Jerrin Bright

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

226-899-7287 jerrin.bright@uwaterloo.ca Portfolio Google Scholar LinkedIn

Education

University of Waterloo Ontario, Canada

MASc in Systems Design Engineering *Sep 2022 - Present*

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

Vellore Institute of Technology Chennai, India

BTech in Mechanical Engineering *Jul 2018 - Apr 2022*

- **Research:** Autonomous UAV Navigation and Inspection for Precision Agriculture.
- **Supervisor:** Dr. Arockia Selvakumar.
- **Courses:** Mechatronics System Design, Machine Drawing, Instrumentation and Control Engineering, Complex Variables and Partial Differential Equations, Problem Solving and Object Oriented Programming.

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.
- **Supervisors:** Mr. Sig Mejdal, Mr. Di Zou and Mr. James Hull.

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.
- **Supervisors:** Prof. Suresh Sundaram and Mr. Badrinarayanan Rangarajan.

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.
- **Supervisor:** Prof. Gary Bone.

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.
- **Supervisor:** Prof. Thomas Czerniawsk.

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.
- **Supervisor:** Mr. Ted Solomom and Mr. Manikanta.

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.
- **Supervisor:** Prof. Wei-Tyng Hong.

Technical Skills

Programming Tools: Python | C++ | Embedded System | HTML | CSS
ML 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

Relevant Publications

PitcherNet: Powering the Moneyball Evolution in Baseball Video Analytics
IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops
Distribution and Depth-Aware Transformers for 3D Human Mesh Recovery
21st International Conference on Robots and Vision
Domain-Guided Masked Autoencoders for Unique Player Identification
21st International Conference on Robots and Vision
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
ME-CapsNet: A Multi-Enhanced Capsule Networks with Routing Mechanism
8th IEEE International Conference on Electronics, Computing & Communication Technologies
Optimization of quadcopter frame using generative design and comparison with DJI F450 frame
International Conference of Robotics, Intelligent Automation and Control Technologies

Teaching Experiences

SYDE 462 — University of Waterloo
Systems Design Capstone Project 2 — *Jan 2024 - Present*
SYDE 461 — University of Waterloo
Systems Design Capstone Project 1 — *Sep 2023 - Dec 2023*
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 Master's Award of Excellence, University of Waterloo, Canada
Graduate Research Fellowship, University of Waterloo, Canada
Globalink Graduate Fellow, MITACS, Canada

Honors and Awards

Outstanding Research Paper Award, RIACT International Conference, 2020
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
Best Club Award, Robotics Club, University Day 2021, VIT Chennai, India
Best Club Award, National Service Scheme, University Day 2022, VIT Chennai, India

Thesis

An End-to-End Autonomous UAV System in GPS-Denied and Unstructured Environments

- Built an autonomous UAV system for use in complex GPS-unfriendly scenarios like disaster zones/ confined spaces.
- Developed an imitation learning navigation system with policy learned from an offline data pipeline.
- Trained offline with a pipeline leveraging monocular depth, RRT path planning, and MPC for robust performance.
- Evaluated system reliability across various inspection tasks (forest fire, search & rescue), using SENet and YOLO.