PRATYUSH KUMAR SAHOO

pratyushk.sahoo.min16@itbhu.ac.in
Home Page, Linkedin

EDUCATION

Indian Institute of Technology Varanasi *July 2016 - July 2020*
Graduate, Department Of Mining Engineering Overall GPA: 8.22/10

AREAS OF INTEREST

3D Computer Vision, Deep Learning, Robotics, Product Development

SOFTWARES/FRAMEWORKS

ROS, Gazebo, OpenCV, Blender, Tensorflow, MATLAB, AutoDesk Fusion

RESEARCH

Semi-Autonomous Stair Climbing Wheelchair
Yogita Choudhary, Nidhi Malhotra, ***Pratyush Kumar Sahoo****, Student Design Competition,* ***Conference on Advanced Intelligent Mechatronics (AIM), Boston 2020****.Poster*

Utilizing Predictive Analysis to Aid Emergency Medical Services
Pratyush Kumar Sahoo*, Nidhi Malhotra, Shirley Kokane, Biplav Srivastava, Harsh Narayan Tiwari, Sushant Sawant, accepted at the* ***The 5th International Workshop On Health Intelligence, 35th AAAI Conference on Artifical Intelligence****.*

Predicting Emergency and Critical Care Outcomes using Deep Learning
Nidhi Malhotra, ***Pratyush Kumar Sahoo****, Sushant Sawant, Harsh Narayan Tiwari, Shirley Kokane,* ***42nd Annual Conference on Engineering in Medicine and Biology (EMBC) 2020****.Paper*

RELEVANT EXPERIENCE

Human Machine Interaction Lab, KAIST, South Korea June 2019 - Aug 2019
Research Intern under Dr. Yong Hwa Park *Certificate*

- **Loss Prediction Module for Active Learning and Tracking of Humans in Videos**: Developed a loss prediction module network based on the work of Yoo et al, and integrated in **YOLO-V2** architecture, the loss prediction module attained a ranking accuracy of **72.4** percent on test images.
- Implemented the extreme learning machines architecture for online learning on moderately confident **YOLO-V2** predictions for robust tracking of humans, the project is under the US patent filing process.

Robotics Research Center, IIIT Hyderabad May 2018 - Jan 2019
Research Intern under Dr. K Madhava Krishna *Results, Report, Github, Project, Certificate*

- **Semantic key-point detection on vehicles using a stacked hourglass type convolutional neural network**: Inspected and used the **stacked hourglass network** for vehicle pose estimation. Demonstrated the pipeline on **KITTI** and **CityScapes**.
- **Monocular shape and pose estimation of dynamic vehicles**: Developed a **pose estimation** pipeline for 3D key-points estimation of any vehicle given its 2d image-keypoint pairs, learned shape priors using **PCA** and found the coefficients by solving a bundle adjustment like optimization problem using Ceres solver.

iVizz February 2020 - July 2020
Computer Vision Lead at iVizz, cAST Technologies *iVizz*

- **iDetect**: Developed a human touch detection method, utilizing a mixture of pose estimation based on the work of **Zhe Cao et al** and a custom pose classification network, deployed the entire application on Google Cloud.
- **Bacteria detection and localization**: Developed a set of algorithms for bacteria detection and locaization in microscopic images. Built a live/dead bacteria image classifier and implemented on live multi bacterial videos, filed a provisional US patent for the project.

PROJECTS

Semi-Autonomous Stairclimbing Wheelchair Feb 2020 - Present
Project Under Dr. Shyam Kamal *Code, Blog, Thesis, Presentation*

- **Design and Simulation of a stair climbing wheelchair**: A Tracked robot capable of semi-autonomous stair climbing using input from Microsoft Kinect(RGBD Sensor) and simulated in the Robot Operating System(ROS) Gazebo environment.
- Developed a recursive line merging algorithm utilizing adaptive canny edge detection algorithm with Probabilistic Hough Transforms for initial line segment predictions, consequently detecting stair edges.
- Developed a custom ROS package including individual nodes for Image Processing, State Estimation and Controller Design for simulating and testing using a robot URDF model in Gazebo 9 environment.

Medi-Assess Jan 2020 - Present
Project Under Dr. Biplav Srivastava *Website, Presentation*

- **Machine Learning for emergency outcome prediction and optimal resource allocation**: Developed a digitized triage application able to intelligently route patients based upon their vital information to appropriate critical care units.
- Proposed and implemented a predictive analysis tool for determining probable emergency outcomes of a patient training a Light GBM model on the NHAMCS dataset.
- Fine tuned the **Word2Vec** network on the NHAMCS text corpus data set and employed learned word embeddings for emergency outcome prediction, the final model has attained an AUC-ROC of 0.76

Swaayat Feb 2018 - Present
Research Project under Dr. Hari Prabhat Gupta *Report, Code, Code*

- **Autonomous Underwater Vehicle**: Developing a completely autonomous robot that could travel in underwater scenarios. Implemented Image enhancement and underwater object detection algorithms.

SELF PROJECTS

- **Camera Position Tracking**: Normalized 8-point algorithm to determine the trajectory of a camera.Github
- **InspirARM**: An Intelligent Robotic Arm for lower arm amputees .(Report,Videos)
- **VOCOWSA**: SLAM based autonomous robot .Presentation
- **STAX**: A line following robot which can sort colored boxes intelligently using a TCS3200 color sensor.Video
- **Pixelate**: A robot which could traverse autonomously using visual feed from an overhead camera.
- **NLU Pattern Matching Software**: Rule based NLU pattern matching algorithm.Github

HONOURS AND ACHIEVEMENTS

- **Second Runner's Up** at the **International Johns Hopkins Healthcare Design Competition**, 2020 in the Digital Health Track.
- **Honorable Mention Award**,Student Design Competition,**Advanced and Intelligent Mechatronics Conference (AIM) 2020.**
- **Honorable Mention** by the **IIT Gymkhana** for outstanding contributions in Robotics.
- **1st Position, Pixelate** (autonomous robotics and image processing event), Technex,IIT-BHU.
- **1st position, Ventura**, a nation wide business plan competition, seed funding for **InspirARM**.
- **2nd Position, STAX** (autonomous robotics and algorithm competition), at Kshitij, IIT-Kharagpur.
- **2nd Position, Paper Presentation Event**, IIT(BHU), The Electrical Engineering Department.
- Among **Top 300 participants** from India, for the **MIT India Initiative 2020** for the **Healthcare Track**.
- **National Level Finalist** of the Samsung BIXBY Appathon held at Technex IIT-BHU.
- **TEEP Asia Plus Scholar** for Machine Intelligence and Robotics.
- Selected to present the **Semi-Autonomous Wheelchair** project at the 1st International Symposium Of Power, Energy and Cybernetics, 2020.
- Cleared the **Preliminary Design (Level - 1) and Conceptual Design (Level - 2)** of the Sixth National Competition on Student Autonomous Underwater Vehicle (SAVe 2019).