Madhu Babu V

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Objective

To obtain a challenging position where I can think beyond and can use my industrial and academic skills to solve the unsolved.

Experience

- **Tata Consultancy Services** — Banglore, India
  Researcher — *Jul 2016 - Present*
- **Indian Institute of Technology** — Kharagpur, India
  Summer Research Intern — *May 2015 - Jul 2015*

Education

- **Rajiv Gandhi University of Knowledge Technologies** — AP, India
  Bachelors in Mechanical Engineering; GPA: 8.88/10.0 — *Jun. 2012 – May. 2016*

Publications

- **Madhu Babu V**, Kauhik das, Swagat Kumar. *Designing of Self Tuning PID Controller for AR Drone Quadrotor*, in proc 18th International Conference on Advanced Robotics (ICAR) 10-12 July 2017.
- **Madhu Babu V**, Kauhik das, Swagat Kumar. *Autonomous Leader-Follower Architecture of A.R. Drones in GPS Constrained Environments*, in proc 3rd International Conference on Advances in Robotics (AIR) Jun 28-Jul 2 2017.
- **Madhu Babu V**, Vamshi Krishna U, Sehansha Sk. *Autonomous Path Finding Using Q Learning*, in proc 10th International Conference on Intelligent Systems and Control (ISCO) 7th to 8th Jan 2016.
- **Madhu Babu V**, GVV Surya Kiran, SK Sameer, Roshan Kumar Hota, Cheruvu Shiv Kumar. *Stabilization of Posture of Humanoid Using PID Controller in Gazebo Simulator Using Robot Operating System (ROS)*, in proc CAD/CAM, Robotics and Factories of the Future, 2016

In review

- **Madhu Babu V**, Kauhik das, Swagat Kumar. *A reinforcement learning approach towards control and landing of autonomous landing of quadrotor UAV* in review of 32 AAAI Conference on Artificial Intelligence Feb-2018.
- Chinmay Shinde, Kauhik das,**Madhu Babu V** Swagat Kumar. *Multi Target Tracking using UAV Network* in review of American Control Conference Jun-2018.

Projects

- **UGV Tracking with UAV using Reinforcement Learning** — Oct-2017
  This project includes tracking of a turtlebot using a Parrot AR Drone 2.0 on top of it. The whole idea is to land the quadrotor on a moving turtle bot. The challenge here is the landing area, the top plate of turtle bot is 30 cm wide. So the control has to be very accurate to do the same. For this instead of a conventional controller, a RL based controller has been trained and tested in Gazebo simulator.
- **Autonomous Landing of Quadrotor using Reinforcement Learning** — Aug-2017
  This Project includes landing of Quad Rotor on an Aruco Marker. Two markers has been used to make the drone drive to the landing marker and another for exact landing location. The general problems such as marker loss, down wash of propellers are solved using Least Squares Policy Iteration (LSPI).

- **Bulding a Custom Quad Rotor using PixHawk** Jun-2017
  In this project a quad rotor from the scratch has been built. The payload capacity has been made for 750 g. So that it can carry a voladine Lidar for visual survoing. Pixhawk 2.4.8 with Ardu Pilot has been used as an autopilot for this. This quad rotor is currently being used for the visual survoing currently in our lab.

- **Way Point Navigation for Quadrotor Using PTAM** Feb-2017
  In this project a visual odometry method, Parallel Tracking and Mapping has been used a position feed for the drone while tracking the way points. A PID controller has been used to achieve this. A gradient descent method has been employed to tune the controller parameters online so that the drone would tune its parameters accoring to its error and velocity.

- **Leader Follower Architecture for Drones.** Oct-2016
  In this project, the idea is to design a low cost architecture for leader follower drones. For that raspberry pi3 has been used as computation platform. The follower will localize it self using an Aruco Marker pasted on the back of the leader. The intertila odometry has been calculated and filtered using EKF. This IO has been used to regain the marker loss position. The validation of the architecure has been done Parrot AR Drones. h

- **Gait Generation for Biped Robot (Tinku)** May-2016
  Under Graduate Thesis
  In this project a biped model has been created in Gazebo till hip. All the hip, calf and foot lengths are taken from mine. The kinematic model has been calculated and inverse kinematics has been solved using Damped Least Squares. The foot trajectory has been calculated using Cubic Spline Interpolation. The hip trajectory for stability has been derived using the ZMP stability criteria.

- **Path Finding Robot using Q learning** Jan-2016
  In this project an image based path and motion planing algorithm using a reinforcement learning method known as Q learning has been used. This will take the feed form the camera on top of it and calculates path from the current position to the goal online. The method finds an optimal path form the current position to goal position.

Relevant Proficiencies

- **Programming Languages**: Python,C,C++,C
- **Softwares**: ROS,Gazebo, Matlab, Octave, Ardupilot
- **Packages**: Scipy, Numpy, Tensor Flow, Kears, Scikit lib