# Yash Goel

M.Sc. Geodetic Engineering (Mobile Sensing & Robotics)
University of Bonn

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## Education

**University of Bonn**, Bonn, Germany — *Oct' 19 - Present*
*Masters of Science*, Geodetic Engineering (Mobile Sensing & Robotics) — **GPA: 1.19**

**Indian Institute of Technology Roorkee**, Uttarakhand, India — *Jul' 14 - Apr' 18*
*Bachelor of Technology*, Mechanical Engineering — **GPA: 6.7**

## Publications

P. S. Naga Jyotish*, **Yash Goel***, A. V. S. Sai Bhargav Kumar , K. Madhava Krishna, **"PIVO: Probabilistic Inverse Velocity Obstacle for Navigation under Uncertainty"** published at *28th IEEE International Conference on Robot Human Interactive Communication* (RO-MAN 2019), New Delhi, India. **[Paper]**

Akshay Walvekar*, **Yash Goel***, Anuj Jain*, Sohom Chakrabarty, Anil Kumar, **"Vision Based Quadcopter Navigation using Reinforcement Learning"** accepted at *IEEE 2nd International Conference on Automation, Electronics and Electrical Engineering* (AUTEEE 2019), Shenyang, China. **[Paper]**

## Work Experience

**Stachniss Lab, University of Bonn**
*Graduate Student Assistant, HiWi* — *Mar '20 - Present*

- Implementation and research on incremental surface reconstruction methods.

**TDB Technologies**
*Computer Vision Engineer* — *August '19 - October '19*

- Worked on 6DoF pose estimation of industrial objects using *singleshotpose* method.
- Training data was generated on images rendered from 3D object model and tested on real life images.

**Robotics Research Centre, IIIT Hyderabad** — **[Video]**
*Supervisor : Prof. K. Madhava Krishna* — *June '18 - June '19*

- Developed a deep network to learn non-linear MPC control for trajectory tracking in ROS.
- Collision cone based dynamic obstacle avoidance using an optimization routine for evasive manoeuvre on Parrot Bebop.
- Worked on probabilistic methods to tackle pose estimation and control uncertainty for dynamic obstacle avoidance.

**IIT Roorkee Motorsports** — **[Video]**
*Powertrain Head, Team Member* — *July '15 - April '18*

- Led the powertrain division of Formula SAE team developing formula style electric race car.
- Responsible for design, FEA analysis, CAD packaging and manufacturing of drivetrain parts of 2017 car, *Saber*.
- Responsible for designing vehicle dynamics models for performance simulation, battery estimation and controller design including yaw rate controller and torque vectoring.

**Tata Motors Research Centre, Bangalore** — **[Report]**
*Supervisor : Anand Vasapparnava* — *May '17 - July '17*

- Modeling, simulation and control of hydrogen fuel cell vehicle and refuelling station in Matlab.
- Thermal control of stationary fuel cell stack temperature using PID controller in Simulink.
- Development of battery model for SOC prediction and observer design using Extended Kalman Filter.

**Blade Motors**
*Research Intern* — *Dec '16*

- Range verification and battery sizing on the basis of data logged for different drive cycles.
- Designed tandom layout vehicle in Solidworks as a prospective design for vehicle considering packaging of battery and motor.
- Selection of suitable battery pack and motor for the powertrain of the vehicle.

## Academic Projects

**Autonomous Control of Quadcopter Using Reinforcement Learning** **[Video]**

*Supervisor : Prof. Sohom Chakraborty and Prof. Anil Kumar* *Oct '17 - Apr '18*

- The project aimed at autonomous navigation of quadcopter in AirSIM where the control policy was learned using Reinforcement Learning.
- Implemented various RL baselines with depth image as the input to the policy and developed a quadcopter model in *Simulink*.
- Achieved the desired results using DQN and the work was published in ICCSEC '2018.

**Tribo-Electric and Carbon Slurry Nano-Generators**

*Supervisor : Prof. Kaushik Pal* *Jan '17 - Apr '17*

- Designed and fabricated a tribo-electric nano-generator using 3D printer.
- Performance of the nano-generator was tested to find the voltage genrated in response to the pressure applied.
- Carbon slurry nano-generator was also designed and manufactured using a 3D printer.

## Technical Skills

**Languages**: C++, Python, LaTeX
**Packages**: ROS, OpenCV, PyTorch
**Simulation Tools**: MATLAB, Simulink, Solidworks, ANSYS, AirSIM

## Awards & Achievements

Secured an **All-India-Rank of 1693** in JEE Advanced 2014 amongst 150,000 candidates
Secured **Rank of 21** in Science Open Merit Test