2025 Women in AI Canada Hackathon Challenge

Join us for the 2025 WAI Canada Hackathon, a virtual innovation sprint running from **October 6 to November 3, 2025, culminating in final presentations and a solution showcase on November 7, 2025.** This year's hackathon challenges you to harness the power of AI for equity, inclusion, sustainability, and public well-being. Whether you're a student, researcher, designer, or entrepreneur, this is your opportunity to build AI-driven solutions that create real-world impact, from personalized learning for neurodiverse communities to precision health systems that detect anomalies early, accelerate drug discovery, and provide culturally sensitive mental health support.

Participants will gain access to curated datasets, expert mentorship, and visibility with top industry and policy leaders. Whether you're prototyping an AI product, building a responsible agent, or designing a concept that could change lives, we invite you to help shape the future of ethical AI.

Theme 1:

"Applied AI for Social Good, Inclusivity & Sustainability"

We challenge you to build AI systems that address global challenges in education, accessibility, environmental resilience, and civic inclusion. From adaptive learning tools and inclusive urban navigation to climate action planning and multilingual public service assistants, this theme invites solutions that remove barriers, promote equity, and create sustainable societal impact.

Theme 2:

"AI for Public Health & Well-being"

We challenge you to design AI solutions that improve health outcomes, enhance quality of life, and strengthen system resilience from personal wellness to global public health challenges. Whether you're building an edge-AI model to detect early signs of illness, a genomics-powered diagnostic tool, or a wearable that offers context-aware support, your solution should be ethically designed, scalable, and impactful for diverse populations.

How to participate?

- The **Call for Abstract Submission is open till September 19, 2025.**
- You are required to submit your application, with the details of your group of size 1-3, along with the abstract of the problem and solution you are submitting.
- Your solution must be plagiarism-free and aligned with this year's challenge themes.
- If we require you to change your problem or solution, we will contact you via email before the Challenge opens formally on **October 6, 2025.**
- You will be paired with a mentor, to help you guide throughout the development of your proposed solution.
- The Challenge period will be between **October 6 - November 3, 2025,** where you will attend weekly mentoring sessions and relevant technical workshops.
- On **November 7, 2025,** there will be a final Hackathon Ceremony where you will submit and present your use case and solutions to the Jury Members.

The solution will be evaluated based on the following:

- Addressing a relevant problem that is impactful
- Innovation
- AI Element
- Responsible AI
- Feasibility of execution and scalability
- Must be plagiarism-free

Read the Terms and Conditions

Sample Ways to Prepare a Use Case for the Hackathon

Challenges for Theme 1: Applied AI for Social Good, Inclusivity & Sustainability

Design AI systems that promote educational equity, social inclusion, and accessibility, empowering diverse learners, underserved communities, and individuals with disabilities through personalization and multimodal experiences.

Challenge 1: AI-Enhanced Multimodal Learning Assistant for Neurodiverse Learners

Problem Statement:
Neurodiverse learners (e.g., those with dyslexia, ADHD, or autism) often lack access to personalized educational tools that adapt to their cognitive and emotional needs.

Potential Solutions:

Approach #1 (Traditional AI):

Solution: NLP-Based Dyslexia Reading Companion
Description: Build a dyslexia-friendly reader that highlights text, converts it to speech, and simplifies vocabulary in real-time.
Technical Aspects: Use NLP and TTS technologies to adapt content based on the user's reading pace and comprehension level.

Approach #2 (Agentic AI):

Solution: Adaptive Multimodal Learning Tutor
Description: Design an AI tutor that senses learner engagement, adjusts modality (text, visual, audio), and adapts its teaching style dynamically.
Technical Aspects: Combine engagement detection models with multimodal content delivery to personalize learning experiences.

Why It Matters (WAI lens): Enables equity in education for neurodiverse learners and those often underserved in traditional systems.

Suggested Datasets/APIs:

1. **OpenNeuro ds003126** – fMRI data capturing reading activity in children with dyslexia and spelling deficits. Freely available for download https://openneuro.org/datasets/ds003126/versions/1.3.1
2. **UCI Autism Screening (Children)** – Screening data for autism in children; suitable for modeling neurodivergent traits https://archive.ics.uci.edu/dataset/419/autistic+spectrum+disorder+screening+data+for+children
3. **UCI Autism Screening (Adolescents)** – Similar dataset for adolescents (104 instances, 21 features) https://archive.ics.uci.edu/dataset/420/autistic+spectrum+disorder+screening+data+for+adolescent
4. **UCI Autism Screening (Adults)** – Adult variant (704 instances) for neurodiversity classification archive.ics.uci.edu.

Challenge 2: Personalized Co-Learning Journey for Special Education Needs

Problem Statement:
Students with physical or cognitive impairments require tailored educational support, which is often lacking in standard systems.

Potential Solutions:

Approach #1 (Traditional AI):

Solution: Struggle Prediction Model for Intervention
Description: Predict when students are likely to struggle using engagement and performance data to trigger timely interventions.
Technical Aspects: Supervised learning using student progress logs and exceptionality labels to forecast need for support.

Approach #2 (Agentic AI):

Solution: Personalized Co-Learning Companion
Description: A digital agent that co-learns with students, dynamically adjusting pace, format, and encouragement based on real-time feedback.
Technical Aspects: Reinforcement learning and sensor-based adaptation to maintain motivation and reduce cognitive load.

Why It Matters (WAI lens):
Promotes educational equity for students with disabilities, tailoring support to real human needs.

Suggested Datasets/APIs:

1. **Special Education Enrolment by Exceptionality (Ontario)-** Includes counts of students by type of special education exceptionality (e.g. learning disabilities, physical disability) for elementary and secondary publicly funded schools in Ontario.
   https://data.ontario.ca/dataset/special-education-enrolment-by-exceptionality
2. **Student Headcount by Diverse Abilities (Canada-wide)-** Official Statistics Canada tables showing counts of students across disability categories (physically dependent, communication, learning).
   https://ouvert.canada.ca/data/dataset/1e730ea9-dd19-4c22-aa95-fe644efc7a06

3. **Ontario EQAO Assessment Linked Data-** Inclusion of variables such as special education status, accommodations, self-efficacy and engagement along with literacy and math scores for Grades 3–10.
   https://www.eqao.com/about-eqao/open-data/

Challenge 3: AI for Accessible Urban Mobility

Problem Statement:
Navigating urban environments can be extremely challenging for individuals with visual, mobility, or cognitive impairments.

Potential Solutions:

Approach #1 (Traditional AI):

Solution: Accessibility-Aware Route Planner
Description: Build a map-based tool that recommends optimal routes based on real-time infrastructure and accessibility tags.
Technical Aspects: Use geospatial and transit data with accessibility filters to personalize routes for different impairment types.

Approach #2 (Agentic AI):

Solution: Context-Aware Navigation Assistant
Description: A wearable or mobile agent that guides users contextually, adjusting directions based on live environmental changes (e.g., blocked sidewalks).
Technical Aspects: Real-time sensor and map data fusion with NLP for personalized verbal guidance.

Why It Matters (WAI lens): Bridges a critical accessibility gap in smart cities, supporting daily independence through inclusive design.

Suggested Datasets/APIs:

1. **Open Toronto Data Catalogue-** Includes sidewalk geometry, TTC transit accessibility data, pedestrian crossings, and real-time construction feeds, ideal for building inclusive urban navigation tools in Toronto.
   https://open.toronto.ca/catalogue/
2. **Geofabrik - OpenStreetMap North America Extract-** Provides detailed map data with attributes like surface type, kerb height, incline, and wheelchair accessibility tags. Useful for route planning based on terrain and physical constraints.
   https://download.geofabrik.de/north-america.html

3. **Mobility Database - Global GTFS & GBFS Feeds-** Aggregates over 2,500 public transportation feeds in GTFS and GBFS formats. Includes real-time updates, vehicle accessibility info, and stop-level metadata for many cities worldwide.
   https://mobilitydatabase.org/

Challenge 4: Culturally Adaptive Public Service Assistant

Problem Statement:
Immigrants and underrepresented communities often face barriers in understanding and accessing essential public services.

Potential Solutions:

Approach #1 (Traditional AI):

Solution: Multilingual Document Summarizer
Description: Automatically translate and simplify government documents for non-native speakers.
Technical Aspects: NLP translation and summarization with tone adjustment models.

Approach #2 (Agentic AI):

Solution: Culturally-Aware Public Service Copilot
Description: A conversational AI that adapts content tone, complexity, and dialect based on the user's profile and context.
Technical Aspects: LLM-based assistant with cultural language models and translation memory.

Why It Matters (WAI lens): Promotes linguistic inclusion and public service equity for underrepresented populations.

Suggested Datasets/APIs:

1. **Open Canada Data Portal-** Provides access to thousands of Canadian government datasets including immigration, healthcare, tax, and civic services. Ideal for training models to summarize and translate public service content.
   https://open.canada.ca/en/using-open-data
2. **FLORES (Facebook Low Resource Supervised Translation Benchmark)-** A multilingual dataset for machine translation covering 100+ languages and dialects, designed to benchmark translation systems in low-resource settings.
   https://github.com/facebookresearch/flores

3. **TICO-19: Translation Initiative for Covid-19-** Offers human-translated COVID-19 public health information in 30+ languages. Designed for crisis communication across diverse populations, it can be repurposed for multilingual civic information delivery.
   https://tico-19.github.io/translators.html
4. **OPUS Global Parallel Corpus-** One of the largest open-source collections of aligned multilingual text from public service domains including government, healthcare, and legal. Supports tone, complexity, and dialect fine-tuning for translation models.
   http://opus.nlpl.eu/

Challenges for Theme 2: AI for Public Health & Well-being

Design AI solutions that enhance personal wellness, improve healthcare delivery, and strengthen resilience against public health challenges. From real-time health anomaly detection and accelerated drug discovery to early mental health support and precision medicine, these challenges aim to make healthcare more accessible, equitable, and effective for diverse populations.

Challenge 1: Personalized Health Anomaly Detection (Edge AI)

Problem Statement:
Early detection of health anomalies can prevent complications, but current solutions often rely on centralized data processing, raising privacy and latency issues.

Potential Solutions:

Approach #1 (Traditional AI):

Solution: Lightweight Health Anomaly Detector
Description: Train a lightweight ML model to detect anomalies (e.g., irregular heart rate, poor sleep quality, abnormal step patterns) using simulated wearable data.
Technical Aspects: On-device model deployment to preserve privacy and reduce dependency on cloud connectivity.

Approach #2 (Agentic AI):

Solution: Adaptive Digital Health Companion
Description: Develop a digital health companion that learns personal baselines, recalls past anomalies, and adapts its behavior to provide timely alerts and suggestions.

Technical Aspects: Continual learning on edge devices, integrating multimodal sensor inputs for personalized recommendations.

Why It Matters (WAI lens): Enables proactive and privacy-preserving health monitoring, empowering individuals to take early action while reducing healthcare system strain.

Suggested Datasets/APIs:

1. MIMIC-IV (PhysioNet) - ICU patient data including vitals and monitoring trends
2. Sleep-EDF Database - Polysomnographic sleep data
3. WISDM Dataset - Smartphone accelerometer data for activity recognition

Challenge 2: AI-Powered Vaccine & Drug Discovery Assistant

Problem Statement:
Drug and vaccine development is time-consuming and resource-intensive, slowing public health responses.

Potential Solutions:

Approach #1 (Traditional AI):

Solution: Genomic Target Identifier
Description: Analyze viral genome sequences and protein structures to identify promising drug or vaccine targets.
Technical Aspects: Use bioinformatics pipelines, protein structure modeling, and ML classification to rank candidate targets.

Approach #2 (Agentic AI):

Solution: Biomedical Research Copilot
Description: Build a research assistant that queries biomedical databases, extracts candidate targets, and summarizes relevant literature interactively.
Technical Aspects: Integrate LLMs with scientific knowledge bases and graph databases for cross-referencing and evidence retrieval.

Why It Matters (WAI lens): Enables proactive and privacy-preserving health monitoring, empowering individuals to take early action while reducing healthcare system strain.

Suggested Datasets/APIs:

1. NCBI GenBank - Viral genome sequences
2. IEDB - Immune Epitope Database
3. UniProt - Protein sequence and structure data
4. CORD-19 - Research papers on coronaviruses and infectious diseases

Challenge 3: Mental Health Early Detection & Support

Problem Statement:
Many people do not receive timely mental health support due to stigma, lack of access, or limited awareness.

Potential Solutions:

Approach #1 (Traditional AI):

Solution: Emotion-Aware Sentiment Classifier
Description: Train sentiment analysis and emotion detection models to identify early signs of distress in text, audio, or wearable biometric data.
Technical Aspects: Use multimodal embeddings and supervised learning with labeled emotional state datasets.

Approach #2 (Agentic AI):

Solution: Context-Aware Mental Health Companion
Description: Create a conversational agent that can detect emotional changes, provide context-aware self-help, and escalate to human support when necessary.
Technical Aspects: Leverage reinforcement learning for empathy-driven dialogue management with escalation protocols.

Why It Matters (WAI lens): Reduces barriers to mental health care by identifying early distress signals, enabling timely interventions, and fostering stigma-free support.

Suggested Datasets/APIs:

1. DAIC-WOZ – Clinical interviews for depression detection
2. WESAD – Wearable stress and emotion dataset
3. SEWA - Multimodal human behavior dataset

Challenge 4: Genomics-Driven Precision Medicine

Problem Statement:
Generic treatment approaches can lead to suboptimal outcomes for patients with complex conditions.

Potential Solutions:

Approach #1 (Traditional AI):

Solution: Genomic Risk Predictor
Description: Build predictive models using genomics and clinical data to forecast disease risk or treatment outcomes.
Technical Aspects: Feature engineering from genetic variants, integrating survival analysis and ensemble modeling.

Approach #2 (Agentic AI):

Solution: Precision Medicine Clinical Assistant
Description: Design an AI assistant for clinicians that integrates genomics, lifestyle, and environmental data to recommend personalized interventions with explainability.
Technical Aspects: Explainable AI pipelines combining genomic risk scoring with knowledge-based reasoning.

Why It Matters (WAI lens): Improves treatment outcomes by tailoring care to each patient's unique genetic and environmental profile, advancing equity in healthcare delivery.

Suggested Datasets/APIs:

1. UK Biobank - Genomics and health data
2. OpenSNP - Crowdsourced genetic data
3. Genomics of Drug Sensitivity in Cancer (GDSC) - Genomic biomarkers and drug response