Abdul Mukit

Computer Vision Engineer

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Experience

Mujin-US **May 2023 - Present**

Computer Vision Engineer *Atlanta, GA*

- Developed and deployed the first deep learning assisted robotic vision system for Walmart depalletization applications.
- Trained, optimized, and deployed an instance segmentation model, outperforming Mujin's geometry-based vision system's mAP by 60% and detection speed by 800%
- Collected, distilled, and annotated a large warehouse dataset of 20,000 images. CVAT, Datumaro, SAM, Voxel51 were used to carefully optimize data and annotations.
- Developed an auto-annotation software to automatically generate ground truth segmentation datasets with 94% mAP.
- Developed point-cloud processing algorithms enabling Mujin robots to pick damaged and tilted items.

Nakamir **February 2022 - April 2023**

Computer Vision Engineer *Mountain View, CA*

- Full-stack software development of Nakamir Augmented Reality Assistant (NARA).
- Integrated human body pose estimation using the depth sensors in the Hololens-2.
- Performed camera calibrations and addressed perception pipeline issues.

University of Oklahoma **August 2018 - December 2021**

Graduate Research Assistant *Norman, OK*

- Developed FDA-approved surgical planning augmented reality software for human surgeries.
- Developed vision software to detect the 6-DoF pose of the human head and surgical instruments during surgery.
- Processed CT scan data and annotated 2D and 3D data for machine learning model training.

Projects

Walmart Robotic Depalletizing Vision System | *PyTorch, OpenCV, ONNX, PCL, CVAT, Voxel51* **2024**

- Developed, trained, and deployed an instance segmentation model using PyTorch and ONNX.
- Developed 6-DoF pose estimation and geometric vision pipeline using OpenCV and Point Cloud Library.
- Optimized vision system to run on CPU at 2-FPS and integrated with the robotic system enabling 700 picks per hour.

Package Condition Sensitive Point Cloud Filtering | *OpenCV, PCL, Numpy, Python* **2024**

- Implemented package condition (damaged or tilted) estimation algorithm for cardboard boxes and packs of cans.
- Developed 3D point cloud filtering algorithms for damaged and tilted items using OpenCV and PCL.
- Integrated vision algorithms to robotic systems at Walmart warehouses enabling damaged and tilted item handling.

Intraoperative Virtual Surgical Planning | *OpenCV, PyTorch, Unity, C#, C++* **2022**

- Developed mixed reality software using Unity, Mixed Reality Toolkit, and Microsoft Hololens-2.
- Used OpenCV, DLib, and PyTorch for 6-DoF pose estimation pipeline.
- Licensed the developed x-ray vision technology to a startup for commercialization.

Education

University of Oklahoma **December 2021**

MS in Computer Engineering. Graduate Fellowship. GPA: 3.88 *Norman, OK*

United International University **May 2014**

BSc in Electrical Engineering. Full Scholarship. GPA: 3.83 *Dhaka, Bangladesh*

Technical Skills

Libraries: PyTorch, OpenCV, PCL, Open3D, CVAT, Voxel51, Numpy, Tensorflow, ONNX
Languages: Python, C#, C++
Technologies/Frameworks: Linux, GitHub, Grafana