HASEEBULLAH SARDAR KHAN NIAZI

ELECTRICAL ENGINEER

PROJECTS PORTFOLIO

- **FYP : Non-Invasive Blood Glucose Monitor**

  C++ | Python | PCB Design(Kicad) | Electronics | Machine Learning | Circuit Debugging | Power Management

  - A non-invasive blood glucose monitor using NIR spectroscopy and ML for real-time, painless glucose prediction. The system captures NIR signals, processes them through trained models, and displays glucose levels with high accuracy.

- **Pose Estimation for Human-Computer Interaction**

  Computer Vision | Python | Pytorch | Tensorflow

  - A real-time human pose estimation system using classical and deep learning(Mediapipe) methods. It enables gesture recognition and depth mapping.

- **Buck Converter**

  Power Electronics | Circuit Simulation | Control

  - A buck converter using TL494 PWM controller to step down DC voltage efficiently through MOSFET switching and LC filtering. It regulates output via feedback control for stable, low-ripple power delivery.

- **RISC-V Implementation**

  Verilog | Quartus Prime | Digital System Design

  - Implement a 32-bit RISC-V soft-core processor using Verilog in Quartus Prime

- **Traffic Analysis**

  YOLO | Machine Learning | Semantic Segmentation

  - A real-time object detection and semantic segmentation system using the YOLO algorithm and deep learning to identify, classify, and segment multiple objects in diverse environments.

- **Microstrip Patch Antenna**

  Waves Propogation and Antenna | Ansys | PCB

  - A 5 db, 2.5 GHz, 60x60mm and 50 Bandwidth simulation and Etchining antenna on PCB.

- **Cleaning EEG data using filters**

  Digital Signal Processing | MATLAB | Transforms | Filters

  - Applying digital filters to EEG data using MATLAB to remove noise and enhancing signal quality for accurate brain activity analysis.

- **5-band Graphic Equalizer**

  Signal and Systems | MATLAB | Simulink | GUI

  - Implements a 5-band audio graphic equalizer using MATLAB and Simulink, applying Signal and Systems techniques and Butterworth filters at key audio frequencies with a user friendly GUI.

- **DTMF Coder and Decoder**

  Communication Systems | MATLAB | GUI

  - Implements a DTMF coder and decoder using MATLAB to generate and detect dual-tone signals for each keypad input.

- **Instrumented Battery Management System**

  ARDUINO | C++ | Sensors Integration | System Design | Proteus

  - This project develops an Instrumented Battery Module (IBM) using Arduino and multiple sensors to monitor voltage, current, temperature, and energy in real time.

- **Discrete-Component Audio Amplifier**
  Electronic Circuits & Designs | Multisim | Electronics | System Design | Amplifier
  - Discrete-component audio amplifier for a condenser microphone using BJTs and MOSFETs, achieving 60 dB gain and wideband frequency response. It ensures efficient signal amplification and power delivery to an 8Ω speaker under ±12 V DC supply.
- **Single Phase Transformer**
  Electric Machines | Transformer Design | | System Design | MATLAB | SIMULINK
  - This project involves the design and implementation of a single-phase transformer that steps up 12V to 24V with a 2A load and 48 VA apparent power. Multiple output taps (8V, 16V, 24V) were integrated for versatile applications.
- **Linear Variable Voltage Supply**
  Electronics Circuits | PCB | Proteus
  - This project designs and implements a regulated DC power supply capable of delivering both constant 5V and variable 1.25V–24V output from a 230V AC input.
- **Soil Moisture Monitoring System using ATmega32**
  Microcontroller | ADC | Voltage Conversion
  - This battery-powered embedded system uses an ATmega32 microcontroller to read soil moisture levels via an analog soil moisture sensor and displays the results on a 16x4 LCD in percentage format.
- **4-Bit ALU**
  Digital Logic Design | Architecture | Proteus | Circuit Debugging
  - This project involves building a basic 4-bit Arithmetic Logic Unit (ALU) on a breadboard using CMOS ICs, and simulating the design in Proteus for verification.
- **Audio Player**
  Object Oriented Programming | C++ | GUI
  - A C++-based audio player with playlist shuffle/save/load, and persistent state. Implemented using object-oriented programming and file handling with optional GUI.
- **Line Follower Robot**
  Robotics | C | Control | Sensor Integration
  - An autonomous robot built using Arduino, IR sensors, and DC motors that follows a black line path by continuously adjusting its movement based on sensor feedback.
- **Active BandPass Filer**
  Electric Network Analysis | Proteus | Electronics | Ltspice
  - A circuit designed using operational amplifiers to allow signals within a specific frequency range to pass while attenuating others.
- **Customer Satisfaction Survey Analysis**
  Probability and Statistics | Python | Numpy
  - This project simulates and analyzes customer satisfaction survey data by calculating descriptive statistics, visualizing responses through histograms.
- **Oximeter**
  Sensor Interfacing | Communication | ESP32 | Data Collection
  - This project measure the SpO2 reading of a person, The algorithm was set incomparision with market available oximeter.