HARSH SHARMA

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INTERESTS

Computer Vision, Image Processing, Artificial Intelligence, Deep Learning, Machine Learning

EDUCATION

M. Sc. in Computing Science with specialization in Multimedia *Sept 2018-Present*
University of Alberta, Edmonton, Canada

B.E. (Hons.) Electrical and Electronics Engineering Aug 2011-Jul 2015
Birla Institute of Technology and Science, Pilani, India
CGPA: 7.19/10.00

WORK EXPERIENCE

Software Developer, Seven Lakes Technologies, Bangalore, India Oct 2016-July 2018
Core member of the Joyn-FDG^{TM} app development team *C#, Objective C, Java, JavaScript, Python*

- Implemented dynamic route generation algorithm - a priority based algorithm that helps the client prioritize the work and improve efficiency(Java)
- Helped stabilize the windows application by implementing features like auto update and intra-day readings (C#/.NET)
- Developed several key features for the windows and iOS applications and helped the company secure important deals (WPF/.NET/C#/Objective-C)
- Collaborated on the development of the new Joyn-FDG^{TM} Saas product (Node.js)
- Initiated the process of writing unit test cases for the Joyn^{TM} Analytics platform (Python)

Applications Engineer, Oracle India Pvt. Ltd., Bangalore, India Jun 2015-Sept 2016
Member of CPQ Cloud Development team *Java, Oracle ADF*

- Worked on enhancing the existing functionality for the product
- Added support for titles, iconsets, accessibility and translations

PROFESSIONAL TRAINING

Self-Driving Car Engineer Dec 2016-Jan 2018
Nanodegree program, Udacity.com *C++, Python - TensorFlow, Keras*

- Topics covered - Computer Vision, Deep Learning, Sensor Fusion, Localization, Control, Path Planning, Concentrations, and Systems

INTERNSHIPS

Intern at Bharat Dynamics Limited, Hyderabad, India Jul-Dec 2014
Real time detection and tracking of a moving colored object *MATLAB, Python, OpenCV, VHDL*

- Extracted object of interest from the video frames using blob detection
- Used Kalman Filter to track and predict the path

Summer Intern at Essar Power MP Ltd, Singrauli, India May-Jul 2013

- Used HTML, CSS, JavaScript, PHP and MySQL to develop a database management system for the residents of the company township which replaced the existing manual process and brought down operational costs.
- Studied the working of an ESP, its various components and also the ESP Controller being used in the plant

· Studied and identified the various types of electrical faults and protection schemes implemented in the plant to prevent any type of damage

PROJECTS

Classification of Parkinson's disease using DTI data Sep-Dec 2018

· Details will be added after project finishes

Denoising images with a spatially varying gaussian noise Sep-Dec 2018

· Details will be added after project finishes

Virtual Reality simulation for chest tube insertion process Sep-Dec 2018

· Details will be added after project finishes

Programming a Real Self-Driving Car Dec 2017

· Capstone project for Udacity Self Driving Car Nano Degree
· Developed using ROS
· Implemented nodes for traffic light detection, waypoint following and control
· Final project run on Udacity's Self Driving Car, Carla

Semantic Segmentation Nov 2017

· Used a Fully Convolutional Network to label the pixels of a road in images.

Path Planning Sep 2017

· Designed a path planner to create smooth, safe paths for the car to follow along a 3 lane highway with traffic

Model Predictive Control Aug 2017

· Implemented a Model Predictive Control using a kinematic model to drive the car around the track.
· Fitted the MPC by looking N points ahead spaced by dt seconds and fitting it to a third order polynomial.

PID Controller July 2017

· Implement a PID controller in C++ to maneuver the vehicle around the track!
· Utilized the cross track error (CTE) and the velocity (mph) from the simulator to compute the appropriate steering angle.

Kidnapped Vehicle June 2017

· Implemented a 2 dimensional particle filter in C++.
· Used the parameters from the simulator to accurately localize the vehicle position and yaw

Unscented Kalman Filter May 2017

· Utilized an Unscented Kalman Filter to estimate the state of a moving object of interest with noisy lidar and radar measurements
· Code written in C++

Extended Kalman Filter April 2017

· Utilized a kalman filter to estimate the state of a moving object of interest with noisy lidar and radar measurements.
· Code written in C++

Vehicle Detection and Tracking March 2017

· Identified vehicles in a video from a front-facing camera on a car.
· Performed a Histogram of Oriented Gradients (HOG) feature extraction on a labeled training set of images and trained a Linear SVM classifier

- Implemented a sliding-window technique and used the trained classifier to search for vehicles in images.
- Tested the pipeline on a video stream
- Estimated a bounding box for the vehicles detected.

Advanced Lane Finding March 2017

- Computed the camera calibration matrix and distortion coefficients using a set of chessboard images.
- Applied the distortion correction to raw images.
- Used color transforms, gradients, etc., to create a thresholded binary image and applied a perspective transform to rectify the image
- Detected lane pixels and fitted them to find the lane boundary.

Behavioral Cloning Feb 2017

- Used the image data and steering angles from the Udacity simulator to train a convolutional neural network and used this model to drive a car autonomously around the track.
- Used Keras to train, validate and test the model.

Traffic Sign Classifier Jan 2017

- Classified traffic signs using deep neural networks and convolutional neural networks.
- Used tensor flow for implementation

Finding Lane Lines on the Road Dec 2016

- Identified lane lines on the road in an image and a video stream
- Code written in Python and OpenCV

Text Summarizer Oct-Nov 2015

- Built a text summarizer to summazrize emails
- Used snowball stemmer, tokenizer and wordnet to filter
- Used Naive Bayes for scoring
- Code written in Python

Build and train a robotic arm to help feed physically disabled Jan-May 2015

- Built a robotic arm with 6 DOF to identify, pickup and feed a food particle
- Used edge detection and blob detection to identify the food particle
- Used SVM, eigenfaces and Viola-Jones for detecting face and mouth and KLT algorithm for tracking
- Trained a neural networks using reinforcement learning to feed the food particle
- Code written in Python and OpenCV

Embedded Instrumentation system for Soil Nutrient Analysis Jan-May 2015

- Used spectroscopic methods to determine the relationships between color intensity and concentration of nutrients in soil samples
- Designed and built a portable embedded instrumentation system to detect color intensity
- Programmed Arduino Nano to calculate concentration
- Designed and built android app to display results over Bluetooth

Dipole Antenna Analysis using Numerical methods Jan-May 2014

- Analyzed current distribution for a thin wire antenna using delta gap excitation.
- Used Method of Moments to solve the Pocklingtons Integral Equation to calculate current distribution.
- Calculated antenna parameters like Input impedance and Reflection coefficient using current distribution.
- Code written in MATLAB.

Sign Language Identifier for the Visually Impaired FEB-MAR 2013

· Used Machine Learning to classify Sign Language alphabets
· Used Gesture Dataset (2012) provided by Massey University for training and testing
· Used Principal Component Analysis for feature extraction and k-Nearest Neighbors for classification

PyAnagrammatic OCT-DEC 2011

· Two player game played over LAN
· Built in Python using Tkinker and Socket

AWARDS AND ACCOLADES

- Awarded the *Rising Star* award at Seven Lakes Technologies (December 2017)
- Recipient of *RBI Golden Jubilee Year Scholarship Scheme for Wards of Employees* for all semesters for excellent academic record
- Second Prize in Word-A-Maze conducted by Hindi Activities Society, BITS Pilani during APOGEE 2014.
- Among top 300 students shortlisted for Kishore Vaigyanik Protsahan Yojana (KVPY) scholarship program by Government of India
- AIR 75 in Mathematics Olympiad organized by Talent Search Institute in 2008.
- 3rd school rank and 10th state rank in National Science Olympiad 2008 organized by Science Olympiad Foundation.

EXTRA-CURRICULAR

- Performed at SHIAMAK Summer Funk 2017 and SHIAMAK Winter Funk 2016 - Dance festivals organized by the Shiamak Davar Institue of Performing Arts — 2016-17
- Conducted workshop on Symbolic computation using Maple, — October 2013
- Administered intra-college file-sharing platform for 2 years — 2012-2014
- Participated in BITSMUN12 conference held from 18th to 20th February, 2012 — February, 2012
- Participated in WordzMUN'08 conference held from 6th to 8th October, 2008 — October, 2008

COMMUNITY WORK

- Responsible for distribution of provisions to families of kids disabled due to Cyanide poisoning from Kolar Gold Fields — February 2016
- Cleaned and painted a Government school in rural Bangalore with help of Magic Bus Foundation — January 2016
- Spent time with special children at Apoorva Center for Autism — August 2015

OTHER INFORMATION

- Programming Languages:
  Experienced - C#, Python, Java, JavaScript,Objective C, HTML, CSS, PHP, MySQL
  Novice - Swift, C, C++, R, Verilog HDL, x86 Assembly Language.
- Software: MATLAB, Maple, LTSpice, Cadence, IBM SPSS Modeler, AutoCAD
- Open Source SW/HW: OpenCV, Arduino
- Human Languages: English, Hindi, Punjabi.
- Github: @HarshSharma12 (https://github.com/HarshSharma12)