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Project Proposal: Wi-Fi Deauther Using NodeMCU ESP8266 for Educational Purposes

Wireless communication is a cornerstone of modern technology, relying on digital signals and protocols to connect devices. For educational purposes, understanding how these systems operate—and how they can be disrupted—offers valuable insights into digital logic and network security.

This project proposes the development of a Wi-Fi deauther using the **NodeMCU ESP8266** microcontroller. Unlike traditional jammers that require complex hardware, this system uses deauthentication packets to temporarily disconnect devices from a Wi-Fi network, making it an accessible and safe way to explore digital communication principles in a controlled environment.

The project aligns with the objectives of **Digital Logic Design** by demonstrating the application of digital signals, programming logic, and hardware-software interfacing using a low-cost, widely available platform.

Objectives

The primary objectives of this project are:

1. To design and implement a functional Wi-Fi deauther using the NodeMCU ESP8266.
2. To demonstrate the principles of digital logic and wireless communication through the manipulation of Wi-Fi packets.
3. To provide an educational tool for understanding network vulnerabilities and digital signal processing.
4. To create a simple, portable, and cost-effective system without requiring advanced hardware like a Raspberry Pi.

Methodology

Hardware Requirements

- **NodeMCU ESP8266**: A low-cost microcontroller with integrated Wi-Fi.
- **Micro-USB Cable**: For programming and power supply.
- **Computer**: For coding and uploading firmware.
- **Optional**: USB power bank for portability.

Software Requirements

- **Arduino IDE**: Free software for programming the NodeMCU.
- **ESP8266 Deauther Code**: Open-source firmware by Spacehuhn (available on GitHub).
- **ESP8266 Board Support**: Library for Arduino IDE.

Implementation Steps

1. **Setup Development Environment**:
   a. Install Arduino IDE and add ESP8266 board support.
   b. Download the ESP8266 Deauther code from GitHub.
2. **Hardware Configuration**:
   a. Connect the NodeMCU ESP8266 to the computer via USB.
   b. Verify functionality by powering it on.
3. **Programming**:
   a. Load the Deauther code into Arduino IDE.
   b. Configure board settings (e.g., NodeMCU 1.0, 4MB flash).
   c. Upload the code to the NodeMCU.
4. **Testing**:
   a. Connect to the NodeMCU's Wi-Fi network ("pwned").
   b. Access the web interface (192.168.4.1) to scan and deauth nearby networks.
5. **Documentation**:
   a. Record observations, including how deauthentication affects devices.
   b. Prepare a report linking the project to DLD concepts.

Relevance to Digital Logic Design

This project integrates several DLD concepts:

- **Digital Signals**: The ESP8266 generates deauthentication frames as binary data transmitted over Wi-Fi.
- **Logic Control**: The firmware uses conditional statements and loops to manage packet transmission.
- **Hardware Interfacing**: The NodeMCU's GPIO pins and memory handle digital operations.
- **System Design**: Combines hardware and software to achieve a specific outcome, reflecting DLD principles of system integration.

Expected Outcomes

- A working Wi-Fi deauther that can scan nearby networks and disconnect devices via deauthentication.
- A demonstration of how digital logic underpins wireless communication and security.
- A portable prototype powered by a USB source, suitable for classroom presentation.
- A detailed report explaining the project's design, implementation, and educational value.

Ethical Considerations

- The project will be tested only on personal or authorized networks in a controlled environment.
- It will not be used to harm or disrupt public networks, ensuring compliance with legal and university policies.
- The focus is educational, aimed at understanding Wi-Fi protocols rather than malicious intent.

Conclusion

This project proposes a simple, cost-effective Wi-Fi deauther using the NodeMCU ESP8266, designed for educational purposes within the scope of Digital Logic Design. By implementing and demonstrating this system, I aim to deepen my understanding of digital signals, logic programming, and wireless communication while providing a tangible example for academic evaluation. I seek approval to proceed with this project and welcome feedback to refine its scope.