Akhil Raj Baranwal

Undergraduate in Electronics and Instrumentation Engineering

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Experience

CFAED - Centre For Advancing Electronics Dresden — *Dresden, Germany*

Guest Researcher, Techinsche Universität Dresden — *Jan 2020 - PRESENT*

- Working on exploiting FPGAs for reinforced deep learning based systems

Micron Technology — *Bengaluru, India*

Embedded Engineer Intern — *May 2019 - July 2019*

- Worked on encrypted high speed memory-trace collection and analysis of DRAM AXI traffic under PetaLinux environments
- Extended the project to develop a Python framework to automate analysis of generated data

Adani Power Maharashtra Limited — *Tirora, Maharashtra*

Summer Intern — *May 2018 - July 2018*

- Developed a rule-based artificially intelligent Human Machine Interface based on Android and GSM network for controlling several industrial pumps spread across an area of more than 1600 acres.

Student Mentorship Programme, BPHC — *BITS Pilani, Hyderabad Campus*

Student Mentor — *Jan 2018 - November 2019*

- Taught electronics and architecture concepts to freshers and sophomores and guided them through their projects.

Education

Birla Institute of Technology and Science, Pilani — *Hyderabad, India*

Bachelor of Electronics and Instrumentation Engineering — *July 2016 to Present*

- **Technische Universität Dresden**, Saxony, Germany — *Semester Abroad 2020 (Jan - July)*

Delhi Public School Ghaziabad — *Ghaziabad, India*

AISSCE, 93.8% — *2013 to 2015*

St. Mary's Convent School — *Ghaziabad, India*

CISCE, 91.2% — *2004 to 2013*

Projects

Implementation of Tomasulo's algorithm with write-through cache controller

Course Project — *Aug 2019 - Nov 2019*

- Verilog based implementation of Tomasulo's approach towards dynamic scheduling.
- System also contained a model for LRU based write-through cache for data.

P^4 — *Closed-source*

Undergrad Research — *Aug 2019 - Dec 2019*

- Worked with the MMNE group to build P^4, an approximate Poly-Potential Portable Potentiostat based on the LMP91000EVM to perform simple electrochemical analysis.
- P^4 supports common electroanalysis routines and reduces the cost of a typical spectro-photometer by about 15-20 times.

Implementation of MIPS-like processor

Course Project — *Jan 2019 - Apr 2019*

- Verilog based implementation of a 32-bit, 4-stage pipelined processor with Fetch, Decode, Execute, and Writeback stages

ECSP

Closed-source

Undergrad Research — *Jan 2019 - Apr 2019*

- Worked with the MMNE group to build ECSP, an intelligent colorimeter able to back-estimate the dominant absorption spectra of a solution with characteristic wavelengths in the visible light range.
- ECSP features a precision of 1 nm with a standard deviation of 2.3% and reduces the cost of a typical spectro-photometer by about 150 times.

Fault Tolerant Network on Chips

Open-source

Undergrad Research — *Aug 2018 – Dec 2018*

- Worked with Prof Soumya J to propose a new algorithm for fault-tolerant network on chips focusing on a packet-routing strategy for link faults between routers that occur either during manufacturing or in-operation. The algorithm decides the shortest path as well as takes care of distributing the load evenly across the network grid.
- Extended the algorithm for Mesh and Torus topologies for both, routers and link-level faults.

xBITS

Undergrad Research — *Dec 2017 - Aug 2018*

- Worked under Dr. Suman Kapur to create a medical device that can diagnose UTI (Urinary Tract Infections) almost 15 times quicker than conventional laboratory methods.
- The device employs an array of colour sensors that predict the contents of the specimen according to RGB absorbance values and a trained model.

EasyMouse

Open-source

Independent Project — *Jan 2018 - Apr 2018*

- Gesture controlled pointing device emulator written in Python targeted towards users with disabled fingers.
- Wearable part based on ATMega328 can be worn around wrist, and data is transmitted wirelessly to the host device.

ardUPS

Open-source

Independent Project — *Mar 2018 - May 2018*

- Smart ATMega328 based CLI programmable UPS for Single Board Computer devices providing options like power throttling and sleep scheduling
- Selected for Unleash Invisible Intelligence contest by Hackster.io

VMS

Open-source

Independent Project — *May 2018 - July 2018*

- Python utility to sync multiple devices playing the same video using MQTT which syncs timestamps instead of video frames, offering significantly less network usage.

Extra Curriculars

Positions of Responsibility Head, Automation and Robotics Club @ BITS Pilani Hyderabad Campus : 2018-2019
Member, Embedded electronics team @ Hyperloop India : 2018-2019
Member, On Board Computing @ Pixxel : 2018-2019

Art Music-composition
Film-Making
Sketching Portraits

Social Service National Service Scheme (NSS-BPHC) : 2016-2017

Languages English, Hindi