

# Jerrin Bright

3D Vision | Computer Graphics | Digital Humans

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## Education

### University of Waterloo

MASc in Systems Design Engineering

Ontario, Canada

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

BTech in Mechanical Engineering

Chennai, India

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

MITACS Accelerate Research Intern

Maryland, USA

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

Research Intern, Conjunction with Artificial Intelligence and Robotics Lab & ARTPARK

Bangalore, India

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

MITACS Globalink Research Intern, Robotics and Manufacturing Automation Lab

Ontario, Canada

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

Summer Research Intern, Edifice Lab

Arizona, USA

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

Autonomous System Developer - Intern

Chennai, India

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

Project Research Intern, Speech and Image Processing Lab

Taoyuan City, Taiwan

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

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<b>Programming Tools</b>	Python   C++   Embedded System   HTML   CSS
<b>ML &amp; DL Tools</b>	PyTorch   TensorFlow   OpenCV   Matplotlib   NumPy   Keras
<b>Autonomous Systems Tools</b>	AirSim   ArduPilot   SimulationX   Gazebo   RViz
<b>CAD &amp; Analysis Tools</b>	Autodesk Fusion 360   Dassault SolidWorks   Ansys
<b>Operating System</b>	Ubuntu Linux   ROS   Raspbian OS   Windows
<b>Reviewer Experience</b>	CVIS 2023   IROS 2024   CTIS 2024

## Relevant Publications

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### **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 International Conference on Robots and Vision (ORAL)*

### **Domain-Guided Masked Autoencoders for Unique Player Identification**

*21st International 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*

### **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

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### **SYDE 462**

*Systems Design Capstone Project 2*

### **SYDE 461**

*Systems Design Capstone Project 1*

### **BME 361**

*Biomedical Engineering Design*

### **BME 101L**

*Communications in Biomedical Engineering- Visualization*

University of Waterloo

*Jan 2024 - Apr 2024*

University of Waterloo

*Sep 2023 - Dec 2023*

University of Waterloo

*Jan 2023 - Apr 2023*

University of Waterloo

*Sep 2022 - Dec 2022*

## Scholarship

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**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

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**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

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### **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.