Amitoj Battu

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Education

M.Sc in Artificial Intelligence *Aug '20 - Jun '23*
University of Groningen, Netherlands

B.Tech in Mechatronics Engineering *Aug '15 - Jul '19*
Manipal University Jaipur, Jaipur, India

Skills

Programming Languages Python | C++ | Embedded C | PLC Ladder Logic | KUKA Robot language

Frameworks & Libraries Tensorflow | PyTorch | SKlearn | Keras | Numpy | ROS | Docker | RESTful API | Git | Autodesk AWS | OpenCV | Siemens S7-200 | Unreal Engine | RaspberryPi | MATLAB | Googling | KUKA | LaTeX

Languages English (Fluent) | Dutch (Beginner)

Experience

Olive Branch Games (Netherlands) *May '23 - **Ongoing***

AI Engineer

- Lead AI-driven solutions to enhance player experiences and gameplay in a remote team, resulting in a substantial 30% increase in customer retention and overall improvement in gameplay quality.
- Achieved 25% improvement in live object-recognition accuracy by optimizing Neural Networks in Python/C++, and increased enemy AI reaction time through RL.
- Reduced latency in live player behavior analysis by a significant 40% through multi-threading and processing while creating pipelines to improve software performance.
- Aligned AI features with gameplay objectives while collaborating with interdisciplinary teams of designers, developers, and artists. This collaboration through documentation and GIT version controlling led to improved team efficiency.

Intelligent Project Solutions (Canada) *Feb '19 - Dec '20*
As the Engineering intern, I worked with Piping and Instrument diagrams (P&ID) for chemical plants, understanding plans and annotating symbols for deep learning analysis using .DWG files and 3D models in AutoCAD Plant3D.

KUKA Robotic Training Centre (AKGEC - India) *Jan - Jul, '19*
During the 6-month internship, I gained expertise in setting up, calibrating, and programming KUKA robotic arms for industrial use. I also programmed these arms for exercises and created custom welding-gun programs for precise 3D metal printing research.

Projects

Master's Thesis - Human-Robot Communication (Computer Vision/DL)

- Engineered custom neural networks and fine-tuned them on a proprietary dataset to recognize physical gestures for collaborative object transportation with the TIAGo robot, achieving 98% accuracy in time-series classification.
- Devised a Point-and-Target method for intuitive object destination selection, involving camera image alignment to PointClouds, frame conversions, and image recognition.
- Programmed TIAGo robot using C++ and Python within a behavioral architecture, enabling seamless communication with AI models running in Docker through RESTful API and ROS Nodes.

Machine Learning

- **NLP Sentiment Analysis: Docker / AWS implementation:**
  - Crafted and fine-tuned a BERT language model for sentiment analysis using a specialized dataset, achieving < 95% accuracy.
  - Deployed the model within a Docker container with a RESTful API and optimized online hosting on an EC2 instance using a Flask application and the Deep Learning Amazon Image.
- **Spotify Recommendation System: Docker / AWS implementation:**
  - Created a music recommendation system using Python, data analysis, and machine learning to compare Collaborative and Content-based filtering, extracting insights from song audio features and genre attributes.
  - Deployed the recommendation model on Docker and AWS for an interactive recommendation engine driven by user-listened songs input.
- **Deep learning & Reinforcement learning**
  - Developed applications include Handwriting Recognition on the Dead Sea Scrolls, an American Sign Language to text converter using OpenCV, and Irish folk music generation using RNNs.
  - Designed custom Pygame environments, such as FlappyBird, for training agents with the NEAT algorithm in reinforcement learning. Trained RL agents in various environments, such as Lunar-Lander, Q-Learning frozen-lake, Deep Q-Learning for Atari games, A2C for robotic simulation in Pybullet, and conducted experiments with Policy Gradient using PyTorch.

ROS & ROS2

- **Domestic Robot Butler:** Currently developing the Butler using ROS2 on Raspberry Pi for SLAM, object and voice recognition, enabling autonomous navigation within the house and object retrieval/delivery.
- **Pick & Place Robot:** Implemented SLAM on a 4W mecanum robot for Pick & Place operations, utilizing generated maps for object recognition-based navigation.
- **5 DOF Arm:** Designed a custom 5 DOF robotic arm in Gazebo, creating URDF and MoveBase functionalities from scratch for precise pick and place operations.

Bachelor's thesis - Metal Additive Manufacturing

- Developed and implemented custom written algorithms to convert CAD models into Gcodes, enabling precise control for 3D printing metallic objects using a welding gun mounted on the KUKA robotic arm.

Extras

Publications

Medical

- DOI Comparison of Incidence of Pre-Analytical phase errors in OPD and IPD samples in a super-specialty hospital: A Retrospective study.
- DOI Incidence of Pre-analytical Phase Errors: A Retrospective study in biochemistry lab of a tertiary care hospital.
- DOI Training - An important factor in reducing Pre-Analytical errors in Biochemistry lab of a tertiary care hospital.

Posts Held

- **UNICEF Sub-committee Secretary:** 1 year volunteer work for the local chapter of UNICEF, where I organized fund-raising events around Groningen, Netherlands.
- **Project Head/Coordinator for the Robotics Club (B.Tech):** Taught a team of 30+ students the basics of electrical and electronics while helping build projects using various controllers. Position also included organising and managing Technical events and seminars for the Robotics Club.
- **Program Committee member for IEEE (B.Tech):** Assisted in planning venues and organize Technical events held by local Chapter of IEEE.

Extracurricular Certification

- KUKA Robot Programming Basic Level
- KUKA Robot Programming Advance Level
- LabVIEW CORE III
- Siemens NX-11 CAD/CAM
- ROS for Beginners I: Basics, Motion, OpenCV - Udemy
- ROS for Beginners II: Localization, Navigation and SLAM - Udemy
- ROS2 How To: Discover Next Generation ROS - Udemy
- Introduction to Computer Science and Programming Using Python - edX
- Introduction to Programming with MATLAB - Coursera
- Control of Mobile Robots - Coursera

Smaller Projects

- **KUKA Robot arm palletizer:**
  Programmed real-world KUKA robotic arms to palletize cubes in various patterns based on keypad input, differentiating between cubes, orientations, and target bins.
- **Microcontrollers and Microprocessors:**
  Developed various projects including a 5 DOF robotic arm, an RFID-based E-passport system, a PLC-based traffic density control, a biometric security system, the Theo Jansen walking mechanism, and an 11-segment, 6-digit display.
- **Generative Adversarial Network(GAN) development:**
  Completed projects used GAN and DCGAN architectures to train deep CNN models for generating handwritten MNIST digits, performed style transfer using cyclegan models, generated MNIST fashion dataset using autoencoder models, and trained WGAN models for generating Van Gogh paintings.