Shambhavi Kuthe

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EDUCATION

Virginia Tech - *MS Computer Engineering* (Specialization : Computer Systems)*, Blacksburg, VA*   **Aug. 2022 - Present**
Relevant Courses: Adv. Real-time systems, Adv. Linux Kernel Programming, Multiprocessor Programming, Compiler Optimizations

SKILLS

Programming Languages : C, C++, Python, Java, Javascript, HTML, VHDL
Softwares : Linux, FreeRTOS, ESP-IDF, ROS, Cadence, PSpice, OrCAD, Xilinx Vivado, Move-It, Eagle, Solidworks, Git, SVN
Hardware : ATmega 128, ESP32, STM32, Kintex-7, RaspberryPi

WORK EXPERIENCE

Schneider Electric India Private Limited   **Oct. 2020 – Jul. 2022**
Systems Engineer R&D Embedded Systems   *Mumbai, India*
- Designed & tested various embedded electronic circuits including AC-DC universal input buck-boost converter and DC-DC regulated power supplies for controlling electronic trip and measurement units of ACB's, MCCB'c & Motor Protection Relays.
- Implemented, debugged and tested op-amp based signal conditioning and filtering circuits for measuring single phase, 3-phase current and voltage analog signals to achieve 2% metering accuracy.
- Interfaced ARM STM32 based system hardware for NFC, Bluetooth, ZigBee, Modbus, CAN, USB, I2C, SPI, UART communication between various modules of motor protection relays, circuit breakers and temperature module.

Centre of Excellence in Complex and Nonlinear Dynamical Systems, VJTI   **May 2018 – Jul. 2018**
Research Intern   *Mumbai, India*
- Simulated and synthesized 128-bit Advanced Encryption Standard(AES) algorithm on Kintex 7 as a co-processor for data transmission of encrypted and decrypted data.
- Executed RS232, VGA, LCD and basic digital circuits on Spartan 3E FPGA using VHDL.

PROJECTS

Scheduler on FreeRTOS [Github]   *FreeRTOS, Scheduler, Arduino Mega 2560, C, C++*
- Composed code for fixed and dynamic scheduling algorithms including RM, DM, EDF, ICPP & OCPP in C language.
- Conducted extensive testing on Arduino Mega 2560 to ensure efficient and reliable execution of tasks across diverse task sets.
CPU Profiler for Linux Kernel [Github]   *OS, Linux Kernel, Kprobes, Completely Fair Scheduler, C*
- Engineered and executed a kernel module that utilized Kprobe to track the statistics of scheduled kernel and userspace tasks, storing relevant data in hash map and Red-Black Tree data structures.
- Modified the program to dump profiling results using the proc file system for easier debugging and backtracing of the kernel.
Compiler Optimizations [Github]   *LLVM, Optimization Pass, Analysis Pass, Dataflow, C++*
- Improved program efficiency through local optimizations like algebraic identities, constant folding, strength reductions in LLVM.
- Developed code for partial redundancy elimination using LCM with passes like liveness, available expressions analysis etc
AVITRA : Surveillance and Disaster Mitigation Robot[Github]   *ROS, Kinematics, Motion Planning, ESP-32, Python*
- Interfaced encoders with ESP32 for an Intel NUC based autonomously navigating omni-directional robot with mobile manipulation capability for disaster mitigation.
- Executed kinematics, motion planning, object recognition & grasp pose detection for a 6DOF manipulator using Rviz & MoveIt motion planning framework & published the data using ROS nodes in Python for localization of the end-effector.
Self-balancing & Line following Robot[Github]   *FreeRTOS, ESP32, PID, IMU, Web Server, Embedded C*
- Utilized a self-designed ESP32 microcontroller development board to interface motor driver, peripheral light sensors, MPU6050 and integrated Complementary Filter to achieve stable self-balancing & line following, employing FreeRTOS for task management.
- Consolidated PD controllers (Proportional and Derivative) for achieving error correction controlled using a HTTP web server.

CO-CURRICULAR ACTIVITIES

National ABU Robocon, 2018: Ranked 4th among 107 teams

Society of Robotics and Automation(SRA), VJTI: Core member, Conducted self-balancing robot and ROS-based 3DOF manipulator workshops for 150 students, Mentor in Eklavya- a mentorship program for undergrad juniors.