

# SURAJ THITE

E-mail: [suraj.thite@colorado.edu](mailto:suraj.thite@colorado.edu) | LinkedIn : <https://www.linkedin.com/in/surajthite/>

Tel: (720) 980-5638

## EDUCATION

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### University of Colorado, Boulder

May 2021

Master of Science in Electrical Engineering (Specialization in Embedded Systems and IoT Firmware Design)

3.8/4

Courses: ECEN 5813 - Principles of Embedded Software, ECEN 5823 - IoT Embedded Firmware Design, ECEN 5013 - Advanced Embedded Software Development, ECEN 5623 Real-Time Embedded Systems, ECEN 5122 Wireless Local Area Networks.

## SKILLS

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- Languages: C, C++, Python, Bash, Embedded C.
- Protocols/Standards: I2C, SPI, TCP/IP, UDP, MQTT, BLE, 802.11.
- Design/Dev Tools: Keil, Eagle, gdb, MCU Expresso, Simplicity Studio, CCS, AVR-Studio, Git, Wire Shark, FreeRTOS, Build root.
- OS Concepts: Virtualization, Multi-Threading, Task Synchronization, Linux Device Drivers, Scheduling Policies, Concurrency.

## PROFESSIONAL EXPERIENCE

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### Larsen and Toubro Ltd, Mumbai, India

Sr. Systems Design and Integration Engineer

Jul 2017 - Jul 2019

- Effectuated narrow band mesh technology for smart electrical meters with 74% cost reduction in lease lines. *Indore, India*
- Installed & Commissioned Building Automation & Control System worth \$7.6bn for Qatar Rail. *Doha, Qatar*
- Implemented PID control model across the gas line to control its process variables along with its SCADA. *Tatweer, Bahrain*
- Designed GSM based RTU system to transmit Pressure and Temperature data-points from in plant transmitters. *OGC, Oman*

### Department of Remote Handling and Robotics, BARC-Mumbai

Dec 2015 - Jan 2016

Research and Project Trainee

- Designed Servo drive models and studied its response for implementing haptic feedback for telerobotic manipulators.
- Transmitted feedback data Implementing Interoperable Teleoperation Protocol wrapped in low overhead UDP packet.

### Department of Radiation Detection and Instrumentation, BARC-Mumbai

Jun 2014 - Jul 2014

Research and Project Trainee

- Developed embedded firmware and data logging system for gamma-radiation detector implementing TI-MSP430 controller.
- Calibrated the electrical pulses in the Sievert scale implementing on-board JTAG interface.

## ACADEMIC PROJECTS

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### Linux Based Remote Health Monitoring System

Jan 2020 – May 2020

- Built custom Linux image to support server-client model over a Wi-Fi network using MQTT for exchange of messages.
- Implemented multi-threaded server with mutexes to handle multiple requests from client and host the data on a web page.
- Implemented logging functionality for sensor data in case of network failure and retransmit them to the server over MQTT.
- Designed a Built-in-Startup-Test (BIST) for flawless system bring-up and Unit Tested each module to ensure system stability.

### Time Lapse Image Acquisition

Jan 2020 – May 2020

- Designed sequencer for real time threads adhering to rate monotonic scheduling policy to capture images 1 Hz and 10 Hz.
- Implemented I/O decoupling to buffer data for best effort services using circular buffer resulting in low jitter and drift.
- Time stamped and overlaid user data into the frames while compressing frames in jpg format with a size reduction of 250%.

### Bluetooth Low Energy based Smart Warehouse System

Sept 2019 – Dec 2019

- Acquired AQI data from CCS801 CO2 sensor over I2C bus on LPN and catered GATT-characteristic services to a friend node.
- Implemented state machine model and load power management while acquiring data from the sensor at regular intervals.
- Effectuated deep sleep states and low energy timer, thus reducing the average current consumed by the system by 200%.
- Integrated iBeacons with LPN by dissociating the beacon frames and posting the head count in its vicinity to the Friend Node.

### Embedded Signal Generator and Analyzer implementing FreeRTOS

Sept 2019 – Dec 2019

- Generated waveforms with varying range and time using a lookup table, achieving a 70% reduction in computation time.
- Implemented DMA transfer from ADC buffer to memory using task scheduling while printing DSP report on serial interface.
- Exploited xQueuing feature in FreeRTOS to create DSP buffer along with semaphores and mutexes for task synchronization.
- Developed bare-metal drivers for SPI, ADC, DAC, I2C and DMA along with a tabular state machine model for FreeRTOS tasks.

### Self-Stabilizing Platform

Jul 2016 - Apr 2017

- Sensor Fusion of accelerometer and gyroscope to yield real-time yaw, pitch, roll of the platform via I2C interface.
- Compensated random drifts in time-varying mean samples of the sensor implementing Kalman Filter.
- Implemented PID control for error correction of real-time yaw, pitch and roll values.
- Implemented serial link for 3D simulation of the platform and graphical analysis of the model using processing software.

### AVR Based Oscilloscope

Jan 2016 - Mar 2016

- Implemented AVR ATMEGA 32 controller along with a GLCD screen to display waveforms of input electrical signals.
- Designed amplifier and low pass filter for the input signal while feeding its output to the ADC pin of the micro-controller.
- Provided the provision of compressing or expanding of the signal along time axis along with the representation of real-time frequency and amplitude of input signal by the means of push-button switches.

## WORKSHOPS AND CERTIFICATIONS

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- Raspberry Pi Platform and Python Programming using Raspberry Pi – University of California, Irvine through Coursera.
- Programming for Everybody (Getting Started with Python)- University of Michigan through Coursera.
- Python Data Structures – University of Michigan through Coursera.