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Touch and Tap Cooking System

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Background: Traditional cooking systems face challenges such as inaccurate temperature control and safety risks like burns and gas leaks, posing hazards to users. This project aims to develop a smart cooking system that enhances safety and efficiency by integrating modern technologies like sensors and remote-control capabilities.

Study Purpose/Objectives:

1. Develop a cooking system supporting both manual and remote operation modes.
2. Implement real-time monitoring of temperature and pan presence.
3. Enhance safety via motion detection, auto shutoff, and alert mechanisms.
4. Provide users with a mobile application for remote interaction and control.

Methods: The system is centered on the ESP32 microcontroller, which manages various sensors and modules

Thermocouple: Measures cooking temperature with high accuracy.

Limit Switches: Detect the presence of a pan.

Ultrasonic Sensor and ESP32-CAM: Detect nearby motion and capture images.

OLED Display: Shows current stove status, temperature, and alerts.



The mobile app developed in Flutter connects via Firebase for real-time user interaction. The software handles temperature regulation, cooking timers, motion alerts, and user commands.

Results: The thermocouple measured temperature accurately within $\pm 2^{\circ}\text{C}$. The system automatically shut down when the pan was removed or motion was detected near the stove. The mobile app displayed real-time data and alerts reliably. Users could successfully control the stove remotely through the app. The OLED display effectively provided instant feedback to users.

Conclusions: The Touch and Tap Cooking System successfully combines sensing, control, and communication technologies to deliver a safer and smarter cooking experience. With features such as remote operation, real-time monitoring, and automatic safety responses, the system represents a significant leap toward intelligent kitchen environments and provides a reliable platform for future enhancements.