

Gaurav Duggal

<http://www.gauravduggal.com> • <https://github.com/gauravduggal> • gauravduggal1729@gmail.com

EDUCATION	<p>Virginia Tech, USA, Bradley department of Electrical and Computer engineering 2021 – present</p> <ul style="list-style-type: none">▪ Ph.D. in Electrical Engineering <p>Indraprastha Institute of Information Technology, Delhi, India 2017 – 2019</p> <ul style="list-style-type: none">▪ Masters (M.Tech.) in Communications and Signal Processing Engineering. <p>Birla Institute of Technology and Sciences, Hyderabad India 2009 – 2013</p> <ul style="list-style-type: none">▪ Bachelor (B.E.) in Electrical and Electronics Engineering.
PROFESSIONAL EXPERIENCE	<p>Graduate Intern, <i>Samsung Research America, Plano, Texas (SMI-lab)</i> May 2022 – Aug 2022</p> <ul style="list-style-type: none">▪ Worked on Ultra WideBand (UWB) Radar based gesture recognition end-to-end pipeline and submitted a patent application for a segmentation algorithm. <p>Engineer, <i>Qualcomm, India (RF software team)</i> Jul 2019 – Aug 2021</p> <ul style="list-style-type: none">▪ Worked on software bring-up of Qualcomm modems and resource allocation algorithms. <p>Graduate Intern, <i>Hertzsell, Singapore</i> Dec 2018 – Feb 2019</p> <ul style="list-style-type: none">▪ Developed an end to end automotive MIMO radar signal processing including waveform design, ground clutter modelling, automotive target modelling and receiver effects modelling. <p>Member of Technical Staff, <i>Tonbo Imaging, India</i> May 2015 – Jun 2016</p> <ul style="list-style-type: none">▪ Developed firmware for a thermal imaging camera system used by Defence Forces across the globe. <p>Embedded Electronics Engineer, <i>Ducere Technologies, India</i> Jul 2013 – Apr 2015</p> <ul style="list-style-type: none">▪ Implemented prototypes of Wearable technology based design ideas using basic physics and electronics. <p>Embedded Electronics Engineer, <i>Ducere Technologies, India</i> Jul 2013 – Apr 2015</p> <ul style="list-style-type: none">▪ Made working prototypes of Wearable technology based design ideas using basic physics and electronics. <p>Research Intern, <i>Cranfield University, United Kingdom</i> May 2012 – Jul 2012</p> <ul style="list-style-type: none">▪ Designed an Inertial Navigation System (INS) for an Unmanned Ground Vehicle using an accelerometer, magnetometer and gyroscope mems based sensors.
SELECTED PUBLICATIONS	<p>[3] N. Pandey, <u>G. Duggal</u>, en S. S. Ram, “Database Of Simulated Inverse Synthetic Aperture Radar Images For Short Range Automotive Radar”, in 2020 IEEE International Radar Conference (RadarConf), 2020, bll 238–243. [Paper]</p> <p>[2] <u>G. Duggal</u>, S. Vishwakarma, K. V. Mishra, en S. S. Ram, “Doppler-resilient 802.11 ad-based ultrashort range automotive joint radar-communications system”, IEEE Transactions on Aerospace and Electronic Systems, vol 56, no 5, bll 4035–4048, 2020. [Paper]</p> <p>[1] <u>G. Duggal</u>, S. S. Ram, en K. V. Mishra, “Micro-Doppler and micro-range detection via Doppler-resilient 802.11 ad-based vehicle-to-pedestrian radar”, in 2019 IEEE Radar Conference (RadarConf), 2019, bll 1–6. [Paper]</p>
GRADUATE COURSEWORK	<p>Software Defined Radios, Stochastic Signals and Systems, Probability and Random Processes, Statistical Signal Processing, Radar Systems, Reinforcement Learning, Data Structures and Algorithms, Principles of Global Positioning Systems, Multi Channel Communications (MIMO).</p>

TEACHING

Teaching Assistantship

- TA for the Grad course - Radar Systems (ECE 5675) with Prof. Mike J. Ruohoniemi (Fall 2021) at Virginia tech
- Wearable Applications, Research, Devices, Interactions (DES 513) with Prof. Aman Parnami (Monsoon 2018)(Aug-Dec) at IIIT Delhi
- Probability And Statistics (MTH 201) with Prof. Sanjit Kaul (Winter 2018)(Jan-May) at IIIT Delhi

PROJECTS

Micro Doppler Radar using HB100 and RCWL-0516, Independent project

- Implemented a Doppler radar by amplifying the received baseband signals using an opamp based active amplifier circuit with adjustable gain.
- Sampled the amplified signal using an Arduino ADC and used Serial to send this data to the computer.
- The digitally sampled signals were processed using an STFT algorithm with a hamming window in Python code. We can see micro Doppler features of the target ceiling fan - blades in the spectrogram output [[Code](#)], [[Video](#)]

ADS-B Receiver and Antenna Design to Track Aircraft, Dr. SS Ram, Assoc Prof, IIITD

- Designed and Constructed a portable Automatic Dependent Surveillance-Broadcast (ADS-B) radio receiver using a Software Defined Radio and an embedded computer to track commercial aircraft
- Implemented a Matched Filter in the preamble detection stage of the ADSB receiver code.
- Implemented 1 bit error correction for the adsb packet.
- Constructed a phased array antenna based on a paper in the Antennas and Propagation journal, for the system to improve aircraft tracking up to the horizon (400km).

Wide Band Spectrum Monitoring using a Narrow band Receiver, Dr. Bohara, Assoc Prof, IIITD

- Estimating the channel occupancy probability distribution by scanning a wideband channel using a narrowband software defined radio.
- The data collected was put into a histogram and the parameters of the probability distribution were estimated by minimising the Kullback-Leiber Divergence between a parameterized probability distribution and the histogram.

Reinforcement Learning Agent for the Atari game Catch, Dr. Sanjit Kaul, Assoc Prof, IIITD

- Implemented Policy Gradient based methods (2018 research papers) and compared it with Deep-Q learning to learn the optimal policy for Atari game Catch. [[Code](#)]

AWARDS

- **Qualcomm Innovation Fellowship 2022 - finalist** - Joint radar-communication based wireless localisation **2022**
- Secured a scholarship amounting to 960 UK pounds per month for 3 months for a research internship at **Cranfield University**, United Kingdom. **2012**
- **All India Engineering Entrance Exam** - Top 0.4 percent among 1.2 million candidates. **2009**
- **IIT Joint Entrance Exam** - Top 1 percent among 0.5 million candidates. **2009**
- Won an Individual **Silver** medal (among 77 teams from 11 countries) at the 4th International Young Mathematician's Convention (**IYMC**). **2008**
- **National Cyber Olympiad 2007** - All India Rank 13 **2007**

SKILLS

Languages : C, C++, Python, Matlab

Deep Learning Libraries : Tensorflow (Basic)

Version Management : Git (fluent)