**Embedded Engineering**

* **Fundamental topics in Electronics**
  + Resistors, Capacitors, Diodes, Transistors, OpAmps etc.,
  + Analog and digital electronics basics
* **Embedded System Architecture**
  + uP Architecture
  + uC Architecture
  + Basics of Machine level language (Op-codes)
  + Basics of Assembly Language Programming (ALP)
  + Higher level language
  + Compilers, Assemblers and Linkers
  + Introduction to ARM M0 architecture
  + Architecture details – CPU, Memories, Peripherals
  + Peripherals
    - Clocks, Interrupts, GPIOs
    - Digital (Timer, Counter PWM)
    - Analog (ADC, DAC, Comparators)
    - Communication (UART, I2C, SPI)
    - Glitch Filter, Frequency Divider,
    - Character LCD
    - Emulated EEPROM
    - RTC
  + Programmable GPIOs and Drive modes
    - Strong, High-Z, High-Z Analog, Pull-up, Pull-down, OD-Low, OD-High
  + Integrated Development Environment (IDE) tools
  + Programming methods
    - ISSP, SWD, JTAG etc.,
  + Power System and Regulators
    - Power Management
    - Power Modes (Active, Sleep, Hibernate)
    - Watch-dog timers
    - Reset sources
* **Wireless Communication Fundamentals**
  + Fundamentals of Wireless Communication
  + Popular Communication Technologies - Cellular, BLE and WIFI
  + Real-world applications in modern communication
* **Micro-controllers**
  + Arduino-UNO – 8-bit AVR
  + Cypress PSoC - ARM Cortex-M0 – Programmable System on Chip
  + ESP32 - System on a chip microcontroller with integrated Wi-Fi and Bluetooth
* **Micro-processors**
  + Raspberry Pi - Small single-board computers
* Embedded programming
  + Embedded C
    - Local/Global variables, loops, subroutines, functions, ISRs, Input-Process-Output
  + C++ Basics
* **System Design with CAD Tool**
  + Circuit schematics and layout design
  + KiCAD tool usage and design example
* **Fundamentals of Electronic product design**
  + Product development process
  + Identifying Input/output modules
  + Component selection process
  + Reading key specifications in datasheets
  + Schematic Design
  + PCB Mechanical Layout and trace routing
  + Introduction of Firmware Design
  + Manufacturing Process overview
  + Different testing process
* **Internet of Things – IoT**
  + Sensors to Analytics
  + Sensors, Digitizers, Gateways, Servers
  + Network communication protocols (TCP/IP, HTTP, MQTT)
  + Different IoT Platforms, Pub/Sub
  + Consumer, Agri, Medical, Automotive, Industrial Use cases
* **Cyber Security**
  + <Raj to fill in here>
* **Test and Measuring Equipment**
  + Concepts and usage of lab equipment
  + Usage of Oscilloscope, Function generators, Power Supplies, spectrum analyzer and multimeter
  + Soldering simple components
* **Live project exposure (at-least 3)**
* **Professional Development**
  + Resume preparation
  + Presentation skills
  + Employee ethics