JATAN BHATT

MECHATRONICS ENGINEERING CO-OP, YEAR 3

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EXPERIENCE

SNC Lavalin
June 2018 - August 2018

Controls Engineering Intern

- Developed practical training system for the operation of nuclear fuel channel inspection tools.
- Created custom **SQL** database using previously acquired data.
- Analyzed performance metrics to improve fuel channel inspection efficiency.

McMaster Autonomous Underwater Vehicle
November 2018 - Present

Team Co-Founder and Electrical Team Lead

- Early stage McMaster Engineering team to compete in the annual RoboSub competition.
- Currently in **research and prototype** stage, focusing on:
  - Hot swappable batteries, system power distribution, propulsion control.

FIRST Robotics (Team 1241)
September 2016 - Present

Design Mentor

- Implemented **visual feedback system** for human operators, based on robot actions.
- Reduced a **1 hour task to 2 minutes** by deriving calculations and implementing them in excel.

PROJECTS

Smart Powerbar

- Custom circuitry, currently working on PCB using **EAGLE**.
- Functional IoT prototype utilizing **Particle Photon** to control a relay over WiFi.
- Integration with Apple HomeKit using **Node.js** in progress, currently operated through IFTTT.

Embedded Systems

- Various projects using **STM32L476 microcontroller** programmed in **embedded C**.
- Chill - Sets PWM duty cycle for fan relative to setpoint and temperature sensor input.
- Reflex - Simple game to calculate time between LED display and user pushbutton interrupt.
- Stepper - Controller for stepper motor with ability to change speed, direction, and step mode.
- Clock - Shows time on digital display, users can save time to **EEPROM** and set custom time.

Image Processing

- Implemented a genetic algorithm in **C**, converging to input target.
- Used euclidean distance between pixels as fitness function.
- Each generation involves a mutation between population members.

Target

Result

Pacemaker

- Designed a Graphical User Interface (GUI) in **Python** to set pacing modes and values.
- Used **PySerial** to transfer parameters between GUI and pacemaker board.
- Established asynchronous handshake protocol for bytes being sent and recieved.

Music Reactive Lamps

- Utilized **NodeMCU** (microcontroller) to control custom-built lamps using audio sensing board.
- Programmed in **Arduino C,** colour and intensity of LEDs determined by input sound.
- Used onboard Analog to Digital Converter (ADC) to set PWM for LEDs.

AWARDS

2017	2nd/54 Teams	McMaster Engineering Competition Junior Design
2016	1st/22 Teams	McMaster Engineering Competition Junior Design
2016	1st/252 Teams	McMaster Engineering IMPACT Project
2016	International	FIRST Robotics Competition World Championship Division Finalists
2013	International	FIRST Robotics Competition World Champions

SKILLS

Electrical

- Microcontrollers
  - Arduino
  - Particle Photon
  - NodeMCU
  - STM32 (ARM Processor)
- Oscilloscope
- Power Supplies
- Soldering
- Breadboard prototyping

Software

- C/Embedded C
- UNIX Command Line
- Python
- Bash
- Assembly
- MATLAB
- Git

Design

- MultiSim (Schematic design)
- EAGLE
- Autodesk Inventor
- AutoCAD
- GrabCAD Workbench
- SolidWorks
- KeyShot (3D rendering)

Manufacturing

- CNC
- 3D Printing
- Lathe and Mill
- Sheet Metal
- Hand and Power Tools

COURSEWORK

Electrical

- Analog and Digital Circuits
- Signals and Systems
- Electricity and Magnetism
- Electrical Circuits and Power

Software

- Embedded Systems Design
- Data Structures, Algorithims
- Software Development