

# Ke XIAO

## Curriculum Vitae

### EDUCATION

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| 09/19 - CURRENT | PhD Student in COMPUTER SCIENCE<br><b>University of Massachusetts Amherst</b> , Amherst, Massachusetts<br>Research Field: Computer Vision & Deep Learning on Medical Imaging<br>Advisor: Prof. Madalina FITERAU BROSTEAN |
| 12/2016         | Master of Science in MECHANICAL ENGINEERING   GPA: 3.97/4.0<br><b>Colorado School of Mines</b> , Golden, Colorado<br>Research Field: Robotics, Automation, and Design<br>ACADEMIC ADVISOR: Prof. Douglas VAN BOSSUYT     |
| 06/2014         | Bachelor's Degree in MECHANICAL ENGINEERING   GPA: 3.43/4.0<br><b>Beihang University</b> , Beijing, China<br>Thesis: "Design and Research of Compliant Mobile Robots in Rough Terrain"<br>THESIS ADVISOR: Prof. Xu PEI   |

### RESEARCH PROJECTS

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| 09/19 - CURRENT | <b>Mitral Valve Regurgitation Classification</b><br><i>Deep Learning and Computer Vision research on Cardiac MRI data</i><br>Developing a fully automated pipeline consisting of a CNN-LSTM classification model, a U-Net segmentation model and a Random Forest ensemble model for classifying mitral valve regurgitation with long-axis view cardiac MRI datasets from UK Biobank.<br>In order to improve model performance and utilizing large unlabeled datasets, we are developing multi-view CNN-LSTM classification model and weakly supervised image segmentation model as well.<br>Ultimately, we are looking for a weakly supervised or an unsupervised solution for extracting, ensembling and utilizing the information from available cardiac MRI datasets.  |
| 07/17 - 08/19   | <b>Bicuspid/Tricuspid aortic valve classification project</b><br><i>Machine Learning and Computer Vision application on Cardiac MRI data</i><br>Developed a Convolutional Neural Network (CNN) model using pre-trained CNN with customized Fully-connected Neural Network (FNN) top model. Developed a fully automated pipeline for experiments and hyper-parameter tuning.<br>Applied image pre-processing and augmentations to further boost model performance. Developed multiple other Neural Network model structures for experiments, such as building a un-trained CNN encoder parallel to the pre-trained CNN model then concatenate the outputs together before feeding into the final FNN top model for classification.<br>Introduced Recurrent Neural Network (RNN) component into the Neural Network model to incorporate temporal information in the MRI sequence for improving the model. |
| 01/16 - 12/16   | <b>Geobot Project</b><br><i>Four-wheeled ground vehicle operating on ROS</i><br>Built a self-driving robot. Used LiDAR and ROS to collect environment data and 3D reconstruct the map of a mine. Also, used the LiDAR point cloud data to avoid obstacle.<br>Designed a path-planning algorithm and built a communication module between the robot and the Ground Penetrating Radar(GPR) through a Network Interface Controller(NIC).   |

	Given the GPS coordinates of the corners of a selected area, the prototype robot can scan the underground area using attached GPRs and collects the related data. The robot is fully autonomous on its own.
12/13 - 06/14	<p>Undergraduate Research Project</p> <p><i>Research on compliant mobile robots in rough terrain</i></p> <p>Designed several compliant joints for 6-wheeled robots that are flexible and suitable for rough terrain. Used Mathematica and ANSYS to build the pseudo-rigid model and a finite element analysis model. Used Solidworks to build a prototype.</p>

## ABSTRACTS, PRESENTATIONS, AND PUBLICATIONS

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- 2020 | C. Tcheandjieu, **K. Xiao**, H. Tejeda, J. Lynch, S. Ruotsalainen, T. Bellomo, M. Palnati, R. Judy, R. Kember, D. Klarin, S. Verma, A. Palotie, M. Daly, M. Ritchie, D. Rader, M. A Rivas, T. Assimes, P. Tsao, S. Damrauer, J. Priest. (2020). High heritability of ascending aortic diameter and multi-ethnic prediction of thoracic aortic disease. doi:10.1101/2020.05.29.20102335
- 2020 | A. Cordova-Palomera, C. Tcheandjieu, J. Fries, P. Varma, V. Chen, M. Fiterau, **K. Xiao**, H. Tejeda, B. Keavney, H. Cordell, Y. Tanigawa, G. Venkataraman, M. Rivas, C. Re, E. Ashley, J. R. Priest. (2020). Cardiac imaging of aortic valve area from 26,142 UK Biobank participants reveal novel genetic associations and shared genetic comorbidity with multiple disease phenotypes. doi:10.1101/2020.04.09.20060012
- 2019 | F. Sala, P. Varma, J. Fries, D. Fu, S. Sagawa, S. Khattar, A. Ramamoorthy, **K. Xiao**, K. Fatahalian, J. Priest, C. Re. Multi-Resolution Weak Supervision for Sequential Data. NIPS 2019
- 2019 | C. Tcheandjieu, **K. Xiao**, H. Tejeda, E. Ingelsson, J. Fries, J. Priest. Polygenic architecture of computationally derived aortic diameter from 20,939 British adults predicts the risk for aortic aneurysm and dissection. Abstract-ASHG 2019.
- 2018 | J. Fries, P. Varma, V. Chen, **K. Xiao**, H. Tejeda, P. Saha, J. Dunnmon, H. Chubb, S. Maskatia, M. Fiterau, S. Delp, E. Ashley, C. Re, J. Priest. Weakly Supervised Classification of Rare Aortic Valve Malformations Using Unlabeled Cardiac MRI Sequences. bioRxiv, Nature Communication 2018
- 2018 | A. Córdoba-Palomera, J. Fries, P. Varma, M. Fiterau, **K. Xiao**, H. Tejeda, B. Keavney, H. Cordell, E. Ashley, J. Priest. Deep Learning of Cardiac Morphology from UK Biobank MRI Data Reveals Genome-wide Associations for Bicuspid Aortic Valve. Abstract-ASHG 2018
- 2017 | **K. Xiao**, H. Tejeda, J. Priest, SP. Lee, J. Fries, M. Fiterau. Data Augmentation for Aortic Valve Morphology Classification from Phase-Contrast MRI. ML4H-NIPS 2017
- 2017 | **K. Xiao**, H. Tejeda, J. Priest, SP. Lee, J. Fries, M. Fiterau. Automated Classification of Aortic Valve Morphology from Phase-Contrast Cardiac MRI Using an Augmented CNN. MED-NIPS 2017

## WORK EXPERIENCE

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06/20 - CURRENT	<b>Teaching Assistant at University of Massachusetts Amherst</b> <i>Teaching Assistant of COMPSci 589 Machine Learning</i> Preparing lecture and homework materials for the class.
09/19 - 05/20	<b>Research Assistant at University of Massachusetts Amherst</b> <i>Medical Imaging Research at Info Fusion Lab</i> Working on Computer Vision & Deep Learning research in the medical imaging field, including Mitral Regurgitation classification, Long-axis view Cardiac MRI segmentation, etc.
07/17 - 08/19	<b>Research Data Analyst at School of Medicine, Stanford University</b> <i>MRI Data Analyst with Machine Learning and Convolutional Neural Network technology.</i> Working on computer vision projects with MRI image datasets. Applying fully-connected neural network models, convolutional neural network models and recurrent neural network models on image classification and segmentation tasks. Developing MRI image processing platforms. Developing Neural Network model experiments and hyper-parameter tuning pipeline, etc.
08/16 - 12/16	<b>Teaching Assistant at EECS, Colorado School of Mines, Colorado</b> <i>Teaching Assistant of CSCI507 Computer Vision Class</i> Provided various assistance to Professor in the class, including giving several lectures for students, grading homeworks, quizzes and lab assignments, and answering students' questions.
01/16 - 12/16	<b>Computer technician at CCIT, Colorado School of Mines, Colorado</b> <i>Administrative/Academic Department Support</i> Provided technical support to academic and administrative departments, including supports and services for desktop, workstation computers, and related peripherals.
SUMMER 2012	<b>Summer Intern at NIMAK Welding(Beijing) Ltd, Beijing</b> <i>Mechanical Engineer of Control Cabinet Assembly line</i> Helped develop, manufacture, install mechanical and electronic components of the Control Cabinet of the electrode holder.

## COURSE PROJECTS

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01/16 - 05/16	<b>Course - Computer Vision</b> Top 1% of the class. Learned image processing/filtering, and various computer vision algorithms: edge detection, pose estimation, image matching and patching, SIFT, etc. Developed an algorithm to recognize the chess board and track the movements of all the chess pieces on the board.
01/16 - 05/16	<b>Course - Mechatronics</b> Learned how to use Atmel Studio to program Arduino in performing multiple tasks. Assembled a quad-copter and programmed an Arduino to control the quad-copter based on the feedback from multiple sensors like Gyro, Compass, Accelerometer, and Barometer.
08/16 - 12/16	<b>Course - Computer Networks</b> Learned how to develop video streaming application with RTSP and RTP. Developed communication applications in Android. Developed a system in C++ to simulate the communication and task allocation of a multi-robot system.
08/15 - 12/15	<b>Course - Robot Mechanics</b>

Designed and simulated a robotic system for an assumed nuclear power plant. Designed a robot that can transport the nuclear fuel rod from the loading room on the 2nd floor to the reactor room on the 1st floor and back.

## AWARDS AND HONORS

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- JUN 2020 | Paul Utgoff Memorial Graduate Scholarship in Machine Learning
- MAR 2016 | First place in DU (University of Denver) Analytics Challenge (\$2,500)
- DEC 2012 | Outstanding Volunteer in the 60th Anniversary of Beihang University
- DEC 2010 | Best Debater in Debate Competition for Freshman in School of Mechanical Engineering and Automation, Beihang University

## SKILLS

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- LANGUAGES | Algorithms, C/C++, Python, Java, bash, Matlab, Mathematica,  $\text{\LaTeX}$
- MACHINE LEARNING | TensorFlow, Keras, PyTorch, Convolutional Neural Network, Recurrent Neural Network, etc.
- ROBOTICS & SYSTEMS | Robot Operating System (ROS), Velodyne LiDAR, SLAM, Computer Vision, OpenCV, Atmel, TCP/IP, etc.
- MECHANICAL | SolidWorks, AutoCAD, ANSYS, Inventor
- OPERATING SYSTEMS | Linux, Mac, Android app development using AndroidStudio

## COURSES

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Probabilistic Graphical Models, Machine Learning, Computer Vision, Computer Networks, Engineering Optimization, Non-Linear Optimization, Advanced Engineering Analysis, Robot Mechanics: *Kinematics, Dynamics, and Control*, Fuel Cell, Mechatronics, Field Robotics System and Control, 3D SLAM Using LiDAR, etc.

## LANGUAGES

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Chinese:Native, English:Fluent, Spanish:Basic Knowledge, Japanese:Basic Knowledge