NIKHIL P SAMBHUS
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EDUCATION

B-Tech in Computer Engineering
College of Engineering, Pune (COEP), Pune, India *(July 2011 to June 2015)*
CGPA – 8.41/10

ACADEMIC PROJECTS

Exploring the Fragmented Log-Structured Merge data structure (with Professor Vijay Chidambaram, The University of Texas at Austin) *(October 2017 to November 2017)*

- Performed theoretical analysis of a recent novel data structure called Fragmented Log-Structured Merge (FLSM).
- Explored effect of different configurable parameters such as guard size, number of *sstables* per level, size of levels on the read and write performance in FLSM based key-value store.
- Compared FLSM with other data-structures such as Log Structure Merge (LSM), Be-Tree and B-Tree.
- Explored designing of a general purpose File-System based on FLSM

Satellite Project "Swayam" (at COEP) *(December 2011 to May 2015)*

"Swayam" satellite was an interdisciplinary R&D project which aimed at developing a pico-class satellite with the scientific mission to demonstrate passive stabilization (first of its kind in India) along with the utility of point to point messaging from one ground-station to another ground-station. It includes 5 subsystems – Structures, Communication, On Board Computer, Attitude Control System (ACS) and Power.

My Roles - Project Manager and Lead Systems Engineer *(April 2014 to May 2015)*
On Board Computer sub-system Lead *(April 2013 – July 2014)*
Team member *(December 2011 to May 2015)*

The team successfully completed the major Critical Design Review (CDR) in September 2014 followed by the assembly and testing of the Flight Model of satellite in January- February 2015 at ISRO in my regime. **"Swayam" was launched by ISRO on 22nd June 2016 and the mission has been successful.** I have also worked on the design and implementation of software and hardware modules, systems integration and assembly of the satellite. This includes:

- System software including the low level drivers, scheduling, file system, boot loader, etc. for ARM controller based On board computer.
- Custom protocol for communication called the COEPSAT protocol which includes various services for the utility and other critical sensitive data such as the Health monitoring and the payload data.

- Integration of On Board Computer with the other sub-systems which include Load Protection, Terminal Node Controller of Communication, Gyroscope of Attitude Control System, etc.
- ECC (Error Correcting Hamming code) to protect the Code section in Flash memory from getting corrupted due to SEU (Single event upsets) such as radiation.
- Design and implementation of OILS (On Board Computer In Loop Simulation) which includes simulating other components of the satellite other than On Board Computer for testing purpose
- Stress testing of the entire mission sequence and functioning of On Board Computer software and hardware, to find out the defects in it and test its reliability

Implementing security in Message Passing Interface in distributed cluster systems (at COEP) *(July 2014 to March 2015)*

- Introduced an efficient and secure cryptographic system in message passing interface (MPI) in distributed environment. This implementation (named as VAN-MPICH2) integrates security measures to ensure data confidentiality using One Time Pad (OTP) encryption technique.
- Since the proposed encryption implementation decreases the security overhead substantially, VAN-MPICH2 manages to provide confidentiality with very insignificant decrease in performance.

INDUSTRIAL EXPERIENCE

Researcher (Systems Engineer) at Tata Research Design and Development Centre, (TCS Research) *(December 2016 to Present)*

- Researcher and Developer in Cybersecurity Research and Innovation programme in the sub-area of data privacy. Part of "Crystal Ball" project which aims at providing end users more control of the way their personal data is used.
- Contributions include designing recommender system engine for automated suggesting of privacy preferences to users, revamping Android mobile application interface, building consent management platform and participating in re-architecting of the product.

Software Developer at IBM India Software Lab *(July 2015 to November 2016)*

- Software Developer at IBM ISL Cloud BU, Pune worked on a cloud orchestration and automation product called "ICO" (IBM Cloud Orchestrator).
- Areas of contribution included ICO core task engine, IBM BPM toolkits for implementing automation service layer and product integration with Openstack, Hypervisors (like VMware, KVM), other public clouds (like AWS, Azure, Softlayer).

PUBLICATIONS

- COEPSAT Protocol: A Modular Link and Network Layer Protocol for Small Satellites, International Astronautical Congress 2014, Toronto, Canada
- A Generic, Customizable, Fault Tolerant Load Protection System for Small Satellites, IEEE International Conference on Power Electronics, Drives and Energy Systems 2014, Mumbai, India
- Project Management and Implementation of Hardware and Software Interfaces between Subsystems of Swayam Student Satellite Initiative, International Astronautical Congress 2015, Jerusalem, Israel

SKILLS

- Programming Languages – C, C++, Python, Java, Linux shell scripting
- Basics of ARM and Intel x86 assembly and architecture
- ARM JTAG, UART, SPI, I2C, etc.
- Parallel programming – MPI and OpenMP
- Openstack, KVM, VMware
- Tools - gcc, vi, ld, gnuplot, gparted, Linux, Windows