# Jerrin Bright


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

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## Education

**University of Waterloo** Ontario, Canada

*PhD in Systems Design Engineering* *Sep 2024 - Present*

- **Research:** Realistic 4D 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.

**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 and Statistical Image Processing.

## 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

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| **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

**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)*

**Mitigating Motion Blur for Robust 3D Baseball Player Pose Modeling for Pitch Analysis**
*6th International ACM Workshop on Multimedia Content Analysis in Sports*

**Jersey Number Recognition using Keyframe Identification from Low-Resolution Broadcast Videos**
*6th International ACM Workshop on Multimedia Content Analysis in Sports*

## Teaching Experiences

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

**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