

Shantam Raj

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Education

Indian Institute of Technology, Guwahati

(August'13 - July'17)

B.Tech in Electronics and Communication Engineering

Research Interests

Data Science, Data Visualization, Big Data, Machine Learning, NLP, Differential privacy, AI on Edge

Experience

Engineer → Consultant

(Oct'17 - Aug'20)

Virtusa

- Worked in Research and Development Department, implementing research papers on requirements engineering using **Natural Language Processing** for internal products.
- Developed and given demonstrations of **Machine Learning as a Service**.
- Worked on **big data** analysis on **health care** data.

Intern

(June'15 - July'15)

Netaji Subhas University of Technology

Guide: Dr. Dhananjay V. Gadre

- As part of Texas Instruments University Program worked on the design and development of a portable, low cost oscilloscope using Piccolo Launchpad based on C2000 DSP.

Technical and R&D Projects

Covid Data Visualization Insights

(Apr'20 - Aug'20)

(PyData Global Conference 2020)

- Recreated various **interactive charts** - bar, line, ridgeline, choropleth, stream graph, layered and faceted charts - that studied the impacts of Covid-19 pandemic like GDP, health disparities, mobility, emissions, from The NYT and other media houses, in Python using Altair.
- It is the basis of my PyData Global 2020 conference talk.

Template Conformance

(Feb'19 - Apr'19)

- Implementation of the research paper "Automated Checking of Conformance to Requirements Templates Using Natural Language Processing" (Arora, et al. 2015) in Python using Spacy.
- Implemented to be used as an API and identify if requirements adhere to RUPP, EARS or Agile templates.

Active or Passive

(Nov'18 - Dec'18)

- Designed a Flask API that served an output stating if the input sentence was in active or passive voice.
- The detection as of now is based on a defined grammar implemented using Spacy.

Batteryless Node for IoT Sensor Networks

(Nov'16 - Aug'17)

Electronics Lab - Poster Presentation

- CC2650 Bluetooth SoC on a custom PCB was used to develop a network of motes (with ultra low power sensors) that run solely on **super-capacitor** and employ **BQ25570** energy harvesting (ambient light/sunlight) solution.
- Motes work and wake up automatically without human intervention. Designed a highly optimized circuit to **minimize current leakages** - few nanoamperes - and ability to run 24 hours on full charge of just 0.5 farad.
- Programmed CC2650 with a RTOS that handles operations based on energy left in super-capacitor. Negative feedback from BQ25570 helps the ARM Cortex M3 microcontroller decide what sub-systems to turn off.

Wireless communication using nRF24L01+ Transceivers

(May'14 - July'14)

Electronics Lab

- Developed a P2P wireless communication interface and wireless mesh network for sensor nodes using **ATmega328** microcontroller and **nRF24L01+** transceivers.
- Integrated with **Processing** to control remote actuators by movement of mouse or key presses. Hardware of a RC car was also modified to increase its range.

Open Source Contributions

- **altair-viz** <https://github.com/altair-viz/altair>
Added novel examples, improved documentation, fixed issues, reported multiple bugs and performed extensive testing of the statistical **data visualization** library - Altair.
- **gifc** <https://github.com/armsp/gifc>
Creator of a **python** library/framework to access, create, edit, delete **Github Gists** from the command line/**bash**.
- **editorial-agent** <https://github.com/armsp/editorial-agent>
Read The New York Times and The Guardian editorials with complex sentences highlighted so as to learn proper use of punctuations. Built using **Spacy & Python**, inspired by **Writing in the Sciences** course by Dr. Kristin Sainani
- **p5.ble.js** <https://itpnyu.github.io/p5ble-website>
Found and **fixed a bug** in transmitting **float32** values to bluetooth devices from **p5** sketch using **Web Bluetooth**. Used nRF52840 SoC to detect the bug. Made a real time sensor data visualizer for browser too.
- **webusb** <https://webusb.github.io/arduino>
WebUSB enables USB devices to be accessed via the web. Extended the library to work out of the box with more hardware development boards and improved the documentation.
- **nano-33-ble-gen** <https://armsp.github.io/nano-33-ble-gen>
Contains a multitude of experiments using Nano 33 BLE (nRF52840 ARM Cortex M4 SoC) like **real time graph plotting** using **web-bluetooth**, **python bluetooth** development, **Madgwick**, **Mahony** filters on IMU etc.

Technical Skills

- **Programming:** Python, C, C++, Javascript, Bash, HTML, CSS, ARM Assembly
- **AI-ML & Data Science:** Scikit-learn, Pandas, Numpy, Scipy, Altair, Spacy, PySpark
- **Development & CI/CD:** Git, GitHub Actions, Docker
- **Python Frameworks:** Flask, FastAPI, Jax, Geopandas
- Others: MATLAB, L^AT_EX, Google Cloud Platform
- PCB & Embedded Product Design: Autodesk Eagle, Fusion 360, Arduino, Code Composer Studio

Scholastic Achievements

- Joint Entrance Examination: **Top 1.3%** of the 1.4 million students that appeared nationally
- Junior Science Olympiad: Invited to attend camp at **Homi Bhabha Center for Science Education** (HBCSE) by being one of the **top 35** students all over India.
- **NTSE Scholar:** Recipient of National Talent Search Examination (NTSE) scholarship by NCERT

Positions of Responsibility

- Team Lead, Virtusa** (May'18 - Dec'18)
- Mentor, Electronics Club, IIT Guwahati** (Aug'15 - July'17)
 - Undertook lectures - Introduction to Electronics and Arduino, **RTOS** Basics - and workshops - **PCB Design** - for the student community.
 - Guided, recommended better solutions and taught requisite skills to teams for successful completion their projects.

Extracurriculars

- **Speaker** at **PyData Global 2020** international conference.
- Creator & Editor of **COVID-19 Stories** - a platform for sharing our experiences in the covid pandemic.
- GitHub Arctic Code Vault Contributor
- I am a **published poet**. I write stories and often lend my editorial skills too.
- **Winner** of RedBear Lab's **IoT challenge**
- **Quarter-finalist, Hackaday Prize '17** for Batteryless Node for Sensor Networks
- Earned **1595** reputation points, **9 silver** and **21 bronze** badges on StackOverflow