David Molony PhD

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Profile

Experienced researcher and leader in cardiovascular healthcare with increasing responsibilities over 20 years. Very high degree of clinical knowledge coupled with an engineering background. Experience working in university, hospital and startup settings. Proficient in quantitative analysis, data interpretation, and problem-solving. Expertise in identifying, implementing and deploying machine learning solutions in a healthcare setting. Served as project lead in diverse and inclusive multi-disciplinary teams of engineers and clinicians. Proven ability in completing large multi-year projects with collaborating institutions. Passionate about personal growth, mentorship and cardiovascular innovation.

Experience

GEORGIA HEART INSTITUTE, GAINESVILLE, GA FEB 2021 - PRESENT

Research Lab Director

Co-founder of research lab with President of Georgia Heart Institute. Laboratory aims are to advance cardiovascular diagnostics, educate medical residents and drive innovation.

- Managed grant funding totaling $500,000 from 3 university collaborations sponsored by the NIH. Responsible for annual lab budget and hiring.
- Manager of team of engineers ranging from entry level experience to 10 years' experience.
- Lead the technical analysis of the Shear-Stent clinical trial. This was a 12-center international clinical trial comparing the performance of two state of the art drug-eluting stents (NCT02098876). Analyses included quantitative coronary angiography, intravascular ultrasound (IVUS) and OCT image analysis.
- Directed the largest cardiovascular biomechanics study to date as part of NIH collaboration. Using computational fluid dynamics (CFD), simulations were performed on 400+ patients with CT scans. Individual contributions include development of automated analysis code.
- Developed deep learning models for cardiac chambers segmentation. Deployed models for use by residents in research projects.
- Faculty member of Northeast Georgia Health System cardiology fellowship program. Responsible for didactic presentations to cardiovascular fellows on latest innovations in cardiology.
- Submitted successful application to NSF ACCESS program and awarded 10,000 CPU hours.

COVANOS INC., ATLANTA, GA FEB 2017 – FEB 2022

Senior Engineer

Founding member of a start-up company developing non-invasive diagnostic tool for coronary artery disease detection.

- Performed validation simulations of software platform against invasive measurements from patients.
- Co-wrote 4 patents for Covanos intellectual property portfolio.
- Lead product demo resulting in $2million dollar investment.
- Developed deep learning solution for coronary artery segmentation. Compared multiple different approaches including convolutional networks, graph neural networks and signed distance functions.

- Managed AWS services – EC2, S3, CodeCommit

EMORY UNIVERSITY, ATLANTA, GA JUL 2015 - JAN 2021
Research Scientist

Joined Emory University as the lead scientist at the Emory Cardiovascular Imaging & Biomechanics Core Laboratory. Served as project lead in multi-disciplinary team of engineers, clinicians and mathematicians.

- Creator, developer and maintainer of DeepIVUS. DeepIVUS is an open-source platform for the analysis of IVUS images. The platform is designed for use by clinicians and consists of a graphical user interface with a deep learning model in the backend to segment areas of interest in IVUS images. Reduced lab image processing time from 2+ hours to <10 minutes
- Designed protocol and instructed a group of clinicians in the generation of manual ground truth IVUS segmentations. Demonstrated non-inferior performance based on inter-observer study of clinicians vs. DeepIVUS platform.
- Identified an association between a biomarker "wall shear stress" and myocardial infarction and published this in the leading cardiology journal JACC.
- Developed an open-source library for the temporal registration of IVUS images.
- Developed and published a novel technique for co-registration of IVUS and OCT intravascular images.

GEORGIA TECH, ATLANTA, GA JAN 2011 – MAY 2015
Postdoctoral Fellow

- Completed research project on coronary artery disease in humans combining medical imaging and CFD. Workflow integrated both anatomical and physiological measurements in humans.
- Jointly supervised MRI imaging study of diseased rabbits using 4D MRI with clinician scientists. This was one of the first studies using 4D MRI to quantify arterial flow in rabbits.

Education

Doctor of Philosophy (Ph.D.) in Biomedical Engineering, University of Limerick, Ireland 2010

Bachelor of Engineering (B.Eng.) in Mechanical Engineering, University of Limerick, Ireland 2005

Awards/Certifications

- Faculty Research Mentor of the Year, Northeast Georgia Medical Center 2024
- Regression modeling strategies (Frank Harrell) 2024
- Microsoft Teals volunteer at Atlanta College and Career Academy 2021
- American Heart Association Postdoctoral Fellowship 2013-2015
- Petit Scholar Mentor 2014
- Gandy Diaz Teaching Fellowship 2014

Skills

- Techniques - Deep Learning, Medical imaging, Statistics, Data visualization, Technical/grant writing
- Frameworks - Pytorch, tensorflow, PyQt, scipy, scikit-learn
- Cloud - AWS, Google Cloud
- Programming - Python/R/Matlab/Javascript