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Work and Research Portfolio with Descriptions and Images

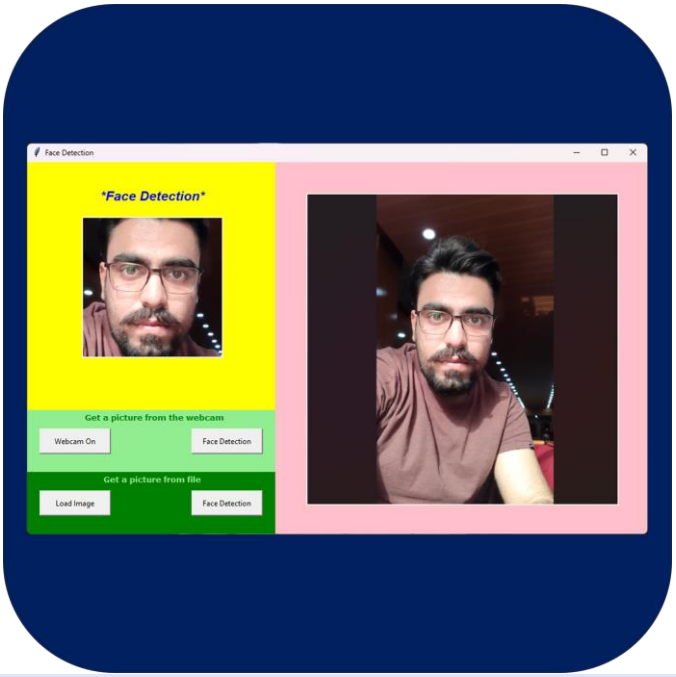
Low-Light Image Enhancement with Deep Neural Networks

Project Overview:

This project introduces an advanced technique for improving the quality of low-light images, effectively mitigating issues associated with underexposed or dimly lit photographs. By leveraging lightweight convolutional neural networks (CNNs), this approach significantly improves image quality without requiring reference images. Instead, it makes use of existing datasets from previous works. The results underscore the efficiency of the lightweight network, which contains substantially fewer parameters, making it ideal for real-time applications. This project highlights my expertise in deep learning for image enhancement and its potential for real-world scenarios.

Babol Noshirvani University of Technology

Face Detection and Recognition with OpenCV Cascade Classifier and ResNet in Python

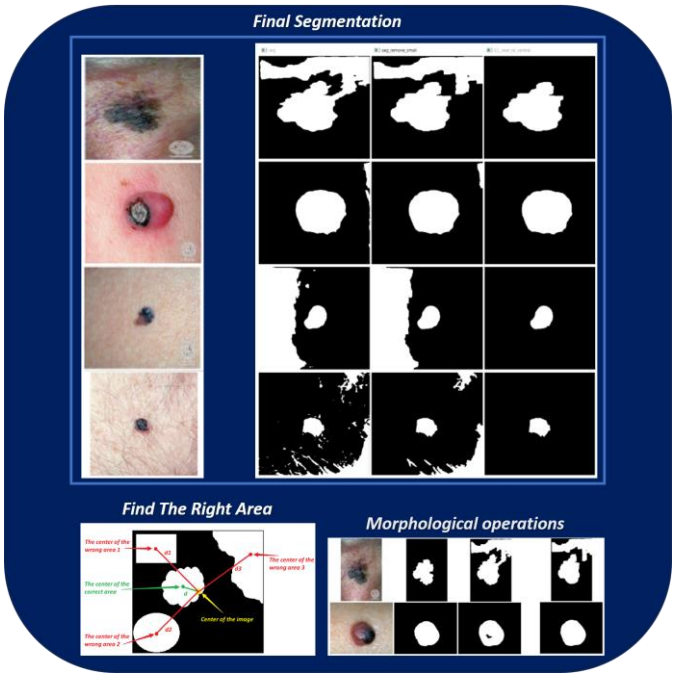


Project Overview:

This project is a multi-step endeavor that seamlessly integrates computer vision and deep learning techniques to achieve face detection and recognition. The application utilizes the Cascade Classifier from OpenCV to locate faces within images or video streams. It then crops and displays these detected faces in a designated area. Subsequently, the program employs a ResNet-based deep learning model, implemented using the Keras library, to train on a custom dataset of collected facial images. This model is trained to recognize individual faces, enabling the system to identify and classify faces in real-time.

Shahrood University of Technology

Melanoma Detection and Segmentation: Combining Image Processing and Machine Learning

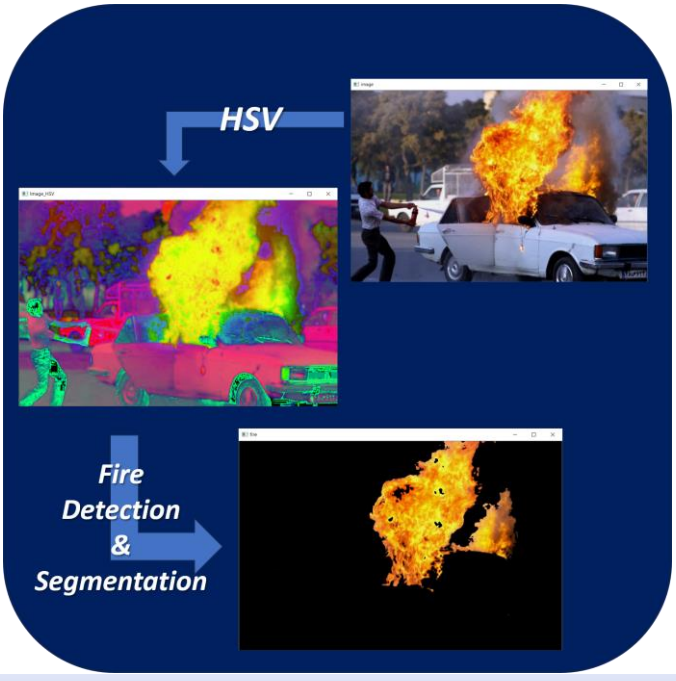


Project Overview:

This comprehensive solution employs a multi-step approach to enhance the accuracy of melanoma detection. Initially, basic image processing techniques are used in tandem with the K-means algorithm to segment the image into two categories: healthy skin and potentially cancerous regions. Subsequently, morphological operations are applied to refine the segmentation, isolating the melanoma-affected area by focusing on the central region of the image. Lastly, machine learning classifiers, such as Support Vector Machines (SVMs), are utilized to achieve precise melanoma diagnosis. This project showcases my proficiency in image analysis, segmentation, and machine learning for

Babol Noshirvani University of Technology

Fire Detection and Segmentation in Images using HSV Color Filtering

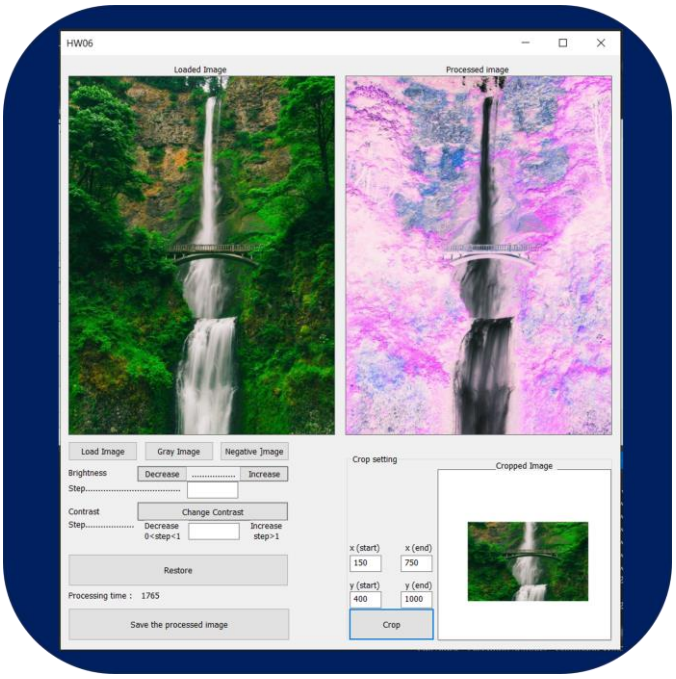


Project Overview:

This project revolves around the creation of an image processing application aimed at detecting and segmenting fire within images. The technique involves filtering images in the HSV (Hue, Saturation, Value) color space to isolate and highlight the regions containing fire. Using color thresholding, the system effectively converts the rest of the image to black, leaving only the fire regions visible. This project serves as a foundational exploration of image processing concepts, particularly color-based thresholding, and is a testament to my proficiency in this field.

Shahrood University of Technology

Fundamental Image Processing Utility with C++: Contrast, Brightness, Inversion, Cropping, and Grayscale Conversion

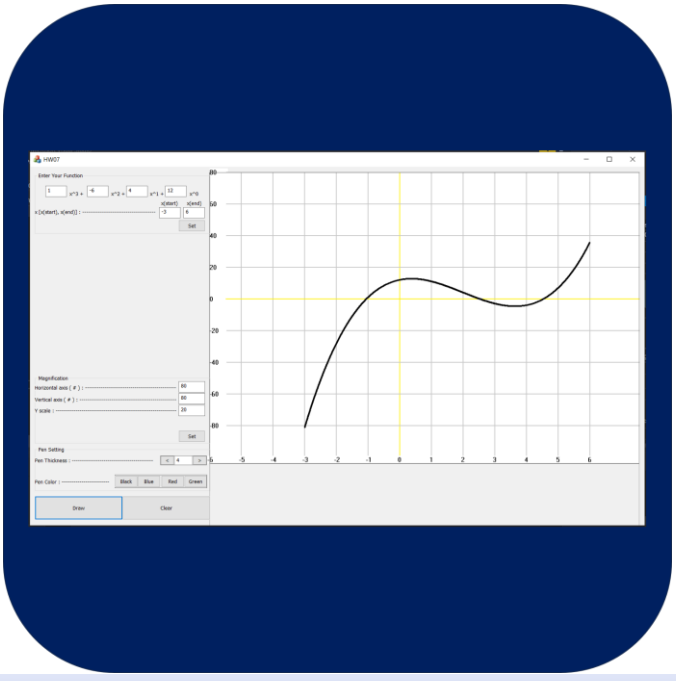


Project Overview:

This project represents the creation of a feature-rich image processing utility, meticulously engineered to facilitate a wide range of fundamental image enhancement and manipulation tasks. This utility provides an intuitive user interface for loading images and intelligently performing operations such as contrast adjustment, brightness enhancement, image inversion, region cropping, and grayscale conversion. The processed results are displayed in real-time, offering an efficient and seamless image editing experience. This project showcases my expertise in C++ programming and image processing, underscoring my ability to create practical and user-friendly software tools.

Shahrood University of Technology

Polynomial Equation Plotter in C++: Customizable Graphs with Range, Color, and Thickness Control

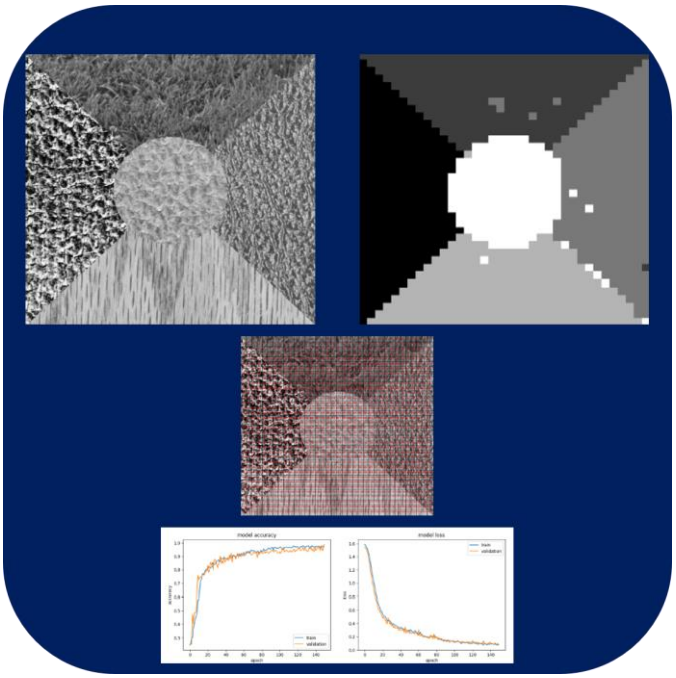


Project Overview:

This project represents the creation of a feature-rich polynomial equation plotting utility, meticulously engineered to provide a comprehensive and customizable graphing experience. This utility can accept polynomial equations as input, offering users the flexibility to define the equation's coefficients. It enables users to customize various graphing settings, including setting the display range, selecting graph colors, adjusting line thickness, and scaling the graph for better visualization. This project showcases my expertise in C++ programming, mathematical modeling, and data visualization, emphasizing my ability to create adaptable and user-friendly software tools.

Shahrood University of Technology

Texture Segmentation and Classification through Convolutional Neural Networks

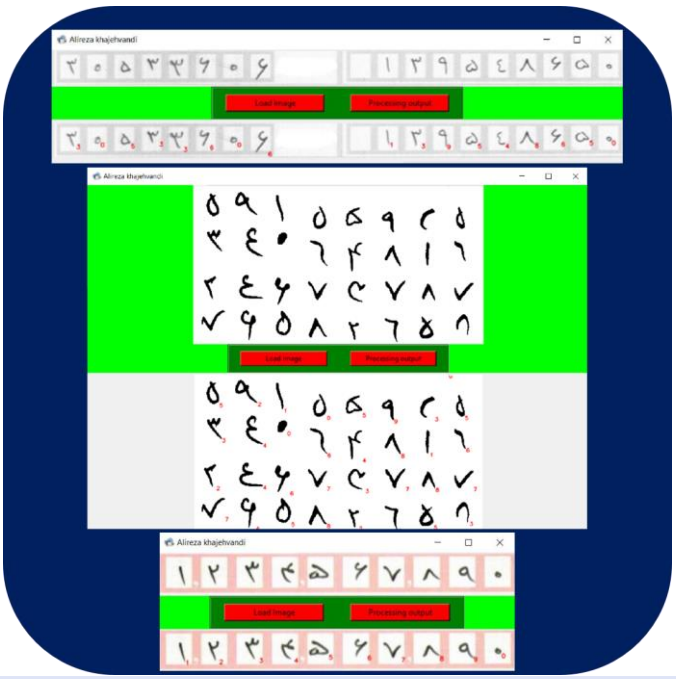


Project Overview:

In this project, I conducted comprehensive texture segmentation and classification within a multispectral image. To achieve this, I subdivided the image into smaller patches, each encapsulating a unique texture, and employed a Convolutional Neural Network (CNN) for training and testing. The CNN successfully categorized these patches into five distinct classes, corresponding to specific textures present in the image. The result was a color-coded representation of the segmented textures, demonstrating my expertise in multispectral image analysis and advanced deep learning techniques for accurate classification and texture segmentation, with applications in computer vision and image analysis.

Babol Noshirvani University of Technology

Persian Handwritten Digit Recognition Using MNIST-Inspired Neural Network

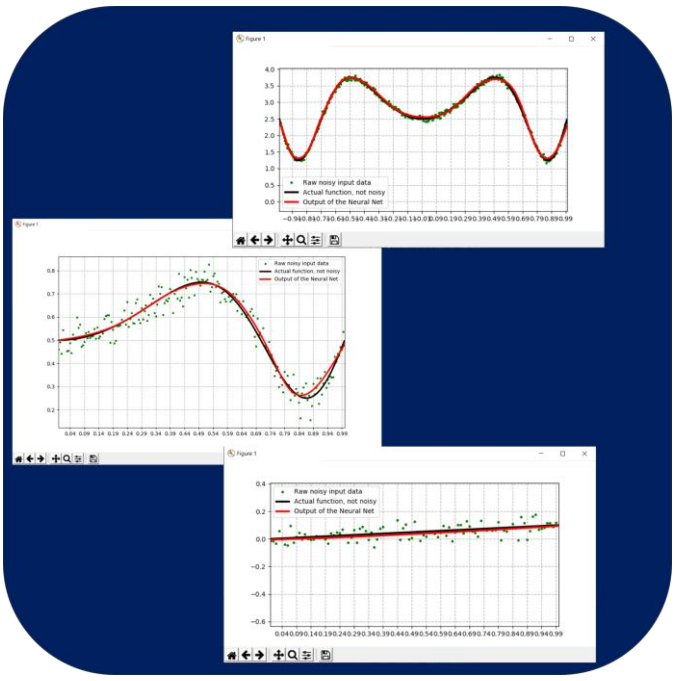


Project Overview:

I developed a system for recognizing handwritten Persian digits by training a neural network inspired by the architecture commonly used for the MNIST dataset. I utilized this network to learn from a custom dataset of handwritten Persian digits, enabling it to accurately recognize and classify Persian characters. After the training phase, I created a user interface with Tkinter, allowing users to input images containing handwritten Persian digits. The system then processed these images, detected and recognized the handwritten digits, and displayed the identified numbers alongside the input image. This project demonstrates my proficiency in adapting neural networks for practical applications in Persian handwritten digit recognition.

Shahrood University of Technology

Linear Regression using Keras for Function Approximation

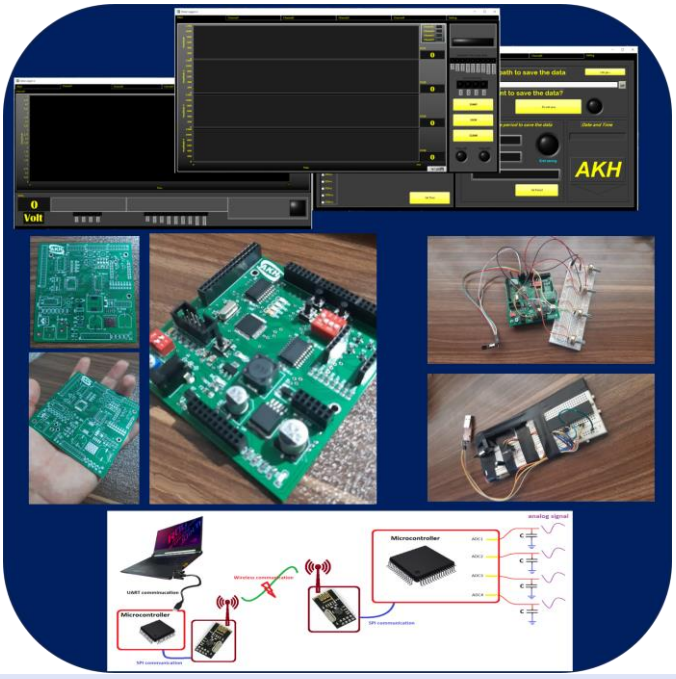


Project Overview:

In this project, I aimed to create a machine learning model for function approximation using linear regression with Keras, a popular deep learning library in Python. The primary motivation behind this endeavor was to showcase my ability to work with neural networks and apply them to real-world problems.

Babol Noshirvani University of Technology

Multi-Channel Data Logger with Wireless Transmission and PC Visualization and Control



Project Overview:

This project represents the development of a comprehensive multi-channel data logging system with a wireless data transmission component and a user-friendly computer interface. The system comprises two boards: the first board accommodates analog data acquisition channels and sensors, processes the data, and wirelessly transmits it to the second board via an NRF module. The second board is connected to a computer through a serial protocol, where a custom-written software application, LabVIEW, receives and displays the transmitted data. The software offers versatile features, including real-time data visualization, adjustable data rates, and the capability to save data into user-defined file formats (e.g., Excel). This project exemplifies my expertise in both software development and hardware implementation, highlighting seamless communication between the two.

Shahrood University of Technology

LabVIEW-Based Multi-Functional Software for Split Air Conditioner Testing

Project Overview:

I have designed and developed a LabVIEW software system tailored for split air conditioner testing. This comprehensive solution enables seamless data acquisition, real-time visualization, and advanced analysis. It communicates effortlessly with our custom ARM STM32 processor-based board through serial and RS232 protocols, allowing for the collection of various sensor data, including temperature, pressure, humidity, and multiple electrical parameters such as voltage, current, and power. The software empowers users with the flexibility to define test parameters, analyze data, and interface with PLCs via Modbus for control data integration. This all-in-one platform simplifies and enhances the split air conditioner testing process while ensuring thorough data management and analysis

AGFAco

LabVIEW Software for Refrigerator Testing and Control

Project Overview:

I've developed a LabVIEW software specifically designed for comprehensive refrigerator testing. This versatile software establishes communication with a custom ARM STM32-based board via serial and RS232 protocols, enabling seamless data acquisition, including temperature, humidity, and electrical parameter measurements. It offers real-time data visualization, data storage, and user-defined test settings. The software also provides data analysis capabilities, empowering users to fine-tune their testing parameters, control the testing environment, and create detailed reports

AGFAco

LabVIEW Software for Washing Machine Testing

Project Overview:

I've exclusively designed a LabVIEW software for precise washing machine testing. This software seamlessly communicates with the testing hardware through serial and RS232 protocols, expertly collecting data from various sensors, including temperature, electrical parameters, water pressure, and flow sensors. Tailored with a specialized user interface for washing machine testing, it simplifies parameter configuration, testing environment control, detailed data analysis, and seamless data storage. Users can create precise test commands, dynamically oversee the testing environment, and generate comprehensive reports, making this versatile software an invaluable tool for executing precise and customized washing machine testing procedures.

AGFAco

LabVIEW Software for Vacuum Cleaner Testing

Project Overview:

I've meticulously developed a LabVIEW software tailored exclusively for testing vacuum cleaners and precisely measuring their suction power, which includes airflow and electrical parameters. This software seamlessly communicates with a custom-designed board via serial and RS232 protocols, enabling it to collect parameters such as temperature, airflow, airflow rate, and electrical data. Through a command sent to an electrical valve located within the vacuum cleaner's air path, the software effectively controls airflow to assess the vacuum cleaner's suction power. Data collection occurs at various points, determined by airflow rate measurements, and various calculated parameters are derived as per the testing standards. These calculations include the measurement of the vacuum cleaner's power consumption, suction power, input power, and output power. The software provides comprehensive capabilities for real-time data display, storage, automatic control, and data acquisition during the testing process, ensuring precision and efficiency in conducting vacuum cleaner testing procedures.

AGFAco

Multi-Purpose Testing, Measurement, and Datalogging Board

Project Overview:

We have designed a versatile board specifically for testing and measuring home appliances, such as refrigerators, washing machines, vacuum cleaners, and similar products. This board incorporates a variety of features to cater to the diverse needs of users, including multiple digital inputs, 4-20mA/0-10V analog inputs, analog voltage inputs, and multiple digital outputs through relays and solid-state relays (SSRs). Additionally, it provides analog output capabilities. With these features, the board is capable of interfacing with a wide range of sensors and controlling various equipment. The microcontroller used in this board is the ARM STM32F107, and it can connect to a computer via serial and RS232 communication to link up with relevant software applications for data sampling, monitoring, and control in various projects. Furthermore, this board is equipped to measure electrical parameters such as voltage, current, and power.

AGFAco

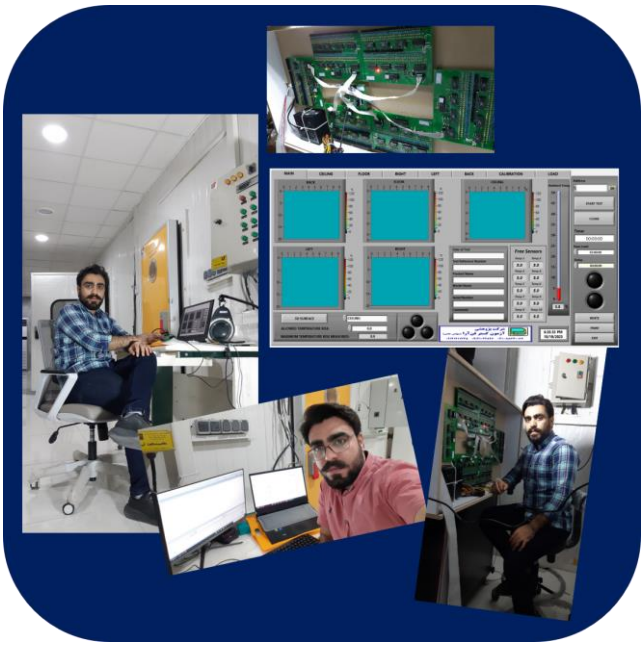
Comprehensive AVR Microcontroller Development Board for Educational and Experimental Applications

Project Overview:

I've designed a versatile educational and experimental development board based on the AVR microcontroller. This board serves as a comprehensive platform for configuring all the microcontroller's peripherals. It facilitates the connection of various display units, including seven-segment displays and character LCDs. It provides access to essential pins, such as SPI, I2C, GPIO, and more. The presence of LEDs and micro switches simplifies testing procedures, making it ideal for educational and laboratory work. This board offers an array of opportunities for hands-on learning and can be a valuable asset for a variety of projects

AGFAco

Integrated Household Appliance Thermal Performance Testing Solution

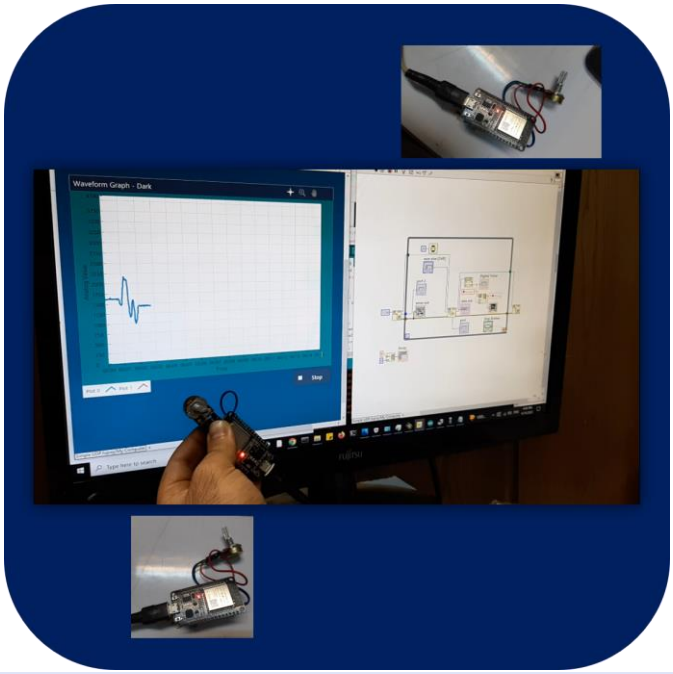


Project Overview:

Our custom-designed hardware and software system is tailored for precise thermal performance testing of household appliances. A dedicated testing structure, typically featuring 5 faces, is equipped with temperature sensors, ensuring comprehensive coverage of each face. These sensors are strategically positioned with a 10 cm spacing to provide accurate readings for each surface. As the appliance operates within this controlled environment, the software continuously monitors the matrix of temperature sensors, checking against user-defined temperature thresholds. If any sensor exceeds the set limits, the product is deemed defective; otherwise, the test is successful. This versatile solution facilitates efficient testing and report generation, ensuring quality control in household appliance production.

AGFAco

ESP32-Based Potentiometer Measurement and Data Transmission Project

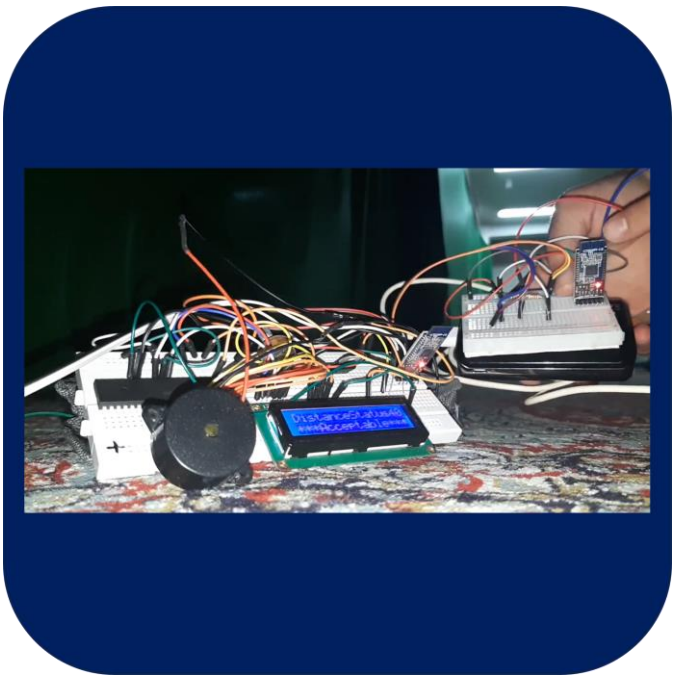


Project Overview:

I've developed a straightforward laboratory experiment using an ESP32 module to measure potentiometer values. This project involves measuring a potentiometer's value and transmitting it to a LabVIEW software over a network using UDP. Subsequently, the LabVIEW software displays and graphs the digital potentiometer value. The primary objective of this project is to gain proficiency with the ESP32 module, network communication, and data transmission. This knowledge will prove invaluable for future projects utilizing similar technologies

AGFAco

Distance Estimation Between Boards Using AVR Microcontroller and Bluetooth Modules

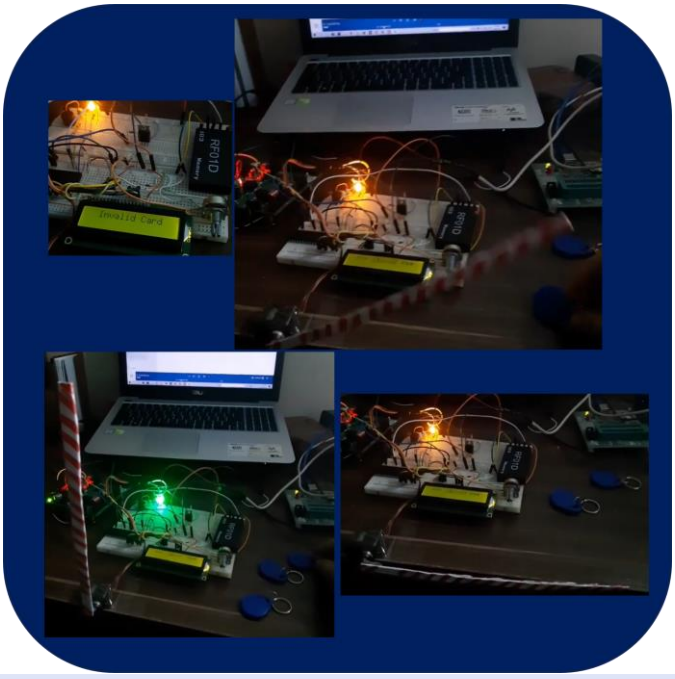


Project Overview:

This project demonstrates the development of a sophisticated distance estimation system, comprising two distinct boards with specialized functions. The master board is equipped with an AVR microcontroller, an HM-10 Bluetooth module, a buzzer, and a character display. The slave board consists of a Bluetooth module and a battery for power supply. When the slave board moves away from the master board, the buzzer on the master board activates, and the character display indicates the distance between them. This distance estimation is achieved through signal strength estimation transmitted via Bluetooth modules. A weaker signal suggests that the boards have moved apart, while a stronger signal indicates their proximity.

Freelance

RFID-Based Door Control System with AVR Microcontroller



Project Overview:

This project showcases my expertise in embedded systems design and access control technology. This system enables secure access control, allowing authorized users to open and close the door using RFID tags. The door is simulated using a servo motor, and when an authorized RFID tag is presented, the system issues the command to open the door. In case of an unauthorized tag, an "invalid card" message is displayed on the screen.

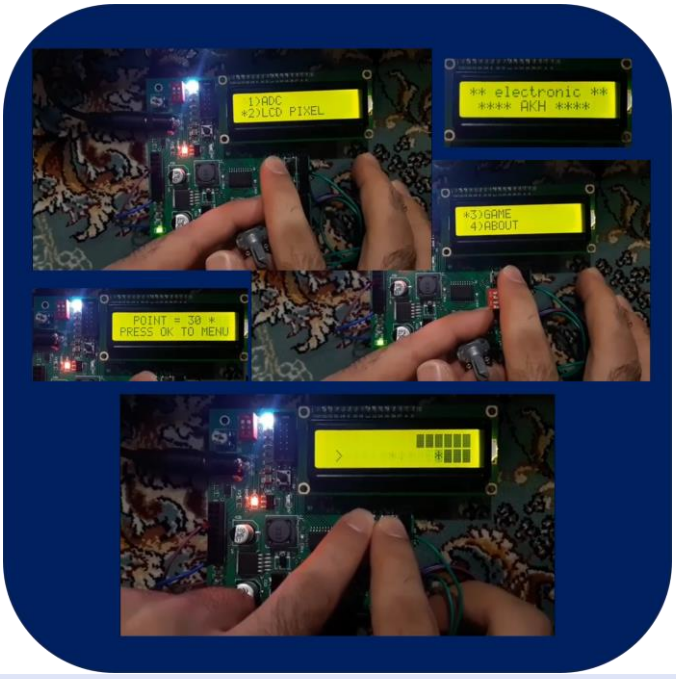
Freelance

Implementation of a Temperature Data Logger with AVR Microcontroller for Monitoring and Visualization on a Computer Using LabVIEW Software

Project Overview:
This project demonstrates my ability to design and implement a comprehensive temperature data logging system. This system not only displays temperature readings but also enables data storage and real-time monitoring on a computer through LabVIEW software. In this project, the DS18B20 sensor has been employed for temperature measurement.

Freelance

AVR Microcontroller-Based Interactive Menu System with Gaming Capability



Project Overview:
This project serves as a testament to my proficiency in microcontroller programming and my ability to create a dynamic menu system. One of the menus within this system includes a captivating game that users can select and play.

Freelance