Arafat

# SUMMARY

* Actively looking for Embedded Software Engineer position which involves system application design and product development.
* Embedded System Design Engineer on Body Control Module as a features implementor basically working on MATLAB Model based designing of Finite State Models and Integrated models for Ford Vehicles
* Automation Engineer on Model-in-the-loop environment for Body Control Module who develops CAPL scripts to run the bench setup using CANoe to validate its basic functionality during software development time
* Software Test Engineering to validate and verify different variants of software for Subaru infotainment system and also to develop software integration and test cases for different system configurations
* Research on Control system for Unmanned Quadrotor Aircraft to develop a autonomous quadcopter
* Worked as a Graduate Assistant in Electrical and Computer engineering in Bradley University
* Worked as Intern in Transmission Corporation of Andhra Pradesh Limited for monitoring and maintaining servers in the power station on Embedded C, C++ and simulink platforms
* Developed GPS connected data collector which generates data files for navigation log by utilizing C++
* Developed a 2D Cellular Automation game called game of life by using C++
* Testing of Atmega128 Development Board on a Circular linked list buffer in C++
* Developed Real time operating systems for programs using UART/RS232 serial communication with Silicon labs
* Multi-page web server interfacing for control of ESP8266 boards for client-server in TCP and UDP
* Designed a audio equalizer on a Atlys FPGA Spartan 6 board which interface with onboard Audio CODEC AC97
* Developed a fingerprinting algorithm in MATLAB to store audio songs and identify songs
* Developed Noise reduction and frequency modulator m-scripts for different audio formats by using MATLAB
* Angle Detection and Tracking position of a moving objects using Image Processing and Computer Vision
* Developed a Image processing code which can differentiate abandoned object from a live video stream
* Reduce noise and improve image quality in a series of images /video: Image Processing Matlab
* Interested in developing thing involving coding embedded applications and product designing

# EDUCATION

* Bradley University, Peoria, IL, USA GPA: 3.9 / 4 Master of Science in Electrical Computer Engineering, Graduated in December 2018
* VR Siddhartha Engineering College, Vijayawada, AP, INDIA GPA: 8.09 / 10 Bachelor of Technology in Electrical Electronic Engineering, completed degree in April 2017

# PROFESSIONAL EXPERIENCE

**Tata Consultancy Services (Client- Ford Motor Company), Dearborn, MI Embedded System Design Engineer** (July 2019 - Present)

* Creation of Model Based Design for different state machines at feature and sub-feature level based on functional specifications and requirements from client
* Requirements/Issue Analysis and Specification Creation/Update of software in SharePoint and Jira
* Creating Epics, Story points in jira and running sprints along with team and closely monitoring the Kanban boards for tracking the project release and development
* Design failure mode and effect analysis for plan Software based releases and Technical Safety requirements
* Tracking open issues in Finite state machines and providing reliable solutions for them. So that they don’t affecting the program delivery time
* Develops a high-level end to end design document on risk mitigation plans related to development of feature by analysing the scope of work and effort estimation for the new feature
* Providing transformation ideas to enhance the system re-usability and business
* End to End Testing and understood the process of Integration testing of different architectures and functionalities in Body Control Module (BCM) like Alarm, HS-CAN, CAN Signal Translation and Automotive Safety Integrity Level Signals
* Developing Model-in-the-loop environment for unit level testing and CAPL script testing for Body Control Module
* Translate feature level requirements into implementation level control system specifications by conducting software design review with client
* Work on Functional Safety of ASIL-B rated signals for different features based on ISO26262 standards
* Resolve issues and/or ambiguities found in specifications during the vehicle development cycle
* Work with the Feature software team explaining algorithm and function safety requirements
* Design state diagrams in Visio and develop Matlab Simulink models to represent an implementation
* Panel based testing and Bench Testing of Body Control module using Vector CANeo and CANalyzer
* Work on functional safety by providing ASIL CAN Messages or signal with AUTOSAR or Ford End-to-End type of protection
* Work on Diagnostic Engineering Tool and On-Board Diagnostics to read DID and DTC for CAN based Networks
* Flashing of Body Control Module with Project specific Booting files, Method3 and Method2 configuration by using Diagnostic Engineering Tool
* Work on Part2 Specifications, GMRD (Global Master References Database) and CMDB (CAN Message Database) of a specific Model year Vehicle to understand the functionality while deep debugging of Issues
* Work on Dbc files as a part of CAN Signal Translation functional implementation by taking files from VSEM
* Maintaining of CAN message Database and High-speed CAN for Body Control Module for Feature Speciations
* Working on tools like MATLAB, Simulink and CANeo to develop behavior model for the feature
* Using CAN based architecture to make different functionalities to work with different ECU’s inside a vehicle
* Conducting Triage meetings to deal with different groups of people to solve any active cross-functional problems whenever issues come in office or during Work from Home environment
* Working with Multiple Teams located in different time zones to coordinate release work and resolving complicated bugs arises during factory production

Skills: MATLAB modeling in Stateflow, GITHUB, Jira, Diagnostic Engineering Tool, Vector CANoe & CANalyzer and CAPL Scripting

**Open System, Inc. (Client- Harman International), Novi, MI Software Test Engineer** (Jan 2019- July 2019)

* System validation and verification on both Bench and in-vehicle for Subaru infotainment system
* Worked on Connectivity Technical Design Documents that are design for develop of systems and components to do validation of feature functionality
* Verification of test cases for infotainment system using RAFT simulation on Bench and in-vehicle
* Developing automation scripts for sanitary, smoke and stress test cases in RQM
* Using Tera Term for configuration and collect CAN, Serial and Ethernet logs for verification
* Develop Unit tests for system validation for different Versions of Subaru HMI
* Raising defects and tracking it to closer to ensure quality of product in ELVIS and JIRA
* Drive test for new releases builts to judge system performance and accuracy by constant exploratory testing
* Developing regression test cases and running them to check the stability of infotainment system
* Configuring and preparing head unit to work for OTA and MOTA programming
* Develop software integration and test cases to check different Tomtom Navigation Maps for HMI
* Collecting HCI logs for testing Bluetooth, Wi-Fi hotspot issues in infotainment system
* Product integration for software builds by developing different makeup files for them before launching software

**Bradley University, Graduate Assistant** (Jan-Dec 2018)

* Position was under Head of Electrical and Computer Department in Bradley University
* Performed research in Embedded C technologies and Data Communication
* Provided assistance with lab firmware in ARM, Texas Instrument Developing boards and FPGA
* Created and submitted research reports on field studies and helped publishing technical papers
* Calibrating equipment and making sure systems are running following specifications along with coordinating technician in Lab
* Preparation procedures as required by professor for conducting research in Advanced Control systems

# Transmission Corporation of Andhra Pradesh Limited, Intern (Sep-Dec 2016)

* Position was under a Divisional Engineering in electrical substation 220KV on transmission of Electrical Energy
* Maintained power station servers using C++, Embedded C firmware to check power consumption and distribution
* Monitored the control room by observing relays and circuit breakers working with real time operating systems
* Observed power distribution and maintained generation to transmission station by Serial peripheral interface bus
* Worked on site for assembling and charging of a 50 MVA transformer firmware by going through schematics and datasheets related to the assembling and configuration
* Performance Verification Test on transformer for wide range of check systems given by manufacture of product under technical guidance

# RESEARCH

**Control System for a Unmanned Quadrotor Aircraft in MATLAB (**Aug-Dec 2018**)**

* Quadrotor position control is done with longitudinal motion of pitch angle, lateral motion of roll angle and rotational motion of the yaw angle
* Matlab code in PID controller is designed with linear model examples with practical values to demonstrate the step response of the trajectories for single Aux motion and 2-Dimensional motion in horizontal plain
* Control motion of x-y plane is explained by the block diagram along with the trajectory with respect to earth fixed frame which also shows blow-up errors of trajectory
* Validation of quadrotor was done to check the firmware to ensure quality is maintained and specifications are appropriate and attainable
* Optimal design by using system regression analysis on root locus system for hovering and Maneuver quadrotor is done

# TECHNICAL SKILLS

* Programming Language: C, C++, Embedded C, Python, C#, Freertos, Atmel, CAPL
* IDE: Keil, Eclipse, Arduino, Silicon labs (SILABSIDE), RAFT
* HDL designs: Xilinx ise design suite 14.7
* Software Tools: MATLAB, Simulink, Tera Term, Vector CANoe, CANalzyer
* Protocols: TCP, UDP, DNS, HTTP, HTTPs, FTP, SMTP/POP3/IMAP, CAN bus
* Familiar with Microsoft office, Visual Studio
* Operating Systems: Mac OS, Windows
* Software version control: GitHub<https://github.com/SK-Arafat>

# PROJECTS

**Data File Generator From GPS Device: C++**

* Developed a program that processes data files produced by an embedded system connected to a GPS device and generates a data file for the navigation log
* Uses the metadata provided by the GPS Devices takes the required parameters from the text file
* Generates Excel Sheet with total distances and change of angle of inclination regarding GPS Devices values

# 2D Cellular Automation: C++

* Designed a game called Game of life which is by using C++ program in 2D cellular Automation
* Game of life is zero-player game its evolution is determined by its initial state and advances play by creating patterns with particular properties determined by its initial state

# Atmel 128 Development Board tested with a linked list: C++

* Circular-based list class template was thoroughly graded, triple the points to interrupt services that calls PWM and at the same time starts ADC conversion
* Sufficient Datatype and length with both short and long average were used to catch PWM rate

# ESP8266 Development board tested: Python

* Tested for interfacing between client-server in TCP and UDP
* Multi-page web server interfacing for control of ESP8266 boards
* Network sniffers for TCP and HTTP

# Data Acquisition System on an FPGA: Xilinx ise design

* Serial peripheral interface bus were designed to interface between analog-to-digital converter and digital-to-analog converter
* Different clock domain in a digital design were developed to synchronize with multiple systems
* Gained experience in on-chip debugging for FPGA design implementation and verification

**Audio equalizer design using VHDL: Xilinx ise design**

* Designed my own specifications of an audio equalizer, for provided VHDL codes of AC97 to get audio samples and play them out
* Then used a MATLAB filter design GUI: FDATOOL to design an IIR filter and generate filter coefficients
* Then Convert the filter coefficients to fixed-point format and implement the IIR filter on the board

# Communication between programs using UART/RS232 serial communication: Silicon labs

* I have designed a desktop program that reads status of attached joystick
* Board program operates on the data received from desktop program
* The embedded board uses that data to control LEDs on board manufacture system correlation
* The two programs communicate using a UART/RS232 serial

# Music Fingerprinting: MATLAB

* Shazam algorithm was studied and from that similar program was developed in Matlab for fingerprinting music libraries and identify songs
* Spectrogram of song was taken to which constellation mapping was done to identify the hash token of song and unique fingerprint was developed for each song

# Guided Vehicle: Arduino software

* Line follower robot was designed with a team of two numbers
* Vehicle tracking guidance system for a autonomous vehicle travelling from one point to one other
* Generating metadata text files by tracking the location of motion of Vehicle by personal positioning system

# Optimal Trajectories motion control: MATLAB

* Approaching linear learning control results for non-holonomic systems by using Matlab and conducting the simulation on the motion planning

# Magnetic Levitation system: MATLAB Simulink

* Stable control of magnetic suspension system without falling from it place even due to external disturbances by using a Simulink program

# Dual Tone Multiple Frequencies Detection: MATLAB

* Using Short Time Fourier Transform from MATLAB to detect Dual Tone Multiple Frequencies Detection

# Design and Fabrication of High Voltage Oil Testing Kit: Arduino software

* Developed a device with a team of four that can test the properties (like breakdown strength) of any oil up to 100 KV
* Designed depending on supplier component basic techniques like cost,quality & safety, delivery, service, social responsibility, convenience/simplicity, risk, agility
* Research over the behaviour of the oil was done at different temperatures and viscosities by using this kit to know the breakdown strength of oil

# Angle Detection and Tracking position of a Vertical Rod of a Crane: Image Processing Matlab

* live streaming video readers the images which are than extracted and cropped to calculate the angle
* Now image is sharpened and thresholded to extract the boundaries of the image
* After tracing boundaries and fitting lines, the angle is calculated, and velocity is measured
* After doing all this calculation is plotted on the live streaming video

# Design of basic butterworth bandpass filter: Image Processing Matlab

* Input is changed to gray scale image than low pass filter is applied using Gaussian filter
* FFT function is applied by using self-designed ‘ffts ’ function to the image
* After that ifftshift is applied,so that image is exposed to fft2 a 2-dimensional discrete Fourier Transform
* After that plot of a Fourier Spectrum of a Original image, Frequency Domain Filter Function of original image and Bandpassed image are plotted in a single figure

# Identifying abandoned objects in a video stream: Image Processing Matlab

* A video is recorded using laptop webcam for 100 frames per second which is taken as references frame
* Then after that again laptop webcam is run again this time it takes a video again for 100 frames which is taken as present frame
* Now comparison is done between the references frame and present frame and differences are detected
* Image subtraction is done and imagine is presented by the Identifying abandoned objects by a red box

# PROFESSIONAL DEVELOPMENT

* Received prestigious MARJORIE WOODS REYNOLDS MEMORIAL SCHOLARSHIP for INTERNATIONAL STUDENTS at BRADLEY UNIVERSITY sponsored by PAFIS (2018)
* Library Workshop Certificate for completing Library Workshop Series for Graduate Students (2017)
* Young Professionals of Caterpillar & Bradley University Innovation Competition (2017)

**- REFERENCES will be provided on Request**