Arjun J. Ram | Résumé

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Objective

Summer Internship in Robotics Engineering

Education

Worcester Polytechnic Institute **Worcester, MA, USA**
Master of Science - Robotics Engineering *May 2019*
GPA: 3.0/ 4.0

Ramaiah Institute Of Technology **Bangalore, Karnataka, India**
Bachelor of Engineering - Electronics and Communication *June 2017*
CGPA: 8.49 out of 10

Professional Skills

Programming Languages: *C++, C, C#, OpenCV, Java, Matlab/Octave, Python*

Tools and Libraries: *OpenCV, Tensorflow, Theano, Keras, Unity3D*

Projects

Volunteer Project **Worcester Polytechnic Institute**
Making a 1/10 RC Race-Car autonomous *December 2017 - Present*

Making a Traxxas Rally 4-wheel drive RC Car autonomous using a LiDAR, and stereo camera for localisation and vision; a Jetson TX2 for high-level control and processing, and a teensy arduino for low-level control.
Currently designing a controller based on the Dubin's Car Model.

Synergy of Human and Robot Course Project **Worcester Polytechnic Institute**
Robot Learning from Demonstration *July 2017 - December 2017*
https://github.com/MapleNSteel/TVM/

Designed a motion mapping between human arm motion and Baxter's arm motion using the Vicon motion-capture system, thus allowing a human subject to teleoperate Baxter's arms by moving their own.
Data from the motion capture system was low-pass filtered using an FIR filter after analysing the spectrum and designing and appropriate filter using Matlab.
The teleoperation module was designed on python, using standard ROS packages, and the vicon-bridge package which allows for acquisition of data from the human subject.

Final Year Undergraduate Project **Ramaiah Institute of Technology**
Detection, and Classification of Diabetic Retinopathy using CNNs *August 2016 - May 2017*
https://github.com/MapleNSteel/DR-detect-and-classify

Designed a Convolutional Neural Network for detecting and classifying Diabetic Retinopathy, using Theano and Lasagne libraries on python.
Obtained data from Kaggle, images for training and validating. Pre-processed the images using OpenCV.

AUVSI SUAS 2016 **Patuxent NAS Webster Field**

Software Sub-Team Lead of Team Edhitha *July 2015- June 2016*

Competed at Patuxent River Naval Air Station (NAS) Webster Field in St. Mary's County, Maryland, placed **5th** overall out of **22 teams**

Joined Team Edhitha, a team of ten engineers in the third year of my undergraduate career to compete at the **S**tudents' **U**nmanned **A**erial **S**ystems (**SUAS**) competition held by the **AUVSI** foundation.

Led a team of four engineers, as the leader of the software sub-team.

Was primarily concerned with:

- Designing and automating the aerial imagery and wireless transfer of these images and the aerial survey aspect of the Unmanned Aerial System (UAS)
- Programming for these tasks was done using bash and C++, respectively
- Used libraries like gphoto2 for the image acquisition; along with a multitude of C++ and C libraries for processing the received images like: OpenCV, Boost, inotify, Intel's tbb, and Geographic Lib.

The computer vision module for processing the images was designed manually by analysing image data from previous flights at the competition. The main tasks, to be accomplished, were:

- Detect Targets on the ground: In our case, images of alphabets of particular sizes and shapes
- Extract the detected targets from the aerial images captured in-flight from the on-board camera
- Determine basic characteristics of the targets such as the alphabet printed on it; the colours of the alphabet, and background; and the shape of the target
- Localising and producing GPS coordinates; and the heading of the target from the image data after accounting for lens distortion
- The algorithms were tested on over 10,000 images, images that were obtained over test-flights and previous competition flights

Designed path-planning software for a secondary task at the competition:

- Designed aerial Path-Planning software for avoiding static obstacles
- The algorithm used the Particle Swarm Optimisation meta-heuristic for avoiding obstacles and finding paths between two points. Published a paper on IEEE xplore.
- Paths were planned in Cartesian Space and the WGS84 standard was used to convert those to Longitude and Latitude using the GeographicLib C++ Library

Research and Publications

Arjun Jagdish Ram, "*Obstacle Avoidance using Gradient Based Swarm Techniques*" in *Proceedings of the International Conference on Robotics: Current Trends and Future Challenges*, Thanjavur, Tamil Nadu, India, Dec 19-20, 2016, pp. 1-6

doi:10.1109/RCTFC.2016.7893406

Spoken Languages

English, Malayalam, Kannada, Hindi, Tamil