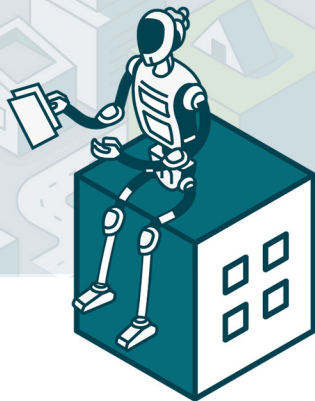# Ai4 Society

UNIVERSITY OF ALBERTA

2021-2022

UNIVERSITY OF ALBERTA
AI4SOCIETY

OUR COMMUNITY

The **AI4Society** Signature Area was established in December 2019 with the objective to bring together the community of University of Alberta researchers working on Artificial Intelligence, its applications, and its transformative implications for our society.

Over the past 30 years, the University of Alberta has been consistently ranked as one of the top three institutions worldwide for AI research. This record has led to the establishment of Amii, the Alberta Machine Intelligence Institute, as one of the three pillars of the Pan-Canadian Strategy for AI.

Building on this recognition, AI4Society has adopted a broad view of, and an interdisciplinary approach to, Artificial Intelligence, including the design of algorithms and methodologies, the development of applications to address real-world problems, and the investigation of ethical and legal frameworks to guide research and development in this area.

In its three short years of activity, AI4Society has seeded new interdisciplinary activities that have gone on to pursue external funding; has supported initiatives that have enriched the experience of our students; and has hosted a series of events to engage and educate our community.

OUR OBJECTIVES

Amplify the AI-related research activities of the University of Alberta community.

Build learning capacity in Artificial Intelligence, Machine Learning, and Data Science.

Cultivate pathways of engagement with the community at large.
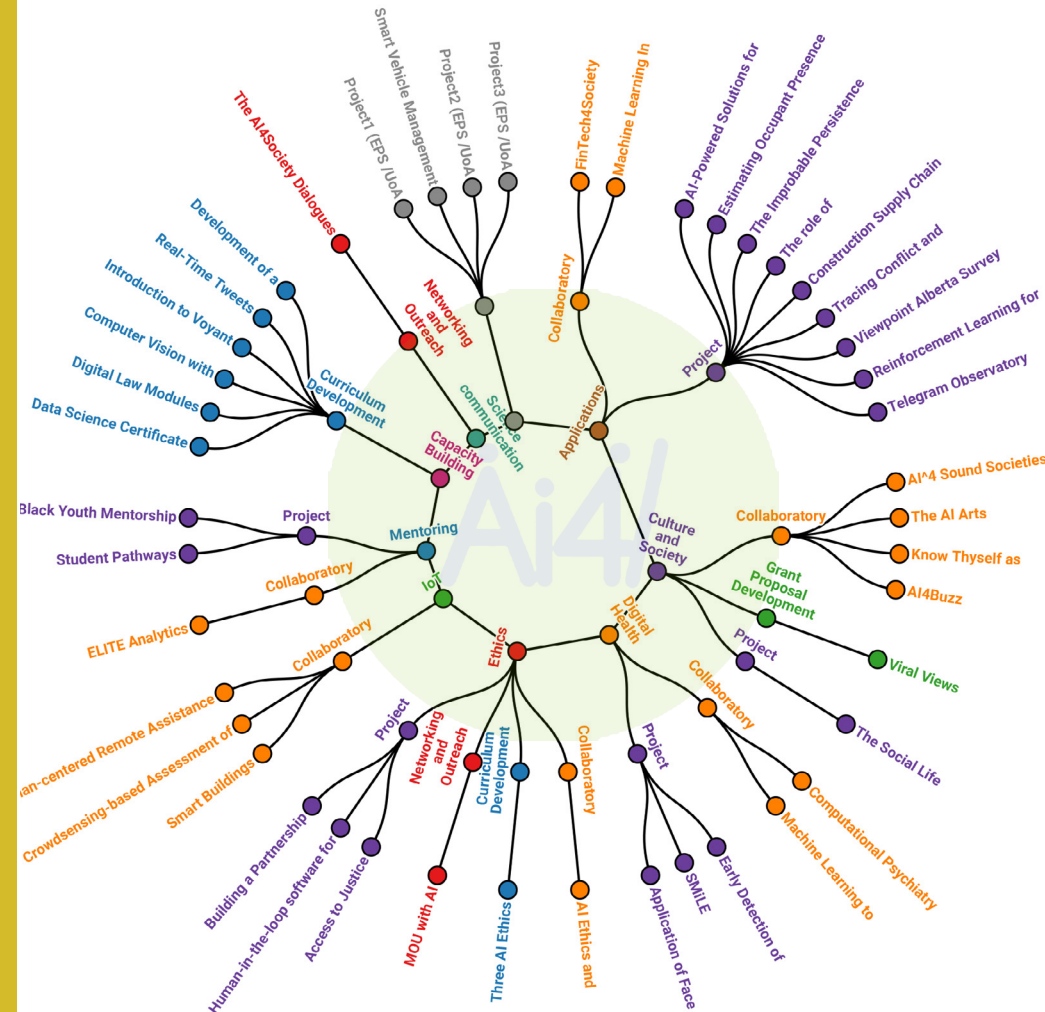
At a Glance

INSTITUTIONS

2021-2022
Film University Babelsberg Konrad Wolf
RCGS Institute (Ritsumeikan University)
KTH Royal Institute of Technology
Grenoble Ecole de Management
Federal University of Bahia
University of Washington
University of Waterloo
Clarkson University
Ethically Aligned AI
Rostock University
Monash University
Ryerson University
McGill University
RMIT University

2020-2021
KIAS
Amii
Sen Sound
City of Edmonton
Queen's University
University of Regina
University of Calgary
Weizenbaum Institut
The University of Aizu
University of Aberdeen
Edmonton Police Service
Tecnológico de Monterrey
University of the Arts London
Center for Digital Ethics & Policy
The Canadian Energy and Climate Nexus
Responsible Artificial Intelligence Institute

NUMBERS

	2020	2021	2022
Researchers	121	171	225
Institutions	36	65	87
Projects	05	26	42
Events	08	42	64
Events Registration	130+	1000+	1500+

TEAM

Dr. Eleni Stroulia
Director
Professor, Computing Science
Acting Vice Dean, Faculty of Science
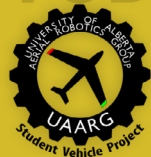director@forum.ai4society.ca

Dr. Geoffrey Rockwell
Associate Director
Professor, Philosophy & Digital Humanities
Director - KIAS
director@forum.ai4society.ca

Dr. Nicolás Arnáez
Project Coordinator
Assistant Lecturer, Faculty of Arts - Music Department
ai4s@ualberta.ca

STUDENT GROUPS

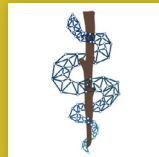University of Alberta Aerial Robotics Group

Undergraduate Artificial Intelligence Society

Digital Law & Innovation Society

ADA

Artificial Intelligence in Medicine Student Society

Youreka Canada

NeurAlbertaTech

Students for Machine Learning in Business

iGeek

Highlighted Research Initiatives

Applications

Tracing Conflict and Radicalization Online

FORUM

Denilson Barbosa

Rockwell, Geoffrey
Stroulia, Eleni
McQuinn, Brian
Oleksandr, Pankieiev
Stepnisky, Jeffrey

Science - Philosophy Politics

Compared to machines, human experts have very limited bandwidth for information processing but much deeper domain knowledge, flexibility, and creativity. Our project seeks to develop AI tools to maximize the human potential in understanding conflict by helping with heavy lifting task of gathering and organizing potentially interesting data online, freeing the experts' time for the deeper analysis that they do best. Our ultimate goal is to create a leading and state-of-the-art global platform to share tools, data, and models – both created by us and contributed by other innovators.

Ethics

Human-in-the-loop software for improving latent fingerprint identification

FORUM

Mattew Taylor

Miguel A. Medina-Pérez
Devin Laforce

Science - ITESM - EPS

Automated methods for identifying latent fingerprints have grown in popularity in the past years. New challenges have emerged that impede the marking of basic features needed to represent fingerprints. The absence of two features can make a fingerprint no longer identifiable, creating barriers to the implementation of automated methods. We are developing an AI-enabled system to improve feature labelling for latent fingerprint identification. The system will predict the impact of including or not including certain features for a latent fingerprint identification system. The project seeks to develop a tool that can be used to support trained fingerprint examiners and in the training of individuals with little or no experience in the field.

Digital Health

Machine Learning to Rapidly Detect Drug-Resistant Human Fungal Pathogens

FORUM WEBSITE

Daniel Charlebois

Dingle, Tanis
Goebel, Randy
Newby, Jay
Guthrie, Joshua
Shankarnarayan, Shamanth

Physics - Science

Healthcare professionals must quickly identify pathogens to initiate prompt antimicrobial therapy to patients and to contain their spread within the hospital and community at large. However, drug-resistant pathogens can be notoriously difficult and time consuming to identify using traditional diagnostic tests. We are developing machine learning models to detect drug resistance in fungal pathogens from patient samples. These machine learning models are anticipated to detect drug-resistant pathogens more rapidly and accurately than the currently available diagnostic methods.

IoT

Crowdsensing-based Assessment of Wildfire-related Risks and Hazards

FORUM

Mustafa Gül

Beverly, Jen
Nykiforuk, Candace

Engineering - ALES School of Public Health

The overarching long-term objective of this initiative is to develop a novel technology for assessment of wildfire-related risks and hazards through crowdsensing, which is a useful tool for obtaining information about various phenomena from large areas in nearly real time. We will develop a unique crowdsensing-based technology by employing crowdsourced image data from in-vehicle cameras analyzed with AI, computer vision, and image analysis with deep learning.

Culture and Society

AI4Buzz: Pulse Check for Canada's Energy Conversations

FORUM WEBSITE

Lianne Lefsrud

Barbosa, Denilson
Gehman, Joel
Stroulia, Eleni
Hollis, Geoff
Boucher, Jean-Christophe
Gutierrez Gutierrez, Candelario
McQuinn, Brian
Westbury, Chris
Winter, Jennifer
Millia, David

Engineering - Science Business

Social media platforms are public venues where conversations about issues of public interest take place. These online conversations have real world impact. The project objective is to understand the vocabularies, speakers, interlinking of conversations, associated topics/themes, and make this all public to draw these narratives together and support solutions-based policy conversations.

AI4Society

Highlighted Research Initiatives

IoT

Smart Buildings

FORUM   WEBSITE

Eleni Stroulia

Ardakanian, Omid
Guzdial, Matthew
Hegde, Nidhi
Li, Ryan Yunwei
Musilek, Petr
Nikolaidis, Ioanis
Oliver, Marilène
Taylor, Matthew
White, Martha

Science - Engineering - Arts

The digitization of building information has the potential to transform the way professionals design, construct and operate facilities and the way occupants interact with them. The objective of the Smart Buildings collaboratory is to engage in research towards improving the planning, design, construction, operation, and maintenance of buildings, to increase occupant comfort and decrease energy consumption and costs.

Culture and Society

The Social Life of Cinema During COVID

FORUM

Deb Verhoeven

Coate, Bronwyn
Eltham, Ben
Glaser, Vern
Loist, Skadi
Moore, Paul
Prommer, Elizabeth
Dadlani, Aresh
Jones, Pete

Arts - Business

Using the Kinomatics Showtime database we are seeking to understand how cinemagoing - as a relationship between films, venue locations and audiences, was affected by the global spread of COVID-19 We have collected data that describes all movie showtimes and cinema locations for all films released in the majority of global jurisdictions between November 2019 and June 2021 inclusively. This period is particularly interesting because it covers the onset and diffusion of COVID-19 around the world.

Applications

Construction Supply Chain Analysis on Forecasting the Demand for Small Equipment, Tools, and Consumables for Industrial Construction Projects

FORUM

Simaan Abourizk

Akhmetov, Ildar
Wu, Lingzi

Engineering - Science

This proposed research aims to improve the construction supply chain's efficiency, resilience, and agility by providing a data-driven forecast solution for small equipment, tools, and consumables throughout an industrial construction project's lifecycle. The proposed research is expected to provide insight into the historical demand for small equipment, tools, and consumables before and during the construction project.

Digital Health

Application of Face Recognition Methodologies for Antibody Selection for COVID-19

FORUM

Maral Aminpour

Marcolin, Federica
Tuszyński, Jack

Science - Engineering Physics

Protein interactions (PPIs) play an important role in a wide range of biological processes. They are involved in the principal activities and pathways at the cellular level, making them promising targets for drug discovery. The SARS-CoV2 spike protein plays a key role in mediating virus–cell fusion and the integration of the SARS-CoV2 virus into host cells. Our proposed project aims to develop a platform to facilitate repurposing of available antibodies to treat COVID-19 through identification of a novel protein–protein interaction protocol.

Applications

Reinforcement Learning for Safe Handover between Humans and Autonomous Vehicles in Complex Environments

FORUM

Ehsan Hashemi

Taylor, Matthew
Melek, William

Engineering - Science

Autonomous vehicles with various levels of high and full automation are revolutionizing Intelligent Transportation Systems (ITS) in terms of safety, energy consumption, and how humans interact with their cars. During these safety critical handover transitions between the human and autonomy, the vehicle knows little about the human's capability/prediction, and the human is unaware of the vehicle's handling capacities, thus, could take actions that deteriorate the stability and imperil the safety of passengers and pedestrians.

AI4IA
ARTIFICIAL INTELLIGENCE FOR INFORMATION ACCESSIBILITY 2022

UNESCO Working Group on Information Accessibility (WGIA) Hosts 3rd Artificial Intelligence for Information Accessibility (AI4IA) Conference (Virtual)

September 28 2022

unesco
Information for All Programme
IFAP

In observance of International Day for Universal Access to Information (IDUAI)
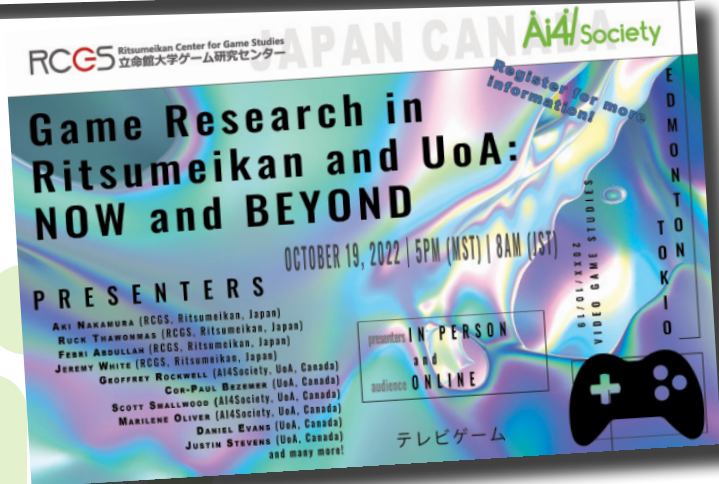

Ai4/ Society × UNIVERSITY OF ALBERTA

UA X AI4/SOCIETY PRESENT:

THE 2022 DATATHON

SOLVE CHALLENGES. WIN BIG.
TEAMS OF ≤ 5 | ONLINE & IN-PERSON

UALBERTA PARTICIPANTS WIN PRIZES!!!

RCGS Ritsumeikan Center for Game Studies 立命館大学ゲーム研究センター

JAPAN CANADA

Ai4/ Society

EDMONTON TOKIO

Game Research in Ritsumeikan and UoA: NOW and BEYOND

OCTOBER 19, 2022 | 5PM (MST) | 8AM (JST)

Register for more information!

VIDEO GAME STUDIES 20XX/10/19

PRESENTERS

Aki Nakamura (RCGS, Ritsumeikan, Japan)
Ruck Thawonmas (RCGS, Ritsumeikan, Japan)
Febri Abdullah (RCGS, Ritsumeikan, Japan)
Jeremy White (RCGS, Ritsumeikan, Japan)
Geoffrey Rockwell (Ai4Society, UoA, Canada)
Cor-Paul Bezemer (UoA, Canada)
Scott Smallwood (Ai4Society, UoA, Canada)
Marilene Oliver (Ai4Society, UoA, Canada)
Daniel Evans (UoA, Canada)
Justin Stevens (UoA, Canada)
and many more!

presenters IN PERSON and audience ONLINE

テレビゲーム

Call For Entries
8 Themes

PUBLIC SPACE AND BUILT URBAN ENVIRONMENT
TACTICAL URBANISM AND TEMPORALITY
SMARTCITIES AND ARTIFICIAL INTELLIGENCE
DESIGNING BUILT ENVIRONMENTS AND HYBRID REMOTE SPACE
(IN)FORMAL PUBLIC SPACE
ENGAGING COMMUNITY AND PARTICIPATION
CONNECTION WITH NATURE FOR MENTAL HEALTH AND WELLNESS
FUTURE POST PANDEMIC PUBLIC SPACE AND...

A Worldwide Post-Pandemic Illustration Competition

Reimagining Architecture & Urbanism in Post Pandemic World

AWARDS

Best of the Best
$1000 CAD

Thematic Best
$800 CAD

Best Award
$500 CAD

Special Mention
$200 CAD

Certificate and Exhibition Entry

Submission Deadline
30 September, 2022 [MDT]

Jury Panel
Han Verschure, University of Leuven, Belgium
Sasha Tsenkova, University of Calgary
Lawrence Esho, Technical University of Kenya, Kenya
NR Khan, Department of Architecture, Bangladesh University
Christopher Kennedy, Urban Systems Lab, New York
Carey Van der Zalm, Reimagine Architects
Mehdi Zahed, Algonquin Centre for Construction Excellence (ACCE), Canada
David Dale-Johnson, City Building, SOR Real Estate, University of Alberta
Yehya Serag, Urban and Regional Planning, Ain Shams University, Egypt
Susan Colberg, Design Studies, University of Alberta
Els De Vos, Faculty of Design Science, University of Antwerp
Vedran Skopac, Principal, Reimagine Architects
Karen Lee, Housing for Health, University of Alberta

Conveners:
Paul Messinger, University of Alberta
Kishwar Habib, Reimagine Architects and University of Alberta
Vivian Manasc, Reimagine Architects
Eleni Stroulia, Ai4 Society

Competition Brief and Reg Link: https://ai4society.ca/post-pandemic-illustration/

UNIVERSITY OF ALBERTA   Mitacs   Ai4/ Society   reimagine

Responsible AI

Reverse EXPO

APIC · UNIVERSITY OF ALBERTA FUTURE ENERGY SYSTEMS · Ai4Society · ISAIC

ENERGY HACKATHON 2022

Do you believe that we can live in a sustainable society? Are you passionate about coming up with well-rounded solutions to the impassable energy challenges?
Then Energy Hackathon is you opportunity!
Energy Hackathon is a 72-hour competition where the teams of students will be able to design and present creative solutions and prototypes will be evaluated by a panel of judges.
The winning team will be granted opportunity to present their idea to the industry at APIC Forum.

Key dates
- Energy Hackathon 2022
May 6 – May 8
- APIC Forum 2022
May 9 – May 10

Who can participate
All students interested in energy systems, computing, data science and AI. This includes undergraduate, graduate and high school students from around the world.

For more information and registration, please visit APIC website.

Intro, Tutorials Brainstorming Ideas	Team formation Hacking Hacking Hacking (support provided)	Hacking continues Presentations Results
FRIDAY	SATURDAY	SUNDAY

Question? Email us on program.coordinator@apicweb.ca

NSERC CRSNG · aeso · ATCO · EPCOR · ALTALINK · ENMAX · FORTIS ALBERTA

DIGITAL LAW FORUM
Artificial Intelligence & the Law: Myths & Reality

February 15 - 16

Co-presented by the Faculty of Law & Ai4Society

UNIVERSITY OF ALBERTA · DLIS

UNIVERSITY OF ALBERTA · Ai4Society · CONSTRUCTION INNOVATION CENTRE

Ai4Society and Construction Innovation Centre Present

AI in Construction
Academia & Industry Meet-and-Greet

Join us for an online event where you can meet fellow researchers and industry professionals interested in the adoption of AI for the construction industry, and discuss the most prominent needs, opportunities and challenges of implementing AI in construction. This event aims at fostering partnerships among researchers and industry partners, too, to raise funding and support provided by the CIC and Ai4Society for research initiatives related to AI in construction.

Tuesday 7 DEC 2021 · www.ai4society.ca
2:00 – 3:30 PM · www.constructionCIC.ca

Ethical Data and AI

PRESENTER
Dr. Jacob Jaremko
Radiology & Diagnostic Imaging / FoMD
University of Alberta

PRESENTER
Hero Laird
Digital Law & Innovation Society
University of Alberta

PRESENTER
Jeanna Matthews
Computer Science
Clarkson University

PRESENTER
Luke Stark
Faculty of Information & Media Studies
University of Western Ontario

PRESENTER
Leonardo Nascimento
Federal University of Bahia
Digital Humanities Laboratory

PRESENTERS
Howard Nye
Tugba Yoldas
Philosophy
Randy Goebel
Shahin Atakishiyev
Computing Science

PRESENTER
William Wadsworth
Faculty of Arts – Anthropology Dept
University of Alberta

Ethical Data and AI discussion salon

Organized by the AI Ethics and Privacy collaboratory
Led by Nidhi Hegde and Geoffrey Rockwell

Ai4Society

Come and join us for the eight Ethical Data and AI Salon!

Wednesday, November 30th - 3:30pm to 5:00pm - online and in person.

The Ethical Data and AI Salon is meant to be an informal gathering. We will have William Wadsworth presenting on Ethics and Non-invasive Archaeology in Canada, followed by an opportunity for open conversation.

This Salon #8 will be held at the Senate Chambers (Old Arts) online through Zoom.

Register to join us!

Podcast

Season 2

How will AI shape society and how will society shape AI? **AI4Society Dialogues** talks to leading researchers across the disciplines at the University of Alberta, a global leader in artificial intelligence research. The podcast explores how researchers are constructing and using AI in the course of their work and examines opportunities, challenges and concerns as AI becomes an increasingly prevalent aspect of our world.

Season 1

AI4Society Dialogues

Knowledge Mobilization

AI4Society Dialogues with:
Jana Rieger
Full Professor
Communication Sciences and Disorders / Rehabilitation
University of Alberta

AI4Society Dialogues with:
Alona Fyshe
Assistant Professor
Computing Science
University of Alberta

AI4Society Dialogues with:
Daniel Baumgart
Full Professor
Faculty of Medicine & Dentistry
University of Alberta

AI4Society Dialogues with:
Adam Kinnaird
Assistant Professor
Faculty of Medicine & Dentistry
University of Alberta

AI4Society Dialogues with:
Ray Nilanjan
Professor
Faculty of Science
University of Alberta

AI4Society Dialogues with:
Jacob Jaremko
Assistant Professor
Faculty of Medicine & Dentistry
Radiology & Diagnostic Imaging
University of Alberta

AI4Society Dialogues with:
Adriana Rios Rincon
Assistant Professor
Occupational Therapy
Rehabilitation
University of Alberta

AI4Society Dialogues with:
Bo Cao
Assistant Professor
Psychiatry / FoMD
University of Alberta

AI4Society Dialogues with:
Padma Kaul
Professor
Faculty of Medicine & Dentistry
University of Alberta

AI4Society Dialogues with:
Marilène Oliver
Assistant Professor
Arts and Design
University of Alberta

AI4Society Dialogues with:
Jonathan Schaeffer
Full Professor
Computing Science / Science
University of Alberta

AI4Society Dialogues with:
Michael Bowling
Full Professor
Computing Science / Science
University of Alberta

AI4Society Dialogues with:
Cathy Adams
Full Professor
Secondary Education / Education
University of Alberta

AI4Society Dialogues with:
Francois Bolduc
Assoc Professor
Pediatric Neurology
Faculty of Medicine & Dentistry
University of Alberta

AI4Society Dialogues with:
Michael Frishkopf
Full Professor
Music / Arts
University of Alberta

AI4Society Dialogues with:
Nidhi Hegde
Associate Professor
Computing Science / Science
University of Alberta

AI4Society Dialogues with:
Noah Castelo
Associate Professor
Marketing / Business
University of Alberta

AI4Society Dialogues with:
Jennifer Raso
Assistant Professor
Law
University of Alberta

AI4Society Dialogues with:
Deb Verhoeven
Professor
Faculty of Arts
Womens & Gender Studies
University of Alberta

AI4Society Dialogues with:
Richard Sutton
Full Professor
Computing Science / Science
University of Alberta

Key Areas of Activity

1. AI for Construction and Smart Buildings

The impressive advances we have been witnessing in sensing and control technologies (under the general "Internet of Things" banner) coupled with new machine-learning methods for modeling, predicting, and controlling the behaviors of complex dynamic systems offer a compelling opportunity for the construction industry.

(1) Today's buildings are complex cyber-physical systems, with a variety of sensors emitting data based on the building usage and controllers managing their heating, ventilation, air conditioning, lighting, major appliances, and access control systems. Funded by CFI-JELF, Stroulia, Ardakanian, and Musilek are working to "Transform a Century-Old Building into a Smart-Building Living Lab" (https://www.ualberta.ca/folio/2022/09/researchers-aim-to-turn-century-old-building-into-a-model-of-smart-energy-use.html).

(2) Construction projects also stand to benefit from AI. Building on the record of the Centre for Innovation in Construction, and funded by NSERC through an Alliance grant, Abourizk, Mohamed, Gonzalez-Moret, Stroulia are working to on a comprehensive, simulation-based platform capable of integrating a variety of data streams, considering multiple aspects of project performance, and supporting important decisions across the entire lifecycle of a construction project, so that in to improve project performance and increase competitiveness.

2. AI for Health

The potential of AI to revolutionize health cannot be over-estimated.

(1) The Computational Psychiatry group (https://ai4society.ca/computational-psychiatry), led by Russ Greiner, applies advanced computational methods from machine learning, data science, and data mining to the problems of psychiatric diagnosis and prognosis.

(2) Biophysics researcher, Daniel Charlebois, is leading a team of researchers developing machine learning models to detect drug resistance in fungal pathogens from patient samples. These machine learning models are anticipated to detect drug-resistant pathogens more rapidly and accurately than the currently available diagnostic methods.

(3) Led by Daniel Baumgart, an interdisciplinary team of researchers, including Geoffrey Rockwell, were awarded a NSERC CREATE program entitled "From Data to Decision (FD2D) - Digital Transformation and Artificial Intelligence from Data Value Chain to Human Value)" (https://fd2d.org).

Key Areas of Activity

3. AI for FinTech

A team established through a seed grant by AI4Society -Avdis and Scholnick (Business), Frei (MSS), and Hegde (CS) - were awarded a SSHRC Insight grant entitled "Financial markets, information extraction, and artificial intelligence" to study the interplay between algorithmic decisions and the socio-economic environment, examining questions such as (i) How do outcomes of algorithms affect financial markets and the economy? (ii) How does a machine think differently from a human and what are the consequences of this difference? (iii) How does bias in machine learning and the underlying data affect outcomes? and (iv) How do economic agents value privacy and how does AI affect this valuation?

4. AI for Social Media

The Centre for Artificial Intelligence, Data, and Conflict (CAIDAC - https://www.tracesofconflict.com), led by Dr. McQuinn (URegina), in collaboration with Drs. Taylor, Barbosa, and Stroulia (CS), studies how social media is transforming conflict, disinformation, and democracy. Numerous proposals by this team are currently being adjudicated.

5. Responsible AI

The societal implications of AI are the focus of several international institutions, both academic and not-for-profits. We have established collaborations with The Ethics of Innovation group within "Alberta Innovates" led by Tammy Mah-Fraser (https://albertainnovates.ca); the Responsible Artificial Intelligence (RAI) CREATE program at TMU (https://rai.rnet.ryerson.ca); the (formerly AI Global) Responsible AI Institute (https://www.responsible.ai); The UNESCO Information For All Programme (IFAP) Working Group on Information Accessibility (WGIA - https://www.unesco.org/en/ifap/information-accessibility); Grenoble's Multidisciplinary Institute in Artificial Intelligence (https://miai.univ-grenoble-alpes.fr); the Center for Digital Ethics and Policy (CDEP - https://www.luc.edu/digitalethics) at Loyola University Chicago; and the Weizenbaum Institute for the Networked Society in Berlin (https://www.weizenbaum-institut.de/en).

6. Implementation Science

The Forum platform underlying the AI4Society website and back-end repository enables and supports implementation-science projects, knowledge mobilization of research outputs, social promotion of ongoing and past research initiatives, overall administrative oversight and project management, as well as outreach and public organizational features. Multidisciplinary Institute in Artificial Intelligence; the Center for Digital Ethics and Policy (CDEP) at Loyola University Chicago; and the Weizenbaum Institute for the Networked Society in Berlin.
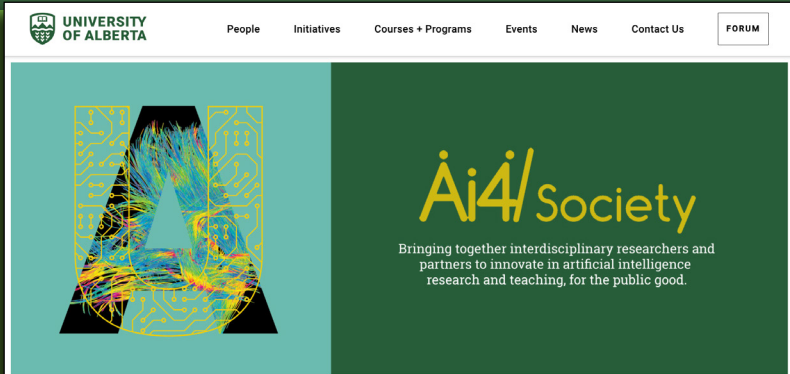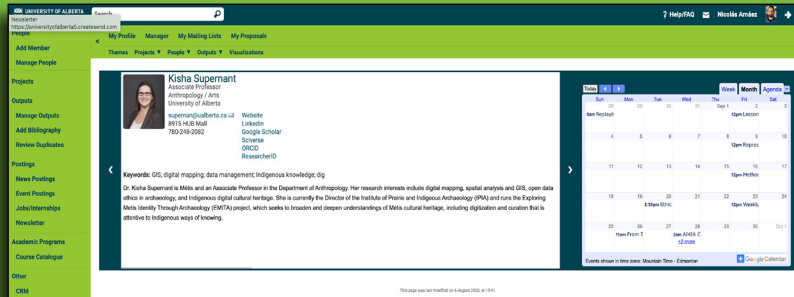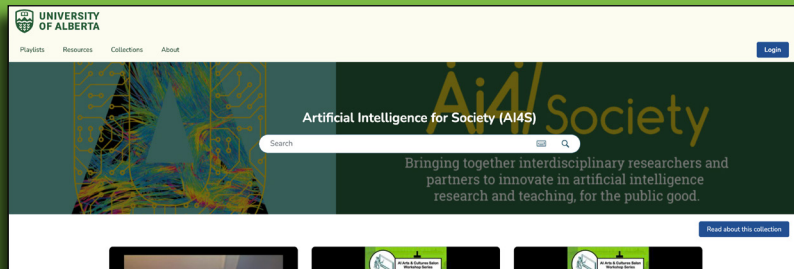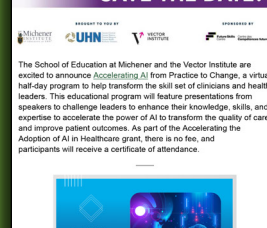
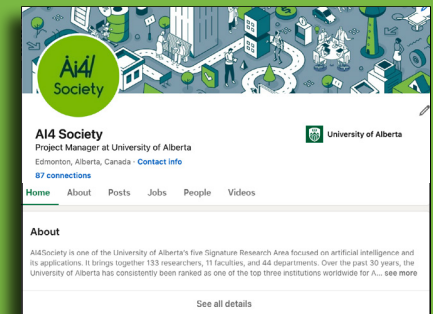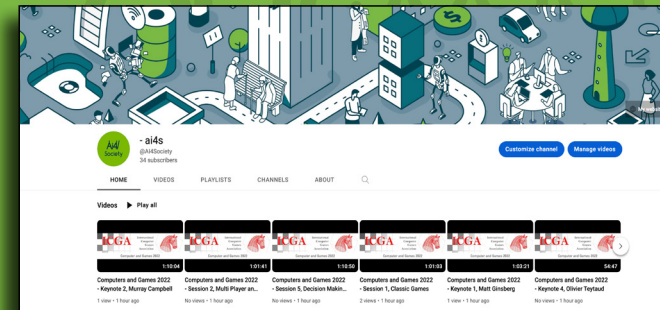# Online Presence

Website

Forum

UofA Library - Aviary

Bi-weekly newsletter

Twitter

Vimeo

Soundcloud

Linkedin

Youtube