Javad Amirian

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Education

• PhD in Computer Science (Robotics and AI) Jan. 2018 - Jul 2021
Inria Rennes (Rainbow Team), France
Thesis: Human Motion Trajectory Prediction for Robot Navigation (CrowdBot)
Supervisors: Dr. Julien Pettré , Dr. Jean-Bernard Hayet

• MSc in Computer Engineering (Artificial Intelligence) Sept. 2012 - Sept. 2014
Sharif University of Technology, Tehran, Iran (1st Rank University in Iran)
Thesis: Dynamic Motion Planning and Obstacle Avoidance for Simulated Autonomous Car in Webots
Supervisor: Dr. Mansour Jamzad

• BSc in Electrical Engineering (Electronics) Sept. 2007 - Sept. 2012
Shahid Behesti University (National University of Iran), Tehran, Iran

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Professional Experience

• CTO and Head of AI @ Vive Robotics Mar. 2021 - June 2023
As the CTO and Head of AI at Vive Robotics, a cutting-edge tech startup specializing in autonomous mobile robots, I have led the development of the Vive Tennis Robot project. This groundbreaking initiative focuses on creating a tennis-ball-retriever robot that utilizes advanced computer vision and AI algorithms to efficiently navigate the court, locate tennis balls, and identify players. My primary responsibility has been to oversee the delivery of an MVP aligned with the project's SAAL design principles: Small, Autonomous, Agile, and Lightweight. By setting specific numerical targets for each principle, I have guided the AI team in developing a high-fps video processing pipeline that maximizes the robot's agility while ensuring cost-effective hardware solutions to maintain an affordable device price.

• Co-Founder of DecorAR @ Inria Startup Studio April. 2022 - Mar. 2023
DecorAR is a tech startup founded at Inria Startup Studio in Paris to bring AI and recommendation engines to Augmented Reality environments. Interior Design by AI is the first platform being developed by DecorAR and it addresses the problem of finding compatible pieces of furniture among a vast database of products from different categories and different brands. As a CTO, my job is to investigate relevant technologies and to build up the software stack so that the engineers in the team can develop their own code and integrate it to the project.

• Doctoral Researcher @ CrowdBot (EU H2020 Project) Jan. 2018 - Jul. 2021
At CrowdBot, a leading European H2020 research project focused on safe navigation of social robots, I contributed as a doctoral researcher. My role involved developing tools for *Motion Prediction* of pedestrians around the robot, enhancing its navigation in crowded environments. Utilizing crowd simulation algorithms and deep learning models, I created the innovative "Social-Ways" model. By leveraging Generative Adversarial Networks (GANs), this model accurately predicted multi-modal distributions of future trajectories based on observed agent trajectories. Throughout the project, I gained expertise in deep learning frameworks such as PyTorch and Keras, and honed my skills in large-scale data analysis, neural network training, and visualization.

• **Computer Vision Engineer @ PixBall** (Previously Sepehr) May 2015 - Dec. 2017
At PixBall (formerly Sepehr), an AI startup specializing in sports video analysis, I played a crucial role in developing image processing and machine vision algorithms. My primary responsibility was to create high-quality APIs that facilitated seamless integration between the algorithms and the UI engineers. One notable achievement was my contribution to PixArt, a powerful video processing software designed specifically for embedding graphical overlays and virtual advertisements into sports content, with a focus on soccer matches. During the project, I encountered a significant technical challenge related to camera calibration parameters, particularly the variation of lens distortion at different zoom values. To address this, I devised an algorithm that systematically collected and validated samples and established a linear regression relationship between the focal length and the radial distortion. This approach yielded remarkable improvements in the precision of overlay placement. To optimize the calibration process, I employed a Levenberg–Marquardt solver, which efficiently converged to the optimal solution. This achievement exemplifies my expertise in overcoming complex challenges in computer vision and applying advanced numerical techniques to achieve superior results.

• **Computer Vision Engineer @ Spad System Co.** Apr. 2016 - Nov. 2017
At Spad System Co., I played a key role in the (Didbaan) project, focusing on automatic recognition of Iranian license plates using the OpenALPR engine based on OpenCV. I utilized my expertise in computer vision and image processing to optimize and fine-tune the code for accurate detection and recognition of local license plates. Additionally, I spearheaded the data collection effort, curating a dataset of over 5,000 annotated license plate images. This highly successful implementation of Didbaan at multiple parking sites revolutionized vehicle entrance and exit management, underscoring my proficiency in computer vision and image processing.

• **Founder and Team Leader @ Cyrus** (Students Robotics Team) Jul. 2010 - Apr. 2015
During my undergraduate studies, I co-founded **Cyrus**, an ambitious project centered around small-size soccer robots. I assembled and led a dedicated team of 5-10 students from diverse backgrounds in electrical engineering, computer engineering, and mechanical engineering. Over the course of 5 years, I guided the project's direction by conducting thorough research, designing the system architecture, and on-boarding talented students to contribute to its development. Initially, I took charge of electronic design, robot firmware, and in 2012, I transitioned to focus on AI and robot navigation and ultimately creating motion planning and control algorithms for the robots. As a notable research outcome, our team introduced a novel approach utilizing Fuzzy logic to enhance robot movements and compensate for inaccuracies in the robot hardware. Additionally, I proposed an efficient motion-planning algorithm that optimizes multiple objectives simultaneously, allowing for adaptive navigation parameters.

Selected Publications

- Gheisari, M., **Amirian, J.**, Furon, T. Amsaleg, L., **"AggNet: Learning to Aggregate Faces for Group Membership Verification,"** (**Preprint-2022**).
- Zhang, B., **Amirian, J.** Eberle, H., Pettré, J., Holloway, C., Carlson , T. **"Towards Safe Human-Robot Interactions in Crowds: Empirical Study of Pedestrian Dynamics with a Wheelchair and a Pepper Robot."** International Journal of Social Robotics (**SORO-2022**).
- **Amirian, J.**, Hayet, J. B., Pettré, J., **"What we see and What we don't see: Imputing Occluded Crowd Structures from Robot Sensing,"** (**Preprint-2021**).
- **Amirian, J.**, Zhang, B., Valente Castro, F., Baldelomar, J., Hayet, J. B., Pettré, J. **"OpenTraj: Assessing Prediction Complexity in Human Trajectories Datasets."** In Proceedings of the 15th Asian Conference on Computer Vision (**ACCV-2020**), Nov-Dec. 2020.
- van Toll, W., Grzeskowiak, F., Gandía, A.L., **Amirian, J.**, Berton, F., Bruneau, J., Daniel, B.C., Jovane, A. and Pettré, J., "**Generalized Microscopic Crowd Simulation using Costs in Velocity**

Space,", In Symposium on Interactive 3D Graphics and Games (**I3D-2020**), May 2020.

- **Amirian, J.**, Van Toll, W., Hayet, J. B., Pettré, J. **"Data-Driven Crowd Simulation with Generative Adversarial Networks."** In Proceedings of the 32nd International Conference on Computer Animation and Social Agents (**CASA'19**), Jul. 2019.
- **Amirian, J.**, Hayet, J. B., Pettré, J., **"Social ways: Learning multi-modal distributions of pedestrian trajectories with GANs,"** IEEE Conference on Computer Vision and Pattern Recognition (**CVPR-2019**) Precognition Workshop, Jul. 2019.
- **Amiryan, J.**, Jamzad, M., **"Adaptive motion planning with artificial potential fields using a prior path,"** 3rd RSI International Conference on Robotics and Mechatronics (**ICROM**), 2015.

Technical Skills

- **Software Development:** Proficient in **Python** and **C/C++**, employing industry best practices in software development. Skilled in designing and implementing robust and scalable code using **object-oriented design (OOD)** and modular approaches. Experienced in developing efficient and high-performance applications for complex use cases.
- **Version Control & Project Management:** Extensive experience with **Git** and **GitHub**, utilizing version control principles and collaborative workflows to streamline development processes. Proficient in setting up and leveraging **CI/CD** pipelines for automated testing and deployment.
- **Deep Learning:** Proficient in **PyTorch** and **Keras**. Experienced in leveraging **W&B** and **FiftyOne** for efficient data and model management, versioning, and experiment tracking. Experience in visualizing model performance, analyzing data distributions, and streamlining machine learning workflows.
- **Computer Vision & 3D Perception:** Proficient in leveraging **OpenCV** and DNN solutions for extracting insights from visual data. Skilled in applying techniques such as **object detection**, **segmentation**, and **tracking** to tackle complex computer vision challenges. Additionally, experienced in **camera calibration** for accurate measurement and **3D reconstruction**.
- **Robotics:** Proficient in working with **ROS**, deep experience with **Nvidia Jetson** products and its frameworks (DeepStream, TensorRT), and simulation environments like CARLA, Webots, Unity, and Gazebo, to develop intelligent and autonomous robotic systems.
- **Cloud & Containerization:** Experience with **AWS** tools for scalable and reliable cloud solutions and **Dockers** and **Containerization** for efficient deployment. Extensive experience in real-time image processing pipelines on cloud, optimizing performance and ensuring reliable data processing.
- **Linux & Bash:** Expertise in Linux and **Bash scripting** for automation and system management. Skilled in developing and optimizing scripts and services for various tasks.
- **Web & App Development:** Skilled in **Django** web framework. Proficient in modeling databases, UI design, and template development. Additionally, experienced in iOS app development using **Swift** for engaging user experiences.

Academic References

- **Dr. Julien Pettre**
  Research Scientist at Rainbow, Inria-Rennes, Brittany, France
  Email: julien.pettre@inria.fr
- **Dr. Jean-Bernard Hayet**
  Researcher at CIMAT, Department of Computer Science., Guanajuato, Mexico
  Email: jbhayet@cimat.mx