



## Irfan Mohammad Al Hasib

### Artificial Intelligence Engineer



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## About me

I am a passionate research engineer, always seeking to learn something new.

## Skills

### Deep Learning

Deep Neural Network  
Convolutional Neural Network  
Reinforcement Learning  
Proficient in Tensorflow & KERAS  
Familiar with Basic Pytorch  
Proficient in Python, numpy, pandas, sklearn

### Machine Learning

Linear and Logistic Regression  
Decision Tree, CART, Bagging and Boosting algorithms : Random Forest, AdaBoost, GBoosting, XGboost, Stacking, Ensemble SVM, Naive Bias, kNN, K Means Clustering

### Computer Vision

CNN based SOTA algorithms : YOLO, SSD, U-Net, ResNet, Inception, R-CNN  
CV algorithms : HOG, SURF, SIFT, ORB, Optical Flow, Segmentation, Clustering, Object Detection and Tracking Algorithms

### Reinforcement Learning

Value Iteration, Policy Gradient, MDP .  
SOTA Algo. : DQN, DDPG, PPO, A2C, A3C

## Experience

### Artificial Intelligence Engineer Hiperdyne Corporation

[www.hiperdyne.com](http://www.hiperdyne.com) ( July, 2019- Till Present)

» Implementation of state of the art Reinforcement Learning algorithms for solenoid valve position (Set Point) controlling using observing sensor values (Process Value) for Oil Refinery Plant. After more than a year of research and optimization, eventually the performance of the AI solution exceeded the performance of human experts in respective industry. The whole system relied on a MQTT sensor Network which made it dynamic and responsive.

» AI based scoring system for optimal oil shipping plan selection. The industry had options for transportation ship, supply refinery with certain capacities and delivery port with varying demand. The system utilized the Inventory data (supply and demand) and Ship Schedules (Ship and available routes) and applying concepts of Q learning to predict long-run feasibility score for each plan at a certain inventory status.

» Early prediction of "After Burn" phenomenon level in refinery from sensor Values using Deep Learning based techniques, for taking early measures to benefit production.

» Deep Learning based dimensionality reduction techniques have been applied to high dimensional sensor values to produce 2 dimensional output. this lower dimensional output was used to plot and visualize latent space of interest that showed the transition of the production phase and helped the operator to take necessary measures much earlier.

### Jr. Research Engineer (Product development and Research Dept.) Pi Labs Bangladesh Ltd.

[www.pilabsbd.com](http://www.pilabsbd.com) ( August, 2017- September, 2018)

» Programmable Syringe Infusion Pump Development. An automatic syringe infusion pump that can be programmed by setting amount of fluid to be pushed in a certain time period. The whole system was developed on AVR micro controller platform and FreeRTOS based system.

» IOT Based Security and Monitoring System Development. Many standalone sensor units were developed on ESP8266 platform with minimal power consumption and could be place at remote places that periodically report security status on a raspberry pi based server

» Box tracking system based on utilization of GPRS signal transmitted from the box at regular interval with location information.

» Online weight machine for a supply shop. It will automatically send the weight and bar code to the system server while packaging.

## Mars Rover Challenge

2016

Participated along with my team, Interplaneter in [University Rover challenge](#) , 2016 at Utah, USA. Our team attained 5th position in Phobos final. I was in charge of Robotic Arm Design and deployment. The Competition is organized by [Mars Society](#), USA annually for college students world wide. [URC 2016 Result](#), Critical Design Review [YouTube](#)

## Machine Learning Project

2020

Machine Learning Algorithms implementation from Scratch (DNN, SVM , Decision Tree, Logistic Regression, Naive Bias, kNN) using python, numpy and pandas. I believe implementing from scratch effective way to study and understand an algorithm. [GitHub link](#)  
Reinforcement Learning Algorithms from Scratch (DQN, DDPG, A2C, PPO) using Python and Tensorflow. [GitHub link](#)

2020

2019

2019

I have implemented YOLO( object detection), U-Net(semantic segmentation), Flow-Net(optical flow), Disparity estimator. [GitHub link](#)  
Kaggle Competition : House Price Prediction using state of the art data preprocessing methods and hiper parameter tuning. [GitHub link](#)

# Skills

## Robotics:

Computer Vision Algorithms (OpenCV)  
Basic Robot Operating System (ROS)  
Visual Odometry and SLAM  
Embedded System Design

## Programming

Python : Advanced Level (3 year +)  
C++ : Intermediate Level (1.5 year)

## Development Platform

Linux : Intermediate Level (2 year +)  
GitHub : Intermediate Level (3 year +)  
DBMS (SQL) : Basic Level ( approx. 1 year)  
MQTT : Intermediate Level (1 year +)  
AWS : Developing (few months)  
Docker : Developing (few months)  
Web Development : Developing (few months)

## Data Structure and Algorithms

Graph Search Algorithms  
Sorting, Search and Tree based Algorithms

## Embedded System Design

AVR Microcontroller (C++), Basic ARM  
ESP 8266, Raspberry Pi (Python, C++)

## Design Software

Proteus for Circuit Design  
SolidWorks for CAD Design  
draw.io for Flow Chart  
MS Word, MS Excel, MS Power Point

## Robotics Project

- 2019 Implementing optimal steering angle estimator from road coordinates using Model Predictive Controller (MPC) and Iterative Linear Quadratic Regulator (ILQR) algorithms from scratch. Tested the on AirSim environment and OpenAI car racing environment. [GitHub link](#) (ILQR Paper : Synthesis and Stabilization of Complex Behaviors through Online Trajectory Optimization.- by Tassa Et al.).
- 2018 Designed a simple two link Robot using URDF and written driver codes for ROS in Python. [YouTube link](#)
- 2017 Built a programmable (G- code) Desktop CNC Machine using AVR Platform, for G-code parsing I have used an open source called GRBL. [YouTube link](#)
- 2014 Visually instructed Robotic arm in AVR Platform. I have build a simple object tracker using IR sensor array [YouTube link 1](#) I also built a software platform that enables it to be controlled by Joy-Stick controller and added some real time computer vision based object tracking and localization based algorithm support to the video feed for operator. [link 2](#) (apologise for poor video quality)

## Education

- 2017 **B.Sc. in Mechanical Engineering**  
Bangladesh University of Engineering and Technology (BUET)  
*CGPA: 3.23 out of 4.00*
- 2011 **HSC (Science)**  
Rajuk Uttara Model College, Uttara, Dhaka 1207  
*GPA: 5.00 out of 5.00*
- 2009 **SSC (Science)**  
Rajuk Uttara Model College, Uttara, Dhaka 1207  
*GPA: 5.00 out of 5.00*
- Language**  
English : Business level proficiency in English  
Japanese : Passed NAT-N5

## Academic Project

- 2015 A Remote control Surveillance robot. The robot was able to pick up small objects from hole. It could also send temperature, pressure and video feed from an remote place using Bluetooth signal for surveillance support. ([Undergrad Project](#))
- 2016 For undergrad thesis we developed a precision velocity measurement system. Our approach was to use sensor fusion for combining GPS (Ublox-NEO 6) and IMU Sensor(MPU6050) data. We used Kalman filter as sensor fusion algorithm to exploit the instantaneous uncertainty information of different signal source. ([Undergrad : Project and Thesis](#))

## Co-Curricular activities

- 2016 *Founding President at BUET ROBOTICS SOCIETY (BRS)*
- 2016 Co-organized Annual Robotics Competition for BRS

## Publications

- 2016 Development of a two wheeled self balancing robot with speech recognition and navigation algorithm, [Journal : AIP Conference Proceedings](#)
- 2019 Integrating data mining and microsimulation modelling to reduce traffic congestion: A case study of signalized intersections in Dhaka, Bangladesh [Journal : Urban Science](#)
- 2021 My most recent research work as main author on Visual Odometry and Auxiliary Task guidance is under review for a renowned conference.