrosis: possible mechanism of pulmonary vein reconnection. **Society of Cardiovascular Magnetic Resonance** (SCMR) meeting, 2011

A6. A novel technique to display tissue contact force in the left atrium following catheter ablation for paroxysmal atrial fibrillation using a force sensing ablation catheter. Abstract only. **European Cardiac Arrhythmia Society** meeting, 2011

A5. Novel pilot data - Cardiac MR Imaging Post Catheter Ablation: Does T2 and DE ratios matter in predicting clinical outcome? **Proceedings of International Society for Magnetic Resonance in Medicine (ISMRM)** meeting, 2011

A4. ‡Correlation of left-atrial endocardial voltage with ablation-scar detected with DE-MRI. In **European Cardiology and Arrhythmia Society (ECAS)** meeting, 2011

A3. ‡Left atrial function correlates with post-ablation scar detected by DE-MRI. Abstract only.**European Cardiology and Arrhythmia Society (ECAS)** meeting, 2011

A2. ‡Automated analysis of atrial ablation scar using delayed enhanced cardiac magnetic resonance imaging. In **British Cardiovascular Society Annual Conference**, 2011

A1. ‡Applicability of pre segmentation of MRA data to generate 3-dimensional anatomical models of the left atrium and pulmonary veins for planning and facilitation of image guided ablation procedures. In **European Society of Cardiac Radiology**, 2010