

# Matthew Lisondra, Physics HBSc, Eng. MSc (Eng. PhD–Present)

UofT Robotics Institute, Toronto, Canada

University of Toronto

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Research Interests	Robotics, Robot Perception, Robot Learning, Computer Vision, SLAM, Autonomous/Intelligent Systems Algorithms, High Framerate Processing Low-Power Unconventional Sensing, 3D Scene Representations and Embodied AI
Education	<p><b>PhD, Doctor of Philosophy</b> <b>UofT Robotics Institute</b> <b>University of Toronto</b></p> <ul style="list-style-type: none"><li>- Toronto, ON Sep 2024 – Present</li><li>- Focus: Robot Perception, Robot Learning, Computer Vision</li><li>- Leveraging LLM and VLM agents w/ Computer Vision for Robot Learning</li><li>- Thesis on Foundation Models for Robotics, Embodied AI</li><li>- Research at the University of Toronto Robotics Institute</li><li>- Supervised by: Dr. G. Nejat of the ASB Lab</li><li>- Referred: Dr. S. Saeedi, Dr. K. Zareinia, Dr. G. Wang, Dr. M. Chevik, Dr. F. Xi</li></ul> <p><b>MSc, Master's of Applied Science</b> <b>Robotics and Computer Vision Laboratory (RCVL)</b> <b>Mechatronics and Robotics Engineering</b></p> <ul style="list-style-type: none"><li>- Toronto, ON Sep 2022 – Aug 2024</li><li>- Focus: Computer Vision and Visual-Inertial SLAM</li><li>- Designed the first 6-DOF Visual Inertial Odometry on FPSPs (BIT-VIO)</li><li>- Thesis Published, Presentation in Yokohama, Japan for IEEE 2024 ICRA</li><li>- Collaboration with Imperial College London and University of Manchester</li><li>- Supervised by: Dr. S. Saeedi of RCVL, Dr. K. Zareinia of HapTel Lab</li><li>- Referred: Dr. D. Jones</li></ul> <p><b>HBSc, Honours Bachelor of Science</b> <b>Physics (Advanced) and Computer Science</b> <b>University of Toronto</b></p> <ul style="list-style-type: none"><li>- Toronto, ON Sep 2017 – June 2021</li><li>- Focus: Robotic Mechanics, Probability, TS-Analysis, Computational Physics</li><li>- Research: Time Series Analysis on Global Temperature, Sea Level Pressure</li><li>- Research: Helium-Neon Laser Analysis (Reviewed by Dr. A. Vutha)</li><li>- Research: Percolation via Random Processes Monte Carlo, Porous Rock</li><li>- Collaborated with: Dr. D. Jones of the APCM Group</li></ul>

**Peer Reviewed Contributions:**

**\* Note: This is not exhaustive/updated. Will update CV when have time.**

[1] Embodied AI with Foundation Models

for Mobile Service Robots: A Systematic Review

**M. Lisondra**<sup>1</sup>, B. Benhabib<sup>1</sup>, G. Nejat<sup>1</sup>

(<sup>1</sup>University of Toronto)

[IEEE Robotics and Automation Magazine \(RA-M\)](#) (In Review)

[2] PovNet+: A Deep Learning Architecture for Socially Assistive Robots  
to Learn and Assist with Multiple Activities of Daily Living

**M. Lisondra**<sup>1,\*</sup>, S. Pashangpour<sup>1,\*</sup>, F. Robinson<sup>1</sup>, G. Nejat<sup>1</sup>

(<sup>1</sup>University of Toronto)

[IEEE Robotics and Automation Letters \(RA-L\)](#) (In Review)

[3] TCB-VIO: Tightly-Coupled Focal-Plane

Binary-Feature Visual Inertial Odometry (In Progress)

**M. Lisondra**<sup>1,\*</sup>, J. Kim<sup>2,\*</sup>, G. Shimoda<sup>3</sup>, K. Zareinia<sup>3</sup>, S. Saeedi<sup>3</sup>

(<sup>1</sup>University of Toronto, <sup>2</sup>TU Delft, <sup>3</sup>TMU)

[IEEE Robotics and Automation Letters \(RA-L\)](#) (In Review)

[4] Microplastics Classification and Size Estimation  
using High-frequency Focused Ultrasound

N. Zarrabi<sup>2</sup>, E. Strohm<sup>2</sup>, H. Rezvani<sup>2</sup>,

**M. Lisondra**<sup>1</sup>, N. Yousefi<sup>2</sup>, S. Saeedi<sup>2</sup>, M. Kolios<sup>2</sup>

(<sup>1</sup>University of Toronto, <sup>2</sup>TMU)

(In Review)

[5] Design of a Robotic Haptic Device with Variable Stiffness  
for Finger Rehabilitation

**M. Lisondra**<sup>1,\*</sup>, A. Basirat Tabrizi<sup>2,\*</sup>, J. Catania<sup>2</sup>, K. Zareinia<sup>2</sup>

(<sup>1</sup>University of Toronto, <sup>2</sup>TMU)

[IEEE Transactions on Haptics \(ToH\)](#) (In Review)

[6] Inverse k-visibility for RSSI-based Indoor Geometric Mapping (In Review)

**M. Lisondra**<sup>1,\*</sup>, J. Kim<sup>2,\*</sup>, Y. Bahoo<sup>3</sup>, S. Saeedi<sup>3</sup>

(<sup>1</sup>University of Toronto, <sup>2</sup>TU Delft, <sup>3</sup>TMU)

[Autonomous Robots 2025](#) (In Review)

[7] Visual Inertial Odometry using Focal Plane Binary Features (BIT-VIO)

**M. Lisondra**<sup>1,\*</sup>, J. Kim<sup>2,\*</sup>, R. Murai<sup>4</sup>, K. Zareinia<sup>3</sup>, S. Saeedi<sup>3</sup>

(<sup>1</sup>University of Toronto, <sup>2</sup>TU Delft, <sup>3</sup>TMU, <sup>4</sup>Imperial College London)

Presented in Yokohama, Japan for IEEE 2024 ICRA

[IEEE International Conference on Robotics and Automation \(ICRA\) 2024](#)

[Project Webpage](#) / [PDF](#) / [Video](#) / [Presentation](#)

### **Forthcoming Contributions:**

**\* Note: This is not exhaustive/updated. Will update CV when have time.**

[8] AnalogPedestrianNet: High Framerate Focal-Plane

Sensor-Processor Pedestrian Tracking (In Progress)

**M. Lisondra**<sup>1</sup>, A. Babaei<sup>2</sup>, A. Ahsan<sup>2</sup>, K. Zareinia<sup>2</sup>, S. Saeedi<sup>2</sup>

(<sup>1</sup>University of Toronto, <sup>2</sup>TMU)

[IEEE Conference on Computer and Robot Vision \(CRV\)](#) (In Progress)

### **Acknowledged Contributions:**

[9] M<sup>3</sup>RS: Multi-robot, Multi-objective, Multi-mode Routing and Scheduling

Ishaan Mehta<sup>2</sup>, J. Kim<sup>2</sup>, S. Taghipour<sup>2</sup>, S. Saeedi<sup>2</sup>

**M. Lisondra**<sup>1</sup> in Experiments, Feedback

(<sup>1</sup>University of Toronto, <sup>2</sup>TMU)

[IEEE Robotics and Automation Letters \(RA-L\)](#) (In Progress)

[10] Structure from WiFi (SfW):

RSSI-based Geometric Mapping of Indoor Environments

J. Kim<sup>2</sup>, J. A. Zalat<sup>3</sup>, Y. Bahoo<sup>3</sup>, S. Saeedi<sup>3</sup>

**M. Lisondra**<sup>1</sup> in Experiments, Feedback, Paper Publishing/Review

(<sup>1</sup>University of Toronto, <sup>2</sup>TU Delft, <sup>3</sup>TMU)

[IEEE 2024 American Control Conference \(ACC\)](#)

### **Research Affiliations**

#### **Autonomous Systems**

#### **and Biomechatronics Lab (ASB Lab)**

#### **UofT Robotics Institute**

#### **University of Toronto**

#### **([Lab Webpage](#))**

- Toronto, ON

Sep 2024 – Present

- Focus: Robot Perception, Robot Learning, Computer Vision

- Research at the University of Toronto Robotics Institute

- Affiliated with UofT Temerty Faculty of Medicine (TFM)

- Affiliated with Universal Health Network (UHN)

- Supervised by: Dr. G. Nejat

#### **Robotics and Computer Vision Laboratory (RCVL)**

#### **([Lab Webpage](#))**

- Toronto, ON

Sep 2022 – Present

- Focus: Computer Vision and Visual-Inertial SLAM

- Affiliated Research with Imperial College London (i.e. Dyson Robotics Lab)

- Affiliated Research with University of Manchester (i.e. MD Lab)

- Affiliated Research with University of Bath (i.e. Pering Lab)

- Supervised by: Dr. S. Saeedi

## **Haptics Telerobotics Laboratory (HapTel Lab)**

### **([Lab Webpage](#))**

- Toronto, ON Sep 2022 – Present
- Focus: Haptics, Robotic Manipulator Operation, Surgical/Medical Robotics
- Currently: Image-Based Force Estimation in Medical Applications Research
- Supervised by: Dr. K. Zareinia

## Organizations

**\* Note: This is not exhaustive/updated. Will update CV when have time.**

**Reviewer (Journal) for ISJ 2025** Fall 2024 – Present

IEEE Sensors Journal (ISJ) 2025

**Reviewer (Journal) for RA-L 2024** Fall 2023 – Present

IEEE Robotics and Automation Letters (RA-L) 2024

**Reviewer (Conference) for IROS 2024** Winter 2024

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

**Reviewer (Conference) for ICRA 2024** Fall 2023

International Conference on Robotics and Automation (ICRA) 2024

**Reviewer (Conference) for IEEE CCECE 2023** Winter 2023

2023 Canadian Conference On Electrical and Computer Engineering

**Reviewer (Conference) for IROS 2023** Winter 2023

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

**Also Affiliated with UHN:** Research

Funding Presentations with S. Pashangpour, G. Nejat

## Honors and Awards

**\* Note: This is not exhaustive/updated. Will update CV when have time.**

**NSERC CREATE Next-Generation Mobile Robotics**

**for Human Spaces (ADVENTOR) Award**

### **([Award Webpage](#))**

- Funding for 4 Years ADVENTOR Sept 2024 – Sept 2028
- Collaboration and Affiliated with: Ingenuity Labs Research Institute
- Research Papers with Dr. Wu
- Responsible for Developing Robotics in Human-Centric Spaces

## Teaching Affiliations

### **Emerald Valley Academy (EVA)**

- Toronto, ON Sep 2024 – Present
- Leading Department of Mathematics and Science
- Teaching Higher-Level Physics, Calculus and Computer Science I, II
- Part of EVA Faculty overseeing Ontario Ministry of Education Inspection

### **Virtute Innovation Academy (VIA)**

- Toronto, ON Sep 2023 – Aug 2024
- Leading Department of Mathematics and Science
- Teaching Higher-Level Physics, Calculus and Computer Science I, II

- Part of VIA Faculty overseeing Ontario Ministry of Education Inspection
- Collaborated with: Dr. A. Jiang

Select List of Students Currently Teaching†, Alumni Taught and **Refereed\***:

H. Li

L. Liang

N. Feng

**R. Sun\*** (Multiple Scholarship Offers in Australia, England)

W. Zheng

A. Zhang

**A. Huang\*** (Now at Berkeley Music School)

B. Zheng

**B. Luo\*** (Full Scholarship Physics, University College London)

**B. Yang\*** (Now at King's College London)

**C. Yang\*** (Now at Durham University)

F. Chen

**G. Ye\*** (Now at University of Hong Kong)

J. Wu

**K. Sheng** (Multiple University Offers)

L. Lin

**N. Zhao\*** (Multiple University Offers in Business)

N. Tian

A. Pu

D. Qiu

M. Wang

R. Zhang

C. Zou

Y. Tang

S. Fan

A. Ma

A. Xu

K. Chen

F. Li

A. Li

C. Tang†

F. Chen†

L. Li†

M. Wu†

R. Zhang†

S. Fan†

### **Thesis Mentoring/Guidance:**

**\* Note: This is not exhaustive/updated. Will update CV when have time.**

[11] Thesis Mentored Junseo Kim, Project:

Autonomous Truck Navigation

with Trailer Integration via Natural Language Processing (NLP)

J. Kim<sup>2</sup>, R. Raja<sup>3</sup>, A. Jawaid<sup>3</sup>, R. Ha<sup>3</sup>

**M. Lisondra**<sup>1</sup> in Mentoring/Guidance of Thesis

(University of Toronto<sup>1</sup>, <sup>2</sup>TU Delft, <sup>3</sup>TMU)

[Conference PDF](#) / [Full Thesis](#)

[12] PHD Application Guidance of Takashi Glenn Shimoda:

Large-scale Distributed Heterogeneous Multiple-robot Localization

and Mapping Dataset with Communication Constraints

**M. Lisondra**<sup>1\*</sup>, G. Shimoda<sup>2\*</sup>, S. Saeedi<sup>2</sup>

(<sup>1</sup>University of Toronto, <sup>2</sup>TMU)

[Project Page](#) / [Full Thesis](#)

### **Other Mentoring:**

**\* Note: This is not exhaustive/updated. Will update CV when have time.**

[13] Jack Nyugen

[14] Sourabh Prasad

[15] Kevin Hsu

**\* Note: This is not exhaustive/updated. Will update CV when have time.**

**PHD Graduate/Teaching for MIE443**

Winter 2025 – Aug 2025

Mechatronics Systems: Design and Integration at University of Toronto (UofT)

**MS Graduate/Teaching for MEC411**

Winter 2023 – Aug 2024

Mechanics of Machines at Toronto Metropolitan University (TMU)

**MS Graduate/Teaching for BME/MEC323**

Fall 2022 – Aug 2024

Statics and Mechanics of Materials at Toronto Metropolitan University (TMU)

### **Academic Horizons★**

- Surrey, BC

Oct 2021 – Sep 2023

- Senior Physics and Computer Science Instructor

- Taught 500+ 1-on-1 Teaching Sessions Physics, Math, Computer Science

- Taught 500+ Class Size Teaching Sessions with Director of Education

- Total Taught 100+ Students (Many now in Science, Engineering)

### **Lumist of Lumi Education★★**

- Toronto, ON

April 2021 – Oct 2021

- Leading Physics Education Sector of Lumist, Lumi Education

- Teaching 1st-4th yr. students from UCLA, UC Berkeley, UCSD, among others

- Textbook Draft/Course Material Written of University Physics I, 500+ Pages

- Total Taught 100+ Students (Many now in Science, Engineering)
- Collaborated with: Dr. N. Murray (Now Algoma University Professor)
- Collaborated with: Dr. F.G. Parra (Now Leading Ace Acumen Academy)

Select List of Students Taught from ★, ★★:

J. Zheng  
 J. Cheema  
 A. Gill  
 C. Liu  
 J. Christofferson  
 W. Burns  
 A. Khan  
 A. Berar  
 J. Bhatthal  
 M. Gosal  
 G. Dhanoa  
 R. Kashif  
 B. Hart  
 G. Kahlon  
 C. Latham  
 K. Dokaj  
 K. Dokaj  
 Z. Johal  
 E. Lubinich  
 M. Fisher  
 J. Tatla  
 I. Sandhu  
 O. Botelho  
 K. Lalani  
 S. Johal  
 C. Holland  
 A. Young  
 K. Sidi  
 K. Chahal  
 P. Bennett  
 M. Kashif  
 A. Psefteas  
 K. Hilts  
 A. Purewal  
 J. Rai  
 B. McGowan  
 J. Tatla  
 Y. Marei  
 G. D'Haese

N. Ashrafi  
R. Chahal  
J. Denman  
A. Marei  
M. Grewal  
M. Negrin  
R. Naeem  
D. Garland  
I. Singh  
J. Bresciani  
S. Dandina  
J. Trentini  
M. Sanger  
A. Sandhu  
G. Warrya  
A. Anwar  
S. Catroppa  
G. Warrya  
A. Gill  
H. Khan  
I. Sidi  
D. Fam  
N. Scoten  
K. Abbas  
W. Hussain  
A. Hayre  
A. Ashton  
C. Latham  
K. Burrell  
K. McDermid  
M. Ali Shah  
D. Jones  
D. Barrett  
C. Dewaal  
C. Mann  
S. Minhas  
J. Hayer  
G. Boychuk  
Y. Johal  
C. Marshall  
D. Gill  
K. Borgersen



Industry Affiliations

**\* Note: This is not exhaustive/updated. Will update CV when have time.**

**Rosor Exploration**

**([Company Webpage](#))**

- Toronto, ON

Jan 2024 – May 2024

- Researcher - Robotics, Geoscientific UAVs and Drones

- Working on Development of Rosor's Active Terrain Following (ATR) System

- Currently: Now Led by H. A. Jaafar

- Collaborated with: R. Efrem

Skills

**Coding:** Python, PyTorch, keras, R, C/C++, Java, R, C#, Javascript, HTML, CSS

**Technologies:** Windows, Linux, NXP MCUs based on Arm Cortex-M cores

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*References available on request.*