Parakh M. Gupta

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Areas of interest

vehicular robotics, legged robotics, aerial robotics, marine robotics, control algorithms, autonomous systems, flight controllers, mechanism design, CAD, internet-of-things, circuit design, microcontrollers, sensor interfacing.

Education

BITS Pilani Hyderabad Campus   **Hyderabad, India**
Mechanical Engineering, B.E.(Hons.)   *2014 - 2019*

Thesis | ModQuad : Self-assembling modular flying robots.

BITS Pilani Hyderabad Campus   **Hyderabad, India**
Physics, M.Sc.(Hons.)   *2014 - 2019*

Thesis | ModQuad : Flying modular structure that can self-reconfigure in midair.

Work Experience

Kumar Lab, GRASP Labs, University of Pennsylvania   **Philadelphia**
Visiting Student Intern   *July 2018–Present*

- **ModQuad 2.0 :** A novel flying modular structure capable of self-reconfiguring mid-air.
- **Position controller for DJI Tello :** A ROS-based position controller for DJI Tello using Tello SDK and Vicon motion capture system.
- **LiDAR-based SLAM on Unmanned Ground Vehicle :** A ROS-based SLAM implementation using Google Cartographer coupled with Velodyne VLP-16 LiDAR on Clearpath Jackal.
- **165mm quadrotor platform :** Pixhawk based quadrotor capable of holding position using PX4Flow and a forward facing camera.

Publication and Posters

- D. Saldaña, **P. M. Gupta**, V. Kumar, "An Inflight Self-disassembly Method for Aerial Modular Robots" , **RA-L/IROS, 2019 - under review.**
- V. Sai, **P. M. Gupta**, S. Khandelwal, L. Modi, S. Wani, Sri Raj, Saumitra , **"Anterior chamber depth and corneal thickness quantification using a slit-lamp and van herrick's technique."** Srujana Center for Innovation Open House, Engineering the Eye Hackathon, (July 2, 2017) - **Awarded 1st Prize.**

Achievements and Awards

- **MIT MediaLabs Hackathon - Engineering the EYE '17 :** Winner.
- **Named in 25 under 25 by Campus Diaries :** Science and Technology Category.
- **Mantra Innovator of the Year - 2018 :** BITS Alumni Association.

- **Whiz Kid - 2014 Batch :** Bon Voyage Awards, BITS Pilani Hyderabad Campus.
- **Indian Oil Start-up Fund :** Finalist.
- **Ink Makers Makeathon Regional Round :** Second Runner-up.
- **Magneto Competition, IIT-Bombay :** Finalist.
- **LAW Follower Competition, BITS Pilani Hyderabad Campus :** Second Runner-up(2014), Second Runner-up(2015).
- **iNavigate Competition, BITS Pilani Hyderabad Campus :** Runner-up(2015).

Projects

Aerial Systems and Robots

Quadrotor Flight Controller   **BITS Hyderabad**
A fully-custom flight controller capable of holding altitude and auto-levelling   *Personal*

Implementing I^2C to fetch IMU data, data fusion using complementary filter, PID control loop, tuning on custom-built rig.

Autonomous Pesticide Spraying Drone   **BITS Hyderabad**
An Ardupilot based quadrotor platform capable of spraying pesticide   *Guided by Dr. Kurra Suresh*

Analysis of spray nozzle and pump setup for optimum atomization, pressure, spray-width, and flow-rate | Thrust test on motor-propeller combinations | Configuring APM with Ardupilot and GPS Trajectory planning.

Marine Robotics

Clearpath Heron : Unmanned Surface Vehicle   **Scalar Lab**
Trajectory planning, PID control, and depth data logging from river-bed.   *University of Pennsylvania*

Custom ROS package for trajectory planning, position control, and data logging for the robot to autonomously follow a trajectory and collect data for reconstruction of river-bed using Micron Echosounder.

Legged and Vehicular Robotics

Dextroid the Biped   **BITS Hyderabad**
Bipedal robot capable of detecting and avoiding obstacles.   *Mechanical Dept. and Physics Dept.*

Design and testing of mechanical structure, electrical circuits for power delivery, component selection, and writing walking algorithm.

The Magneto Robot   **BITS Hyderabad**
Wireless mobile robot capable of collecting and shooting balls   *Personal*

Design and construction of chassis, manipulator arm | Design and soldering of circuits for transmitter, receiver, motor-drive and control units.

Biomedical Devices

Anterior Chamber Depth and Corneal thickness measurement device(ACDC)   **Hyderabad**
MIT MediaLabs - ETE'17, Srujana Centre for Innovation   *Hackathon*

Design, rapid-prototyping, and fabrication of optical setup, lens holder, and face-mask to sit on user's head for focusing a narrow slit.

Low-cost Handheld Pneumonia monitor for Rural Children **BITS Hyderabad**

Collaboration with MediCiti Hospitals, and Indian Council of Medical Research Under Prof. M. B. Srinivas

Designing and testing of 16-bit ADC data sampling at 4 KHz, first-stage amplifier using trans-impedance op-amp, second-stage amplifier using op-amp for 20x amplification, filtering circuit, SPI-based flash storage for rapid storage.

Other Projects

- Online temperature logger for automatic monitoring and cooling of solar panel.
- Wirelessly controlled room lock using ESP8266 module.
- PID control algorithm based self-balancing two-wheeled ground-robot.
- Ising model simulation for a square ferromagnetic lattice using the Metropolis algorithm on MATLAB.

Technical skills

- **Programming :** Arduino (Advanced), C (Intermediate), MATLAB (Intermediate), Python (Beginner), ROS (Intermediate).
- **Industry Software:** SolidWorks (Intermediate), EagleCAD (Beginner).
- **Hardware Skills:** Sensor Interfacing (Advanced), Circuit Design (Advanced), PCB Design (Beginner).
- **Other Skills:** Awesome soldering skills.

Position of Responsibility

- **Mentor :** Student Mentorship Program - Robotics, BITS Pilani Hyderabad Campus.
- **Co-Founder :** Automation and Robotics Club, BITS Pilani Hyderabad Campus.
- **Co-Founder :** Aero Club, BITS Pilani Hyderabad Campus.
- **Founder :** Technopedia Documentation Blog, BITS Pilani Hyderabad Campus.
- **Recording Team Lead :** Dept. of Visual Effects, BITS Pilani Hyderabad Campus.