
Infinit
SOLUTIONS
Embedded portfolio

#DOT:DOT

The #dot:dot project focuses on creating an ad hoc mesh network between nodes. The primary goal is to enable seamless communication between the nodes in the network. To achieve this, the project utilizes the ESPNow framework, which is a communication protocol developed by Espressif Systems specifically for low-power IoT devices.

The ESP32 microcontroller plays a central role in the project, serving as the main hardware component for the nodes in the mesh network. The ESP32 microcontroller provides the necessary processing power, connectivity options, and compatibility with the ESPNow framework.

One of the key features of the project is the establishment of a mesh network. A mesh network is a network topology where each node can communicate directly with other nodes in the network, forming a decentralized and self-routing communication infrastructure. In the #dot:dot project, the ESPNow framework handles the routing information automatically, allowing for efficient node-to-node communication within the mesh network. This means that each node can send and receive data to and from other nodes in the network without the need for a centralized routing mechanism.

By utilizing the ESPNow framework and the ESP32 microcontroller, the #dot:dot project enables the creation of a robust and flexible ad hoc mesh network. This network architecture facilitates reliable and scalable communication between the nodes, making it suitable for various IoT applications where seamless connectivity and data exchange are crucial.

TECHNOLOGIES AND PROTOCOLS:
ESP32, ESPNOW

WI-FI REPEATER

The #dot:dot project is a software solution that enables the creation of a WiFi ad-hoc mesh network between pocket-size electronic boards called #dot's. The main characteristics and features of the #dot:dot project are as follows:

1. Customized Mesh Network: The project implements a customized mesh network architecture. The #dots, without any human intervention, autonomously discover each other and establish local routing tables. This allows for the formation of a self-configuring and self-healing mesh network.

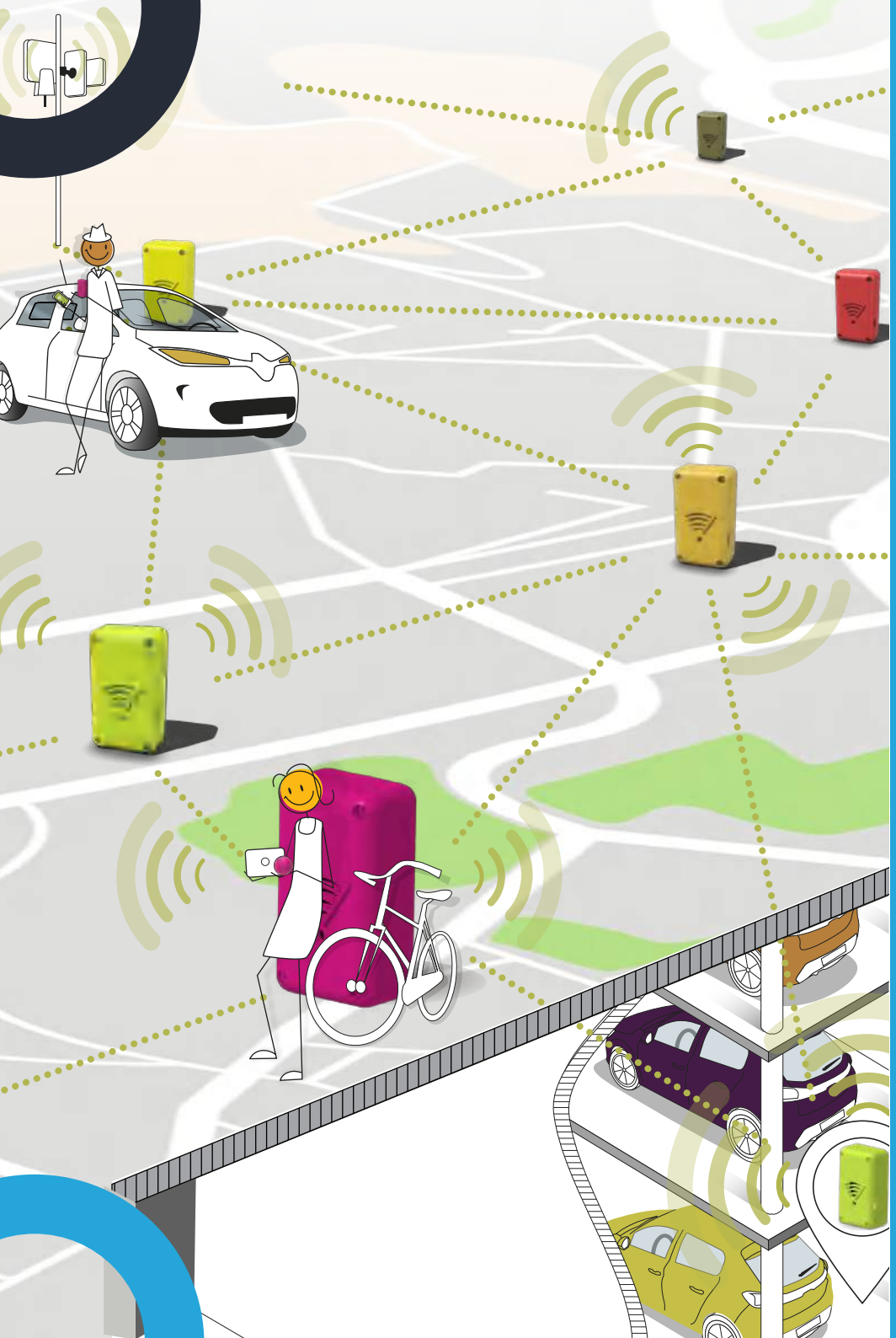
2. Customized Routing Operation: The project utilizes decentralized routing ledger tables to handle routing operations within the mesh network. These tables contain routing information and enable efficient data transfer between nodes. The decentralized nature ensures scalability and resilience of the routing infrastructure.

3. Node-to-Node Chat Communications: The project includes a dot:dot mobile app that facilitates node-to-node chat communications. The mobile app serves as a user interface for interacting with the #dots in the mesh network. Users can communicate with each other through the app, enabling chat-based communication between the connected #dot devices.

4. Data Transfer Using HTTP Protocols: Data transfer from the #dots to the mobile application is accomplished using HTTP protocols. This allows for reliable and standardized communication between the mesh network and the mobile app. HTTP protocols enable seamless transmission of data and ensure compatibility with a wide range of devices and platforms.

5. The #dot:dot project creates an ambient off-grid WiFi network through the spontaneous connection and collaboration of #dot devices. By leveraging a customized mesh network, decentralized routing tables, a dedicated mobile app, and HTTP protocols for data transfer, the project provides a robust solution for establishing private and decentralized communication among the #dot devices.

6. the #dot:dot project also includes a self-healing mechanism for the root-child relationship within the mesh network. This feature ensures that the network remains resilient even in the event of the root node going offline. The nodes in the mesh network have the ability to automatically heal the root-child relationship. When the root node becomes unavailable or goes offline, the slave node with the highest priority or a predetermined criteria automatically assumes the role of the root node. This self-healing code ensures the continuous operation and stability of the network by dynamically adapting to changes in the network topology.



VFOTA

VFOTA, which stands for Viral Firmware Over-The-Air, refers to the capability of remotely updating the firmware of devices wirelessly, without the need for physical access or manual intervention. FOTA allows for the seamless and efficient distribution of firmware updates to devices within a network, including those operating in a dot:dot mesh network.

In the context of the #dot:dot project, FOTA can be used to update the firmware of the ESP32 microcontrollers in the mesh network. With FOTA integration, the project enables remote firmware updates over the air, eliminating the need for manual intervention or physical connection to each individual node.

The FOTA functionality ensures that the ESP32 microcontrollers in the mesh network can receive the latest firmware updates, bug fixes, security enhancements, or feature additions without requiring manual intervention. These updates can be distributed and deployed to all the nodes within the mesh network simultaneously or in a controlled manner, as per the requirements of the project.

By combining FOTA with the dot:dot mesh network, the #dot:dot project benefits from the ability to remotely manage and update the firmware of the ESP 32 microcontrollers. This capability enhances the scalability, flexibility, and maintainability of the mesh network, allowing for seamless updates and ensuring that all nodes operate with the most up-to-date firmware versions.

The web platform served as a user interface for monitoring and managing the dot:dot mesh network. It allowed users to access and view detailed information about each node within the network, such as their status, connectivity, and performance metrics. Additionally, the web platform facilitated the visualization of file transfer details, leveraging the VFOTA node log files.

TECHNOLOGIES AND PROTOCLOS:
ESP32, ESPNOW, WEB

CHEF COMPANION

The idea of assisting chefs with the display of recipe on an LCD screen with display controls and warning alarms for temperature.

Technologies used:

- ESP-IDF
- 40x4 LCD integration
- Contactless temperature sensor integration
- I2C integration
- SPI integration
- Sensor calibration
- Buzzer integration
- Button integration
- JSON formatting

HOME AUTOMATION

Home Assistant serves as a hub or brain for your smart home. It can be installed on a Raspberry Pi, a server, or even a desktop computer. Once set up, Home Assistant connects to different smart devices and systems using various protoHome automation refers to the use of technology to control and automate various devices and systems within a home. Home Assistant (also known as HASS) is an open-source home automation platform that enables users to integrate and control a wide range of smart devices and services in a centralized manner.

Home Assistant serves as a hub or a brain for your smart home. It can be installed on a Raspberry Pi, a server, or even a desktop computer. Once set up, Home Assistant connects to different smart devices and systems using various protocols such as Wi-Fi, Zigbee, Z-Wave

HMI in home automation is the interface enabling users to control and monitor devices, customize settings, create automation scenarios, and integrate systems for a seamless and personalized home automation experience.

Technologies used:

- Andorid
- Raspberry
- HASS – iOT library
- HMI
- polymer.js

360 - DEGREE VIDEO

The project involved creating 360-degree videos by utilizing five real-time cameras and an Intel Compute Box running on Linux. The development was done using the C programming language. FFMPEG and various video streaming protocols were employed to accomplish the objectives of the project.

In the project, alongside FFMPEG, various video streaming protocols were utilized to enhance the capabilities of the 360-degree video system. Video streaming protocols are responsible for transmitting video data over networks efficiently and reliably.

Technologies used:

- Intel Compute Box with Inbuilt MicroProcessor.
- Ffmpeg, RTMP, MPEG-DASH
- Web

CNC GCODE UPDATER

The CNC Gcode Updater project focuses on serving a Gcode file to a CNC machine and updating its Gcodes. Gcode is a programming language used to control CNC machines and guide their movements. In this project, the following components and technologies were utilized:

- RS232 PORT: RS232 is a standard interface used for serial communication between devices. In this project, the RS232 port was employed to establish a connection between the CNC machine and the desktop computer. This allowed for the transmission of Gcode data between the two devices.

- File Transfer Protocols: File transfer protocols were utilized to facilitate the transfer of Gcode files from the desktop computer to the CNC machine. These protocols ensure reliable and efficient transmission of the Gcode data. Common file transfer protocols that might have been used include FTP (File Transfer Protocol), SFTP (SSH File Transfer Protocol), or a custom file transfer mechanism designed specifically for this project.

The CNC Gcode Updater project aimed to streamline the process of updating Gcode files on a CNC machine. By utilizing the RS232 port and implementing file transfer protocols, the project enabled the seamless transfer and updating of Gcode files from a desktop computer to the CNC machine. This streamlined workflow ensures that the CNC machine always has the latest Gcode instructions, allowing for precise and accurate machining operations.

Technologies used:

- Desktop
- RS232 PORT
- File Transfer protocols

IOT GSM CONTROLLER

The IoT GSM controller project focused on controlling a motor pump using a GSM controller unit and performing specific functions. The project involved the use of a GSM SIM card with an onboard module to enable communication and control capabilities. This project finds significant application in the agriculture sector. By utilizing the IoT GSM controller, farmers or agricultural professionals can remotely operate and manage the motor pump, allowing for efficient irrigation and water management in agricultural fields. GSM connectivity enables control commands to be sent via SMS or other communication methods, providing a convenient and accessible solution for remote control and monitoring in agricultural operations.

Technologies used:

- Mobile
- GSM Technologies

BLE DATA COLLECTION

The IAD data collection project focuses on gathering health statistics data from health monitoring devices such as smartwatches and health monitoring units. The project utilizes the Bluetooth Low Energy (BLE) protocol to collect and transfer data from these devices to a mobile app. BLE is a power-efficient wireless communication technology designed for transmitting small amounts of data over short distances.

In this project, the health monitor devices establish a connection with the mobile app via BLE. The data collected from these devices, which includes metrics such as heart rate, steps taken, sleep patterns, and other health-related information, is transferred to the mobile app for further processing and analysis.

The mobile application plays a crucial role in this project as it visualizes the collected data in a format that is easily understandable and accessible to end users. The app may present the health statistics through interactive charts, graphs, or personalized dashboards, allowing users to track their health progress, set goals, and monitor their overall well-being.

The IAD data collection project ultimately aims to provide users with a convenient and insightful way to monitor their health using wearable devices. By leveraging BLE and a user-friendly mobile app, the project enables individuals to gather, visualize, and interpret their health data, empowering them to make informed decisions about their lifestyle, fitness, and overall health management.

Technologies used:

- Mobile
- BLE- Bluetooth Low energy

SURGICAL CONTROL PANEL

An integrated board indicating air pressure of each gas nozzles, temperature, humidity, AHU & HEPA control, light control of ICU and also providing warning for any threshold breaking situation.

Technologies used:

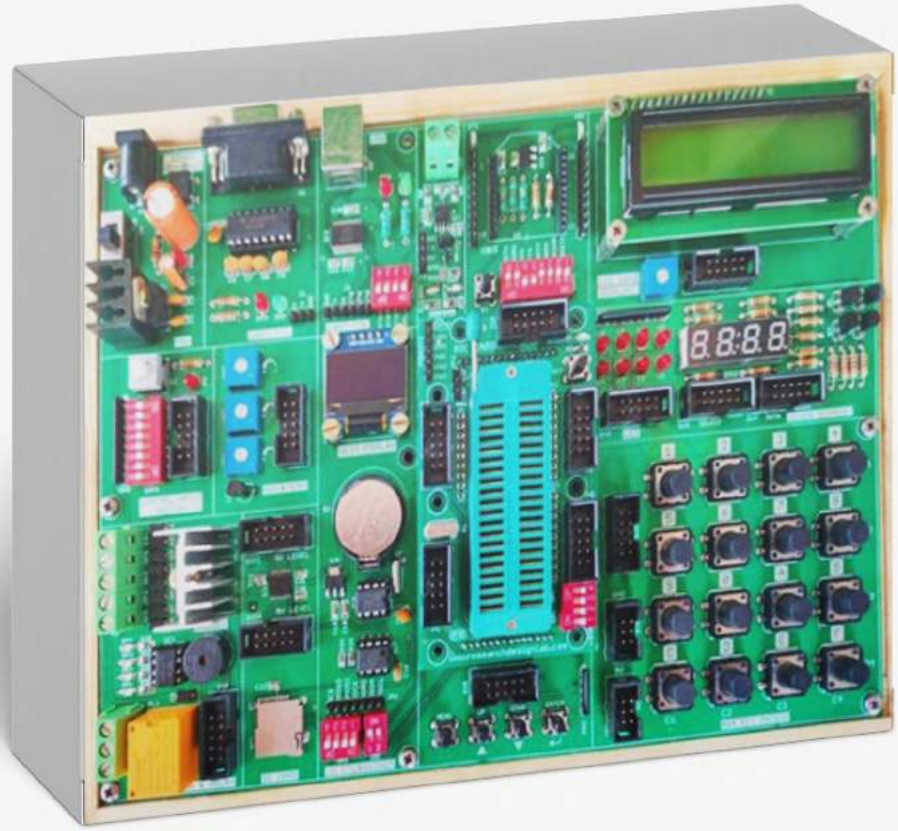
- Pressure sensor integration
- I2C integration
- UART integration
- Switching mechanisms
- GPIO integration
- PIC 16F & PIC 18F
- Temperature and humidity sensor integration
- Buzzer integration
- Relay card design
- PCB design
- PCB troubleshooting.

PIC DEVELOPMENT KIT

Improvising PIC & 8051 development KIT and peripheral integration by reverse engineering.

Technologies used:

- LED & push button integration
- 7 segment LCD display integration
- UART, I2C, SPI integration
- ADC integration
- Buzzer integration
- Timer design
- DHT sensor integration
- Ultrasonic integration
- Relay card integration
- Stepper motor integration
- RTC integration



RPM MEASURING UNIT

A RPM measuring unit with display on an LCD screen

Technologies used:

- Proximity sensor integration
- LCD integration
- PIC 16F
- Interrupt handling
- Timer configuration
- UART integration(RS232 protocol)

DIGITAL ENERGY METER

An Energy measuring unit with parameter display (Voltage, Current, Power, Power factor, Energy) on an LCD screen.

Technologies used:

- CT-PT(Current transformer Potential transformer) integration
- ADC integration
- LCD integration
- UART integration(RS232 protocol)
- MQTT integration
- Relay integration
- GSM integration

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