Western Faculty Profile: Dr. Ali Khan

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No conflicts of interest declared

Background

Dr. Khan studied computer engineering as an undergraduate, but his interest in computers manifested at a much earlier stage in his life. His first exposure to computers occurred at age six. Back then, a simple set of classic video games laid out on a “monochrome green screen” was enough of a captivating introduction to the virtual world. Dr. Khan eventually learned how to hack into those games that he played, and that slowly developed his interest in computer programming, a relatively new field at the time. Working with larger and larger systems, Dr. Khan eventually stepped into the field of medical imaging during his co-op term at Simon Fraser University. The ability of computer systems to analyze MRI data of the brain and connect that information to diseases is ultimately what led Dr. Khan to where he is today.

Current research projects

Currently, Dr. Khan and his lab group are focusing on the hippocampus. Specifically, they are looking at this brain structure’s role on memory computations: determining this association is central to the elucidation of the cause of many hippocampal diseases and disorders. Currently, the team uses 7T MRI scans to get a closer look at hippocampal substructures. Developing computational techniques to model the abnormalities in the hippocampus is crucial to future clinical studies.

Another major project being pursued is diffusion MRI technology. This imaging technique takes advantage of random water molecule diffusion in the brain, and can be used to discover microstructure, neural pathways, and cortical grey matter.

Challenges

Sometimes, it is difficult to allocate enough time on research work when there is a multitude of other activities professors must complete. In addition to research, investigators often must focus on teaching, meetings, and administration

services. With regards to research itself, it is a big challenge to try and branch out from topics of familiarity to new topics in order to find new, innovative solutions. How is this resolved? Talk to more people of different fields and let the “cross-fertilization” of ideas take place.

Industry Snapshot

In the field of medical imaging, the quality of images is rapidly increasing, and the sheer amount of detail that can be extracted from a single voxel is immense. Coupling that with artificial intelligence, a new milestone is being achieved in this point in time.

Moreover, the research facility at Robarts and Western University is a unique imaging core. Robarts is home to Canada’s only 7T magnet and boasts a wide array of 3T magnets and ultrasound devices.

Research for undergraduates

As a mentor, Dr. Khan is a firm believer in making himself available to those under his supervision. Meanwhile, he recommends mentees to ask as many questions as possible, participate in social events, and be flexible with both groupwork and individual learning.

To aspiring undergraduate researchers, Dr. Khan recommends focusing on core skills. Computational skills are often overlooked and spending some time on Python tutorials or coding challenges is invaluable to building transferrable skills.

To learn more on Dr. Khan’s lab and research, please visit his website at:

<https://www.khanlab.ca/>