Jerrin Bright

3D Vision | **Computer Graphics** | **Digital Humans**

jerrin.bright@uwaterloo.ca Portfolio Google Scholar LinkedIn

Education

University of Waterloo Ontario, Canada

PhD in Systems Design Engineering *Sep 2024 - Present*

- **Research:** Realistic Human Modeling with Scene-aware Dynamics and Understanding.
- **Supervisor:** Dr. John Zelek.
- **Group:** Vision and Image Processing (VIP) Lab.
- **Courses:** Generative AI and LLMs, Deep Reinforcement Learning, Modern Computer Vision.

University of Waterloo Ontario, Canada

MASc in Systems Design Engineering *Sep 2022 - Aug 2024*

- **Research:** Monocular 3D Human Modeling and Analysis for Baseball Sports Analysis.
- **Supervisor:** Dr. John Zelek.
- **Group:** Vision and Image Processing (VIP) Lab.
- **Courses:** Probabilistic Machine Learning, Graphical Deep Learning, Advanced Image Processing (IP) and Statistical IP.

Research Experiences

Baltimore Orioles Maryland, USA

MITACS Accelerate Research Intern *Sep 2022 - Present*

- Implementing end-to-end player kinematics estimation and analysis for baseball players from broadcast videos.
- Built novel transformer and temporal convolution networks to reconstruct and analyze baseball players.
- Utilized cutting-edge techniques including Gaussian Splatting to synthesize novel viewpoint 3D sequences using motion data generated from diffusion models and human deformations from 3D human prior models.

Indian Institute of Science Bangalore, India

Research Intern, Conjunction with Artificial Intelligence and Robotics Lab & ARTPARK *Jul 2021 - Apr 2022*

- Developed autonomous navigation for UAVs in unstructured environments using visual and event sensor data.
- Implemented transformer-based depth estimation and MPC with barrier functions for efficient UAV navigation.
- Gained hands-on experience with Jetson boards, RealSense cameras, Turtlebot, DJI M600, and custom UAVs.

McMaster University Ontario, Canada

MITACS Globalink Research Intern, Robotics and Manufacturing Automation Lab *Jul 2021 - Sep 2021*

- Built and simulated a 4-DoF soft robotic manipulator using PyBullet and the SoMo toolkit.
- Analyzed manipulator behavior by simulating actions with sinusoidal torques and visualizing the resulting motion.

Arizona State University Arizona, USA

Summer Research Intern, Edifice Lab *May 2021 - Jul 2021*

- Developed a digital environment capture system using laser scanning and photogrammetry.
- Fused sensor data into a unified 3D model for reliable visualization and analysis.
- Designed DL algorithms to automate environment analysis, providing valuable insights for builders and stewards.

Aero2Astro Chennai, India

Autonomous System Developer - Intern *Oct 2020 - Apr 2021*

- Built ROS-based autonomous navigation for indoor environments using Visual-Inertial SLAM.
- Developed an odometry toolkit with ORB detector, FLANN matcher, RANSAC, Optical Flow, and PnP algorithms.
- Leveraged sensor fusion with Extended Kalman Filters to eliminate reliance on GPS, enhancing system reliability.

Yuan-Ze University Taoyuan City, Taiwan

Project Research Intern, Speech and Image Processing Lab *Apr 2020 – Jun 2020*

- Developed a robust smart parking system using deep learning for accurate vehicle detection and localization.
- Employed semantic segmentation with convolutional conditional random field to enable reliable image recognition.

Technical Skills

Programming Tools	Python | C++ | Embedded System | HTML | CSS
ML & DL Tools	PyTorch | TensorFlow | OpenCV | Matplotlib | NumPy | Keras
Autonomous Systems Tools	AirSim | ArduPilot | SimulationX | Gazebo | RViz
CAD & Analysis Tools	Autodesk Fusion 360 | Dassault SolidWorks | Ansys
Operating System	Ubuntu Linux | ROS | Raspbian OS | Windows
Reviewer Experience	CVPR | IROS | CVIS | CTIS | ACM MMSports | EAAI | TCSVT | IMAVIS | IEEE SII | TNNLS | Journal of Supercomputing | IEEE Transactions of Multimedia

Current Projects

Dynamic Motion Segmentation with Ego-Motion Compensation | *Transformers, Optical Flow, Visual Odometry*

Prompt-driven 4D Avatar and Context-aware Scene Generation | *SMPL, Diffusion, Gaussian Splatting, Relighting*

Motion-aware Diffusion Models for 3D Human Pose Estimation | *Diffusion, Transformers, Pose Estimation*

Relevant Publications

DreamPose3D: Hallucinative Diffusion with Prompt Learning for 3D Human Pose Estimation
39th Annual Conference on Neural Information Processing Systems (Submitted)

SportMamba: Adaptive Non-Linear Multi-Object Tracking with State Space Models for Team Sports
IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (ORAL)

Seeing Beyond the Crop: Using Language Priors for Out-of-Bounding Box Keypoint Prediction
38th Annual Conference on Neural Information Processing Systems (POSTER)

PitcherNet: Powering the Moneyball Evolution in Baseball Video Analytics
IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (ORAL)

Distribution and Depth-Aware Transformers for 3D Human Mesh Recovery
21st Conference on Robots and Vision (ORAL)

Domain-Guided Masked Autoencoders for Unique Player Identification
21st Conference on Robots and Vision (ORAL)

Teaching Experiences

SYDE 461 & SYDE 462 — University of Waterloo
Systems Design Capstone Project 1 & 2 — *Sep 2023 - Apr 2024 | Sep 2024 - Apr 2025*

SYDE 361 — University of Waterloo
Systems Design Methods 1: Needs Analysis and Prototyping — *May 2024 - Aug 2024*

BME 361 — University of Waterloo
Biomedical Engineering Design — *Jan 2023 - Apr 2023*

BME 101L — University of Waterloo
Communications in Biomedical Engineering- Visualization — *Sep 2022 - Dec 2022*

Scholarship

International Doctoral Student Award, University of Waterloo, Ontario, Canada
MITACS Accelerate International Award, University of Waterloo, Ontario, Canada
Graduate Research Studentship, University of Waterloo, Canada
International Master's Award of Excellence, University of Waterloo, Canada
Graduate Research Fellowship, MITACS, Canada

Honors and Awards

Best Paper Award (Computer Vision), 21st Conference on Robots and Vision, 2024
Best Research Paper Award, RIACT International Conference, 2020
Technical Program Member, ACM Workshop on Multimedia Content Analysis in Sports, 2024
Best Outgoing Student, Atom Robotics, VIT Chennai, India, 2022
Top Ten Internationally, International Planetary Aerial Challenge, 2021
Runner-up, IEEE Hackathon on Autonomous Drone Applications, 2021