



DRIVING PRECISION MEDICINE THROUGH ARTIFICIAL INTELLIGENCE



Medical Imaging
UNIVERSITY OF TORONTO

Temerty
Medicine

DEVELOPING NEXT-GENERATION MEDICAL IMAGING TECHNOLOGY

In today's busy hospitals, we're seeing more patients, with more complex, delicate diagnoses than ever. To provide excellent care for a diverse range of patients across Canada, the race is on to develop better supports and resources that will allow our world-class health professionals to respond more effectively to the growing demands on our health system.

Thanks to continued advances in research, medical education and patient care, change is on the horizon. The Department of Medical Imaging at the University of Toronto is on the vanguard of many of these life-changing gains.

In addition to training the next generation of highly-skilled scientists, expert faculty members, including **Farzad Khalvati, PhD**, are developing promising new tools that bridge the gap between pioneering machine learning research and the development of real-world solutions for use in hospitals and other health care sites.



Dr. Farzad Khalvati, PhD,
Endowed Chair in Medical Imaging
and Artificial Intelligence,
Temerty Faculty of Medicine,
University of Toronto *and*
the Hospital for Sick Children

Dr. Khalvati's research focuses on building novel solutions that combine artificial intelligence (AI) and clinician expertise. These solutions help improve how physicians interpret AI findings and translate them into practical information. By doing so, they can significantly enhance the accuracy of their diagnoses, prognoses, and treatment planning — ultimately improving patient outcomes.

As the inaugural Chair in Medical Imaging and Artificial Intelligence, Dr. Farzad Khalvati holds appointments at the Hospital for Sick Children (SickKids), the Vector Institute for Artificial Intelligence and the University of Toronto.

His research focuses on five key themes, each of which provides a promising opportunity to significantly improve health care delivery and outcomes:

- 1. AI for precision child health** — Creating AI computer programs that combine medical imaging and verified data to help clinicians identify specific paediatric health conditions and guide the type, timing and intensity of therapy to achieve optimal outcomes.
- 2. Predictive modeling for early detection and intervention** — Creating smart systems that can spot early, often missed, signs of illness in medical images and predict disease progression, leading to earlier diagnoses and better patient outcomes.
- 3. Multi-modal image registration and fusion** — Combining images from different scans and tests (e.g. CT, MRI, PET) to more accurately show body structures and to more easily identify health concerns.
- 4. Ensuring AI remains explainable and trustworthy** — Promoting transparency, accountability and ease-of-use in AI models to build confidence among users and encourage broader adoption of data-driven tools in clinical practice.
- 5. Developing guidelines for ethical AI** — Addressing concerns regarding fairness, privacy, security and bias when implementing AI solutions, ensuring equitable distribution of benefits and reducing risks associated with these powerful technologies.

These are important efforts that are already having an impact. But faculty members like Dr. Khalvati don't do it alone — generous donors are our essential partners in this work.

Together, with new support for Dr. Khalvati and other health care experts at the University of Toronto, we can accelerate the innovative application of AI and other technology in health care for the benefit of patients and communities everywhere.

For more information about how you can support Dr. Khalvati's research in the Department of Medical Imaging at the University of Toronto, please visit <https://uoft.me/AIMedImaging>



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U of T's Temerty Faculty of Medicine stands at the heart of the Toronto Academic Health Science Network (TAHSN) — a network of world-leading teaching hospitals and community health care sites that includes:

- » Baycrest Health Sciences
- » Centre for Addiction and Mental Health
- » Holland Bloorview Kids Rehabilitation Hospital
- » The Hospital for Sick Children (SickKids)
- » Humber River Hospital
- » Michael Garron Hospital
- » North York General Hospital
- » Scarborough Health Network
- » Sinai Health (Bridgepoint Health, Mount Sinai Hospital)
- » Sunnybrook Health Sciences Centre
- » Trillium Health Partners
- » Unity Health Toronto (St. Michael's Hospital, St. Joseph's Health Centre and Providence Healthcare)
- » University Health Network (Princess Margaret Cancer Centre, Toronto General Hospital, Toronto Rehabilitation Institute and Toronto Western Hospital)
- » Women's College Hospital



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