

Rashed Karim

Image Data Scientist



(44) 79 69 77 03 72



bit.ly/drkarim



rashed.karim@gmail.com



/in/karimphd



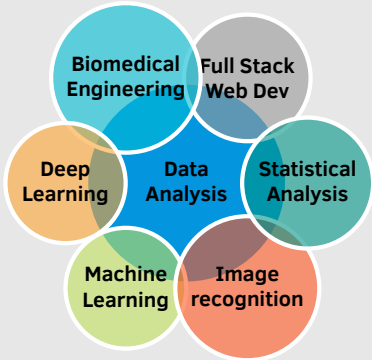
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drkarim

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

Sep 2010 - **Research Fellow**

King's College London

Present

- Making predictions from 3D imaging data using ML and AI. Quantitative analysis of data. Gaining over 10 years' experience in image data analytics.
- Published 41 research papers in leading journals and conferences in last 7 years. An authority on cardiac image analysis
- 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)
- The CRM software now runs most of the day-to-day operations of its business. As of Oct. 2018, there are 30 users, processing over 1000 claims and invoices each month.

Sep 2009 -
Dec 2010

Research Associate

Imperial College London

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

Sep 2007 -
Sep 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.

2003 - 04

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 - 03

Java developer

BEA Weblogic Dubai

- JSP and Servlets development. Sun Java certified programmer

2001 - 02

Part-time Tutor in Microprocessor Systems

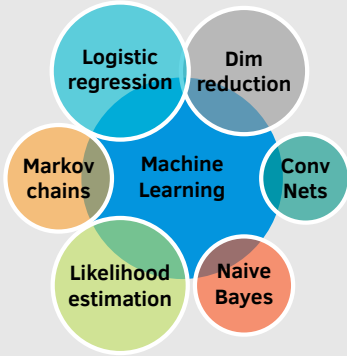
University of Toronto

Publications

Journals
Conference
Abstracts
Summary
Full list

28 publications, 8 as first author, 4 as second
22 proceedings, 9 as lead author
24 clinical abstracts, 14 as first, second or lead author
Published 50 articles in 10 years. 23 highly influential citations
[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 - experiments 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 is set to appear in the press in Nov. 2018.

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 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 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 visualisations** [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 published 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 Engaging 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:

- J1. †Algorithms for left atrial wall segmentation and thickness - evaluation on an open-source CT and MRI image database, **Medical Image Analysis**, 2018
- J2. A work flow to build and validate patient specific left atrium electrophysiology models from catheter measurements, **Medical Image Analysis**, 2018
- J3. The optimization of post-ablation atrial scar imaging: a cross-over study, **J. of Cardiovascular Magnetic Resonance**, 2018
- J4. The reproducibility of late gadolinium enhanced imaging of post-ablation atrial scar: a cross-over study, **J. of Cardiovascular Magnetic Resonance**, 2018
- J5. †*Left atrial voltage, circulating biomarkers of fibrosis, and atrial fibrillation ablation. A prospective cohort study, **PLOS One** (*accepted*), (* - joint first authorship) (IMP = 2.9)
- J6. Standardised Unfold Mapping: A technique to permit left atrial regional data display and analysis, **J. of Interventional Cardiac Electrophysiology** 50(1), 2017 (IMP=1.5)
- J7. A planning and guidance platform for cardiac resynchronisation therapy, In **IEEE Transactions Medical Imaging** 36(11), 2017 (IMP=3.9)
- J8. Real time X-MRI guided left ventricular lead implantation for targeted delivery of cardiac resynchronization therapy, in **JACC: Clinical Electrophysiology**, (*in press*)
- J9. †*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)
- J10. 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)
- J11. 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)
- J12. †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)
- J13. ‡3-DOF MR-Compatible Multi-Segment Cardiac Catheter Steering Mechanism **IEEE Transactions on Biomedical Engineering** 63(11), 2016. (IMP=2.3)
- J14. ‡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)
- J15. 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.
- J16. Benchmark for algorithms segmenting the left atrium from 3D CT and MRI datasets. In **IEEE Transactions on Medical Imaging**, 2015. (IMP=3.4)
- J17. Interventional CMR in Electrophysiology - Advances towards clinical translation. **Circulation: Arrhythmia & Electrophysiology** 8(1), 2015. (IMP=4.5)
- J18. Repeat Left Atrial Catheter Ablation: Cardiac Magnetic Resonance Prediction of Endocardial Voltage and Gaps in Ablation Lesion Sets. **Circulation: Arrhythmia & Electrophysiology** 8(2), 2015. (IMP=4.5)
- J19. †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)
- J20. †Surface Flattening of the Human Left Atrium and Proof-of-Concept Clinical Applications. **Computerized Medical Imaging and Graphics** 38(4), 2014. (IMP=1.6)
- J21. †*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)
- J22. 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)
- J23. Multimodality imaging for catheter ablation of atrial fibrillation. Is it still necessary? **The International Journal of Cardiology** 175(3), 2014. (IMP=4.0)

- J24. 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)
- J25. †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)
- J26. 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)
- J27. Native T1 mapping in differentiation of normal myocardium from diffuse disease in hypertrophic and dilative cardiomyopathy. In **JACC: Cardiovascular Imaging** 2013. (IMP=6.7)
- J28. ‡Acute Pulmonary Vein Isolation Is Achieved by a Combination of Reversible and Irreversible Atrial Injury **Circulation: Arrhythmia & Electrophysiology**, 2012. (IMP=4.5)

Conference proceedings:

- C1. *Convolutional neural networks for segmentation of the left atrium from gadolinium enhancement MRI images, **Proceedings of MICCAI-STACOM, Granada, Spain, 2018**
- C2. †Image data analysis for quantifying scar tissue transmuralitY in cardiac resynchronisation therapy, **Proceedings of the IEEE Eng. in Med. and Bio., Hawaii, USA, 2018**
- C3. ‡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**
- C4. ‡A platform for quantifying atrial structure remodelling, **Proceedings of Computers in Cardiology, Germany, 2017**
- C5. †Segmentation Challenge on the Quantification of Left Atrial Wall Thickness. **Proceedings of MICCAI-STACOM, Athens, Greece, 2016**
- C6. †Left Atrial Segmentation from 3D Respiratory- and ECG-gated Magnetic Resonance Angiography, **Proceedings of FIMH Workshop, Maastricht, The Netherlands, 2015**
- C7. ‡Tension sensing for a linear actuated catheter robot, **Proceedings of Intel. Robotics and Appl. meeting, 2015**
- C8. Interactive visualization for scar transmuralitY in cardiac resynchronization therapy, **Proceedings of SPIE Medical Imaging, San Diego, USA, 2016.**
- C9. ‡Statistical Model of Paroxysmal Atrial Fibrillation Catheter Ablation Targets for Pulmonary Vein Isolation, **Proceedings MICCAI-STACOM, 2015**
- C10. ‡Catheter contact force estimation from shape detection using a real-time Cosserat rod model, **Proceedings of IEEE Intelligent Robots and Systems, 2015.**
- C11. Left Atrial Segmentation Challenge: A Unified Benchmarking Framework, **Proceedings of MICCAI-STACOM, 2014**
- C12. †Infarct Segmentation Challenge on Delayed Enhancement MRI of the Left Ventricle, **Proceedings of MICCAI-STACOM, Nice, France, 2012**
- C13. †Infarct Segmentation of the Left Ventricle Using Graph-Cuts, **Proceedings of MICCAI-STACOM), Nice, France, 2012**
- C14. ‡Cardiac Unfold: A Novel Technique for Image-Guided Cardiac Catheterization Procedures, **Proceedings of Information Processing in Computer-Assisted Interventions (IPCAI), 2012**
- C15. †Validation of a Novel Method for the Automatic Segmentation of Left Atrial Scar from Delayed-Enhancement Magnetic, **Proceedings of MICCAI-STACOM, 2011**
- C16. †Automatic Segmentation of Left Atrial Scar from Delayed-Enhancement Magnetic Resonance Imaging, **Proceedings of Functional Imaging and Modeling of the Heart (FIMH) 2011**
- C17. †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.
- C18. †Automatic Segmentation of Left Atrial Geometry from Contrast-Enhanced MRI using a Probabilistic Atlas, In **Proceedings of MICCAI-STACOM, 2010**
- C19. †Left atrium pulmonary veins: segmentation and quantification for planning atrial fibrillation ablation. **Proceedings SPIE Medical Imaging, 2009**
- C20. †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.**
- C21. †Left Atrium Segmentation for Atrial Fibrillation Ablation, **Proceedings of SPIE Medical Imaging, San Diego, 2008.**
- C22. †Automatic Segmentation of the Left Atrium. **Proceedings of Medical Image Understanding and Analysis Conference (MIUA), Aberswyth, Wales, 2007.**

Abstract & short papers:

- A1. *Validating scar quantification for guiding cardiac resynchronisation therapy, in **Institute of Physics and Engineering in Medicine MEIBioeng** meeting, 2017
- A2. *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
- A3. ‡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, 2013
- A4. ‡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
- A5. ‡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
- A6. †Left atrium surface flattening for assisting guidance in catheter ablation procedures, at **Hamlyn Symposium on Medical Robotics**, 2012
- A7. ‡MR-Compatible autonomous catheterization Robot with unfolded navigational maps (best poster prize), at **Hamlyn Symposium on Medical Robotics**, 2012
- A8. Acute Atrial Ablation Injury Is Better Visualised By Late Gadolinium Enhancement Than T2-weighted Magnetic Resonance Imaging, at **Heart Rhythm Society**, 2012
- A9. Late Gadolinium Enhancement Magnetic Resonance Imaging Prediction Of Gaps In Atrial Ablation Lesions, at **Heart Rhythm Society**, 2012
- A10. †An automatic segmentation algorithm for improved visualization of atrial ablation lesions using magnetic resonance imaging. In **Society of Cardiovascular Magnetic Resonance (SCMR)** meeting, 2011
- A11. †Evaluation of a rapid quantification algorithm for delayed enhancement mri following left atrial ablation. In **Heart Rhythm Society**, 2011
- A12. †Magnetic resonance imaging analysis of tissue-contact force following catheter ablation for paroxysmal atrial fibrillation. **Heart Rhythm Society** meeting, 2011
- A13. Novel dual inversion recovery pre-pulse imaging technique improves post ablation cardiac MR scar visualization. **Heart Rhythm Society** meeting, 2012
- A14. Automated analysis of atrial delayed-enhancement cardiac mri correlates with endocardial voltage, In **Heart Rhythm society** 2011
- A15. Acute atrial ablation injury is better visualised by late gadolinium enhancement than t2-weighted magnetic resonance imaging. In **Heart Rhythm Society** meeting, 2012
- A16. ‡Interstitial oedema, delayed enhancement and recurrences following catheter ablation in paroxysmal AF: how are they related? In **Heart Rhythm Society** meeting, 2011
- A17. ‡Assessment of left atrial injury by cardiac MR: a randomised prospective comparison of robotic versus manual AF ablation. In **Heart Rhythm Society** meeting, 2011
- A18. 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
- A19. 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
- A20. 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
- A21. ‡Correlation of left-atrial endocardial voltage with ablation-scar detected with DE-MRI. In **European Cardiology and Arrhythmia Society (ECAS)** meeting, 2011
- A22. ‡Left atrial function correlates with post-ablation scar detected by DE-MRI. Abstract only. **European Cardiology and Arrhythmia Society (ECAS)** meeting, 2011
- A23. ‡Automated analysis of atrial ablation scar using delayed enhanced cardiac magnetic resonance imaging. In **British Cardiovascular Society Annual Conference**, 2011
- A24. ‡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