

KOLA GOVARDHAN

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CAREER OBJECTIVE

To secure a challenging position in a reputable organization to expand my learnings, knowledge, and skills. A highly motivated and passionate individual with a strong foundation in Electrical and Electronics Engineering, seeking to leverage my expertise in embedded systems and programming

WORK EXPERIENCE

- Currently undergoing technical training program – **Advanced Embedded Systems Course** at Emertxe Information Technologies (<http://www.emertxe.com>) Bangalore

TECHNICAL SKILLS

- Programming Languages:
 - Shell scripting
 - Advanced C programming
 - OOP using C++
 - QT
 - QML
- System programming:
 - Linux Kernel system calls
 - IPC mechanisms – Pipe, FIFO, Shared memory
 - Network Programming using TCP and UDP sockets
 - pThreads – Multi thread programming
- Embedded Linux:
 - U-boot, cross compiling, porting Linux kernel
 - Linux bring-up on Emertxe ARM board
- Embedded controllers:
 - Hands-on working with GPIOs, Analog I/Os, Memory usage, interfacing, character LCD
 - Peripherals usage - Timers, Counters and Interrupts
 - Communication protocols - UART, SPI, I2C, CAN etc
- Embedded platforms:
 - Distributions - Linux (Fedora / Ubuntu)
 - BeagleBone Black (ARM Cortex A8)
 - PIC (18F4520) board
- Development environment and tools:
 - Dev environment: Vim, Makefiles, MPLAB, Qt Creator
 - Compilers: GCC, XC8, ARM-Linux-gcc
 - Debuggers: GDB

COURSE WORK

- Microprocessor
- Digital Electronics
- Power Electronics
- Analog Electronics
- Electrical Machines

EDUCATION

- B.Tech (EEE), SITAMS, JNTUA, 7.78CGPA 2021-2024
- Diploma (EEE), GPTKDR, APSBTET, 69.05 % 2021
- Class – X, SBSE, 8.3 CGPA, 2018

CONTRIBUTIONS AND ACHEIVEMENTS

- Paper presentation on main project at SITAMS College during the 3rd International Conference on Advances and Innovations in Engineering and Science, May 24-25, 2024. Awarded Best Technical Paper Presentation

PROJECTS AT EMERTXE

Project Number:1

Title	Image Steganography using LSB Encoding and Decoding
Project brief	The objective was to send a secret text file encoded inside an image of bmp file format. Encoded the length of the secret text and then encoded the data into the LSB of the image bytes. The decoding process involves decoding the length and then decoding the text bit by bit. The final output is the secret text after decoding.
Technologies used	C – File operations, Pointers, Bitwise operations, Functions, Makefiles, Command line arguments
Key challenges & Learnings	<ul style="list-style-type: none">✓ Understanding of pixels and header of image file by doing literature study✓ Transforming the embedded information to the destination without changing properties of original image✓ Faced challenges while doing bitwise manipulation of data to embed as well to retrieve the data from the destination image which was solved by self-understanding

Project number:2

Title	Address book
Project brief	The aim of this project is to create a simple address book application in C that allows users to manage contact information efficiently. Users can add, delete, and display contacts, which include names, phone numbers, and email addresses. The contacts will be stored in alphabetical order for easy retrieval.
Technologies used	Structures, Array, String, Bubble Sort
Key challenges & Learnings	<ul style="list-style-type: none">✓ The task was to define an appropriate data structure for storing contact information, ensuring efficient addition, deletion, and retrieval.✓ The main issue was keeping contacts sorted in alphabetical order after each insertion, which required careful implementation of sorting algorithms.

Project number:3

Title	Car Black Box (CBB) implementation
Project brief	Black Boxes are typically used in any transportation system (ex: Airplanes) that are used for analysis post-crash and understand the root cause of accidents. Continuous monitoring and logging of events (ex: over-speeding) is critical for effective usage of black box. The goal of this project is to implement core functionalities of a care black-box in a PIC based micro-controller supported by rich peripherals. Events will be logged in EEPROM in this project. This project can be further extended to any vehicle..
Technologies used	PIC micro-controller & schematics Peripheral (ex: Potentiometer) handling by understanding data-sheets Interrupt handling
Key challenges & Learnings	<ul style="list-style-type: none"> ✓ Data Handling: Logging and storing massive amounts of real-time data (speed, location, engine metrics) efficiently. This means robust data structures and fast memory access. ✓ Event Detection: Developing algorithms that can identify and log critical events (e.g., collisions, sudden stops). This is where AI can play a big role.

Project number:4

Title	Mp3 tag reader and recorder
Project brief	MP3 tag reader is a software which will read and display MP3 (ID3) tag information from MP3 files. The software will be desktop based and not web based. This solution will read the given MP3 file, extract various tag information and display them via command line. This project can be extended to implement a tag editor, where-in users can modify mp3 tag information.
Technologies used	Advanced C, Functions and pointers, string operators , file I/O operators
Key challenges & Learnings	<ul style="list-style-type: none"> ✓ Understanding ID3 Tags: MP3 files use ID3 tags to store metadata like the title, artist, album, and more. <u>There are two main versions, ID3v1 and ID3v2, with ID3v2 being more complex and flexible</u> The main problem was to demonize the server, given the server executable. ✓ Error Handling: Robust error handling is essential to manage cases where the MP3 file might be corrupted, or the tags are not in the expected format

Project number:5

Title	Text indexing using Hash Algorithms
Project brief	Text Indexer is an application that helps to locate a particular text faster in given set of large data by keeping track of words and their locations in files. This console based application uses standard I/O for searching the words in the files. The purpose of storing an index is to optimize speed and performance in finding relevant documents for a search query. Without an index, the search engine would scan every document in the corpus, which would require considerable time and computing power. The goal of the project is to achieve optimal searching by using Hashing.
Technologies used	Hashing algorithms , File I/O , Text parsing
Key challenges & Learnings	Hash Function Design: <ul style="list-style-type: none"> ✓ Challenge: Choosing an efficient hash function to minimize collisions. ✓ Impact: Poor hash functions can lead to an uneven distribution of words, causing clusters and increased search time. ✓ Solution: Use well-known hash functions like djb2 or SDBM, and consider using a good hash library or implementing custom hash functions if needed.

Handling Collisions:

- ✓ **Challenge:** Dealing with collisions when different words hash to the same index.
- ✓ **Impact:** Collisions can degrade performance if not handled properly.
- ✓ **Solution:** Implement collision resolution strategies such as chaining (using linked lists) or open addressing (using linear or quadratic probing).

Index Updating:

- ✓ **Challenge:** Updating the index when the dataset changes (e.g., new documents added).
- ✓ **Impact:** Frequent updates can be computationally expensive.
- ✓ **Solution:** Use incremental indexing or maintain a dynamic index that can be updated efficiently

Project number:6

Title	Mini Shell implementation – System calls & Signal handling
Project brief	Mini shell is a command processor, typically run in a text window, allowing the user to type commands which cause actions. BASH can also read commands from a file, called a script. Like all Unix shells, it supports piping and variables as well. The goal of this project is to implement a mini-shell that mimics the BASH shell by using Linux Kernel System calls and IPC mechanisms like signals. It will also handle special keyboard actions (ex: Control C), can be extended for advanced functionalities (ex: Command history) as well.
Technologies used	Linux Kernel System Calls usage ,IPC – Signal handling ,String pointers & parsing
Key challenges & Learnings	Signal Handling: <ul style="list-style-type: none">✓ Challenge: Managing signals such as SIGINT (Control+C) to handle interruptions gracefully without crashing the shell.✓ Learning: Understanding the sigaction() system call, designing signal handlers, and ensuring they are safe and minimal. Command Parsing and Execution: <ul style="list-style-type: none">✓ Challenge: Accurately parsing user input to execute the correct commands, handling arguments, and managing errors.✓ Learning: Understanding how to tokenize strings and manage memory dynamically, as well as the intricacies of command-line arguments in Linux. Piping and Redirection: <ul style="list-style-type: none">✓ Challenge: Implementing piping (e.g., ls grep foo) and I/O redirection (e.g., ls > output.txt) which requires setting up file descriptors correctly.✓ Learning: Gaining knowledge of file descriptor manipulation, pipe() system call, and process control through fork() and exec() family of functions.

ACADEMIC PROJECTS

Title	Dynamic Wireless Charging for EV using Eolar Energy
Project brief	Wireless battery charging (WBC) for electric vehicles (EVs) uses inductive power transfer (IPT) to transfer power between coils buried in the road and those on the EV. This thesis focuses on dynamic wireless charging (DWC), where the EV charges while moving over a segmented track of multiple coils. The study highlights the importance of segmentation to reduce losses and electromagnetic exposure, and it finds that DD coils

are effective for maintaining power transfer efficiency despite misalignment. Various compensation topologies are analyzed for their effectiveness in track segmentation

Technologies used	ATmega328p controller, Smart Grid Integration, Optimized Coil Design.
Key challenges & Learnings	<ul style="list-style-type: none">✓ Efficient Power Transfer: Ensuring high efficiency in power transfer over large air gaps and while the vehicle is in motion requires precise alignment and high-frequency current supply.✓ Track Segmentation: Implementing effective segmentation of the track to minimize power losses and reduce electromagnetic exposure to people is crucial. This involves complex control mechanisms to activate/deactivate coils as needed.✓ Coil Design and Coupling: Designing and optimizing the DD coils for consistent power transfer despite misalignment between the track and the EV's pickup coil is challenging.✓ Compensation Topologies: Selecting and implementing the right compensation topologies to manage the impedance reflected into the track coils from the pickup is essential for maintaining efficient power transfer.✓ System Integration: Integrating the DWC system with existing EV infrastructure and ensuring compatibility with various EV models while maintaining safety and reliability is a significant challenge.

mini project

Title	Solar Powered Electric Bi-cycle
Project brief	A solar-powered electric bicycle integrates solar panels to charge its battery, enabling it to run on renewable energy. This project involves mounting solar panels on the bicycle to harness sunlight, which is then converted into electrical energy to power the bike's motor. The goal is to create a sustainable and eco-friendly mode of transportation that reduces reliance on fossil fuels and minimizes carbon emissions.
Technologies used	Photovoltaic (PV) Panels, Smart Controllers, Power electronic switches
Key challenges & Learning	<ul style="list-style-type: none">✓ Efficient Motor Control: Achieving precise control of the BLDC motor using MOSFETs requires accurate timing and synchronization to ensure smooth operation and avoid issues like cogging or torque ripple✓ Thermal Management: MOSFETs can generate significant heat during operation, especially under high loads. Effective cooling solutions are necessary to prevent overheating and ensure reliable performance✓ Battery Management: Managing the battery's charge and discharge cycles to maximize lifespan and efficiency while ensuring it can store enough energy for extended use.✓ Weight and Aerodynamics: Adding solar panels and batteries increases the bicycle's weight and can affect its aerodynamics, potentially impacting performance and handling