Smart cooker whistle counter with auto shut-off

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Product Problem:

Traditional pressure cookers demand constant supervision, increasing the risk of overcooking or accidents. Busy individuals and those with disabilities often find it challenging to monitor whistles manually. A Smart Cooker Whistle Counter with Auto Shut-Off addresses this by automating whistle detection and stove control. This enhances cooking precision, safety, and convenience while promoting energy efficiency.This solution benefits busy users and promotes energy efficiency through automation.

Solutions:

The Smart Cooker Whistle Counter with Auto Shut-Off is a compact device designed to accurately count cooker whistles using advanced audio and vibration sensors. Once the preset number of whistles is detected, it automatically shuts off the stove using a relay, ensuring perfect cooking every time—without constant monitoring.

Product domain study

SUMMARY

A Smart Cooker Whistle Counter with Auto Shut-Off belongs to the smart kitchen appliances category, combining IoT, sensor technology, and automation to optimize cooking efficiency. The device is designed to address problems associated with manual whistle counting, overcooking, and safety issues through automated shut-off. The major technological elements involve sound and vibration sensors, microcontrollers (Arduino/Raspberry Pi), AI-based noise filtering, and smart relays for heat control. Market adoption relies on ease of use, compatibility with different cookers and stoves, affordability, and consumer trust. Future developments may include mobile app connectivity, voice assistant integration, and real-time monitoring for improved user experience. The product meets the increasing demand for smart home automation, meeting users looking for convenience and energy savings when cooking, and with the need for automated kitchen solutions increasing, it has immense potential in the household and business markets.

Article Link:

https://www.linkedin.com/posts/lokesh-telapolu-06b045256_smartcooking-kitchenautomation-iotdevices-activity-7328483549789990912-b9zW?utm_source=share&utm_medium=member_desktop&rcm=ACoAAD8ChhMBd9Ya1U2zwFULxu0KE0XKE7D15RY

Problem Statement

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Project Scope

My Roles:

1. **Product Research & Development** – Identify market needs and develop a functional prototype.
2. **Technology Integration** – Implement sensors, microcontrollers, and automation features.
3. **Testing & Optimization** – Ensure accuracy, reliability, and compatibility.
4. **User Experience Design** – Develop an intuitive interface and control system.
5. **Safety & Compliance** – Ensure adherence to safety standards and risk minimization.
6. **Market Strategy** – Plan pricing, positioning, and consumer adoption strategies.
7. **Future Enhancements** – Explore new features like real-time monitoring and voice integration.

Responsibilities:

1. **Developing and Prototyping** – Design, build, and refine the smart cooker whistle counter system.
2. **Integrating Sensor Technology** – Implement sound and vibration sensors for accurate whistle detection.
3. **Ensuring System Accuracy** – Optimize algorithms to prevent false detections and improve reliability.
4. **Testing and Validation** – Conduct real-world testing to ensure proper functionality across different cookers and stoves.
5. **User Interface Design** – Create an intuitive control system for ease of use.
6. **Safety and Compliance** – Ensure the product meets safety regulations and minimizes risks.
7. **Market Research and Adoption** – Analyze consumer needs and improve the product for better adoption.
8. **Continuous Improvement** – Innovate and explore additional features like mobile connectivity and voice assistant integration.

Project Plan

Smart Cooker Whistle Counter - Project Plan
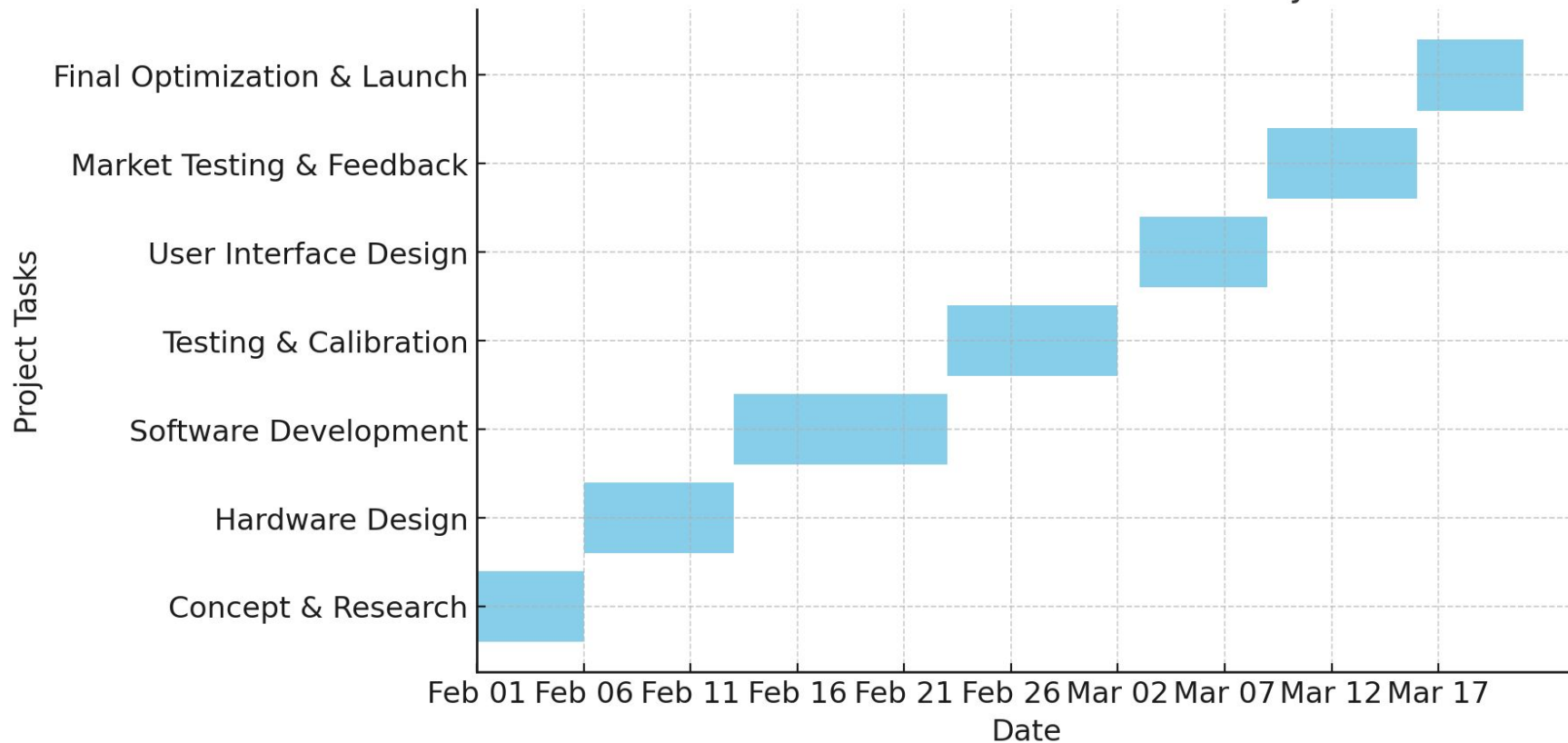
Project Timeline
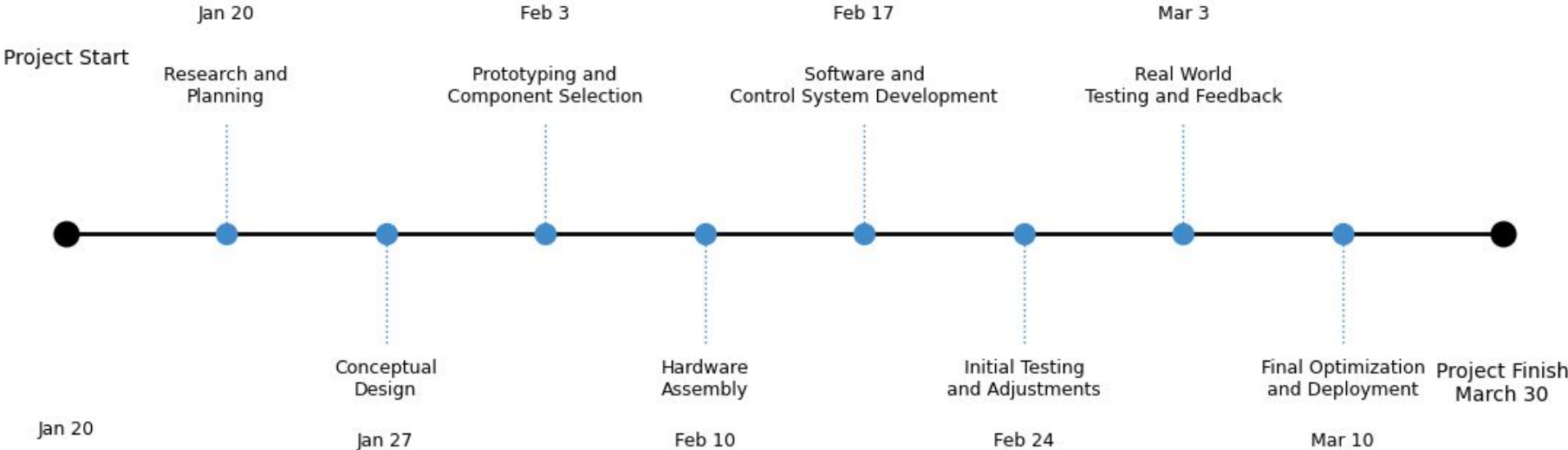
User Persona 1

1. Name: Krishna

2. Age: 48 years

3. Occupation: Embedded Systems Engineer

4. Education: Bachelor's Degree in Electronics and Communication Engineering (ECE)

5. Hometown: Bengaluru, India

6.Problem Statement :

Krishna, an undergraduate student, often struggles to manage cooking while focusing on his studies and other tasks. Traditional pressure cookers require constant supervision, making it stressful and time-consuming. A Smart Cooker Whistle Counter with Auto Shut-Off would help Krishna cook safely and efficiently without needing to monitor whistles, allowing him to focus on his academics and relax with peace of mind.

7. Goals & Needs:

- Needs a smart cooking assistant that reduces manual effort.
- Prefers an automated system that ensures consistent food quality.
- Wants an energy-efficient and safe cooking solution.

8. Frustrations

- Constant need to monitor the cooker manually leads to stress and distraction during multitasking.
- Fear of overcooking or forgetting to switch off the stove causes anxiety, especially during busy schedules.
- Lack of automation in traditional cooking methods limits the user's ability to relax or focus on other tasks, resulting in mental fatigue.

9. Behavior Patterns:

- Prefers quick cooking methods due to a busy lifestyle.
- Actively researches and adopts new tech-based solutions.
- Shares experiences and reviews on online forums and social media.

User Persona 2

1. **Name:** Ananya

2. **Age:** 23 years

3. **Occupation:** IoT Product Developer

4. **Education:** Bachelor's Degree in Electronics and Communication Engineering (ECE)

5. **Hometown:** Hyderabad, India

6. Problem Statement:

Ananya, a 23-year-old home cook, wants a reliable smart cooker whistle counter with an automatic switch-off feature that helps him cook perfectly without constantly monitoring the cooker. He needs a device that accurately counts whistles and safely turns off the cooker to prevent overcooking or accidents, making cooking easier and stress-free.

7. Goals & Needs:

- Needs a **smart cooker** that **tracks whistle count** for perfect pressure cooking.
- Looks for a **user-friendly device** that prevents overcooking and saves time.
- Wants a solution that is **portable, safe, and budget-friendly** for everyday use.
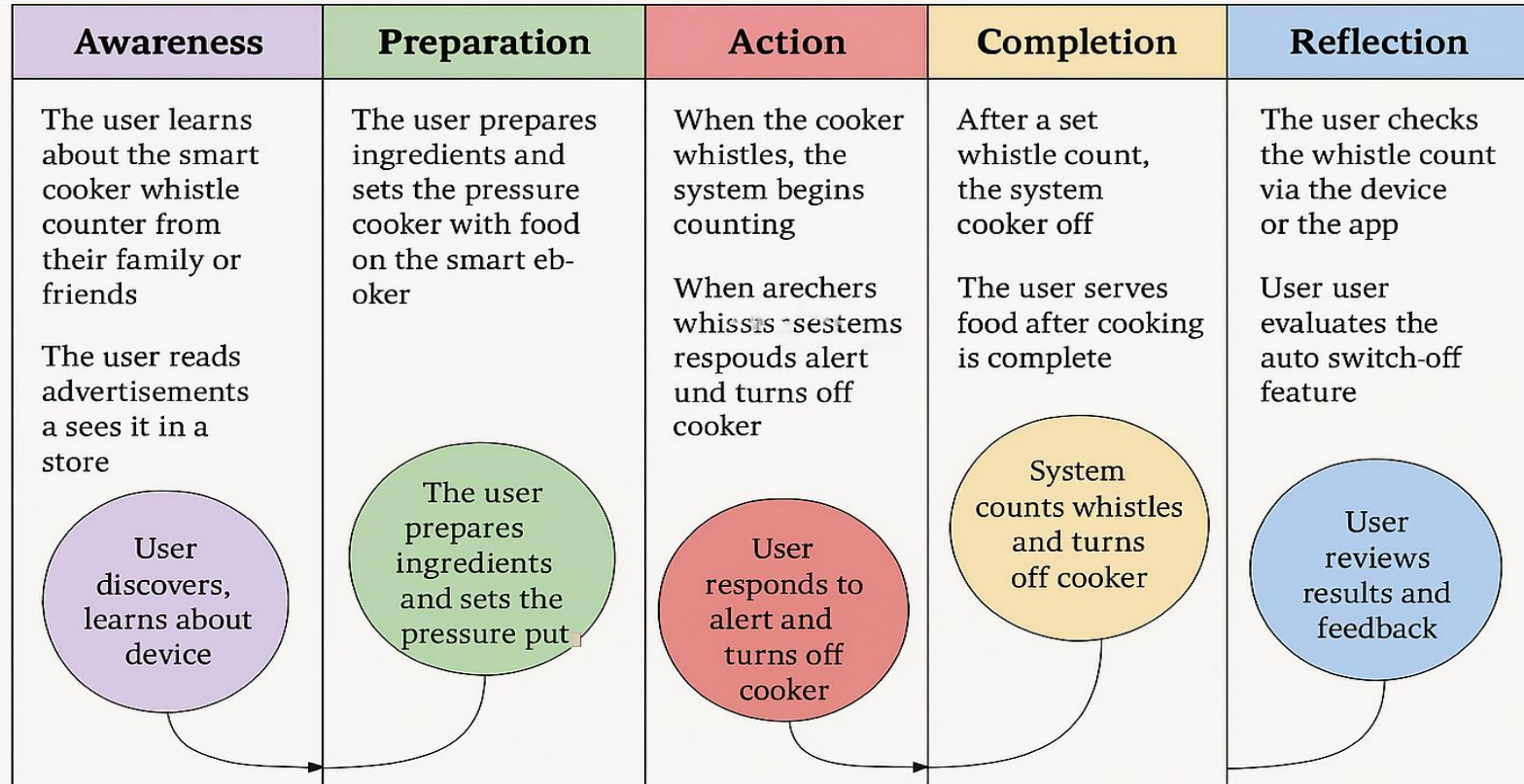
8.Frustrations

- Difficulty in motivating users to consistently use the whistle counter feature while cooking.
- Ensuring that the device accurately counts whistles according to different cooking styles and pressure levels.
- Users may perceive the whistle counter and auto switch-off feature as complicated or unnecessary, reducing trust in the device's automation.

10. Behavior Patterns:

- Regularly uses smart gadgets at home, especially for cooking and cleaning.
- Looks for **YouTube reviews and tech blogs** before purchasing new kitchen appliances.
- Often recommends useful smart kitchen products to friends and family.

USER JOURNEY MAP My Smart Cooker Whistle Counter with Auto Switch-off

Awareness	Preparation	Action	Completion	Reflection
The user learns about the smart cooker whistle counter from their family or friends The user reads advertisements a sees it in a store	The user prepares ingredients and sets the pressure cooker with food on the smart eb-oker	When the cooker whistles, the system begins counting When arechers whissis·sestems respouds alert und turns off cooker	After a set whistle count, the system cooker off The user serves food after cooking is complete	The user checks the whistle count via the device or the app User user evaluates the auto switch-off feature
User discovers, learns about device	The user prepares ingredients and sets the pressure put	User responds to alert and turns off cooker	System counts whistles and turns off cooker	User reviews results and feedback

Competitive Analysis

Competitor Type	Location	Product Offering	Cost (in ₹)	Website	Business Size
Direct	India	Smart Pressure Cooker with Digital Timer	₹15,000–₹30,000	www.smartcook.in	Medium
Indirect	China	Electric Pressure Cookers with IoT Features	₹50,000–₹1,50,000	www.iotcook.cn	Large
Direct	Germany	Auto Shut-Off Attachments for Gas Stoves	₹70,000–₹2,00,000	www.kitchensmarttech.com	Small
Indirect	India	Manual Stove Timers and Whistle Counters (non-auto)	₹5,000–₹10,00	www.cookingtools.in	Medium

Interaction Analysis

Accessibility	User Flow	Navigation	Visual Design	Brand Identity	Tone	Descriptiveness	Features
Multilingual support (includes regional Indian languages)	Guided setup with user roles (home cook / caregiver modes)	Simple UI with large icons and touch navigation	Clean interface with cooking-related visuals & whistle display	Smart, health-conscious kitchen companion	Friendly, family-oriented, tech-savvy	Real-time display of status, timer, whistle count	Whistle counter, overcook alert, auto cutoff, energy monitoring
Currently supports only English & 1–2 regional languages	Manual setup; no adaptive flow for cooking preferences	Occasional backtracking due to nested menus	Bland UI; lacks personalization or warm design feel	Generic look, lacks distinct smart kitchen branding	Neutral, lacks emotional tone	May be unclear for non-tech-savvy users	Limited customization; no cross-appliance integration

Business Potential

GAP ANALYSIS

- Traditional pressure cookers lack automatic whistle counting, leading to overcooked or undercooked food.
- Users need to manually monitor cooking, which is inconvenient and error-prone.
- Demand for an affordable, smart solution with real-time alerts and automation.

TARGET AUDIENCE

Home cooks, working professionals, and elderly individuals who need precise cooking assistance.
Restaurants and catering businesses that require accurate cooking time management.

UNIQUENESS

Automatically counts cooker whistles and alerts users via buzzer and display.
Can be integrated with mobile apps for real-time monitoring.
Ensures consistent cooking results with minimal supervision.

MARKET SIZE

The smart kitchen appliances market in India is estimated to grow significantly, reaching ₹5,000+ crore by 2025.
SOURCE: INDUSTRY REPORT 2023

The global smart kitchen market is projected to grow from USD 15 billion in 2023 to USD 30 billion by 2030, with a CAGR of 9.2%.
SOURCE: MARKET RESEARCH 2023

User Pain Points

🔴 **Manual Monitoring Hassle**: Traditional pressure cookers require users to manually count whistles, leading to inconsistencies in cooking.

🟠 **Overcooking & Undercooking Risks**: Without precise tracking, food may be overcooked or undercooked, affecting taste and texture.

🟡 **Limited Automation**: Most pressure cookers lack smart features like automatic whistle counting, real-time alerts, or integration with other devices.
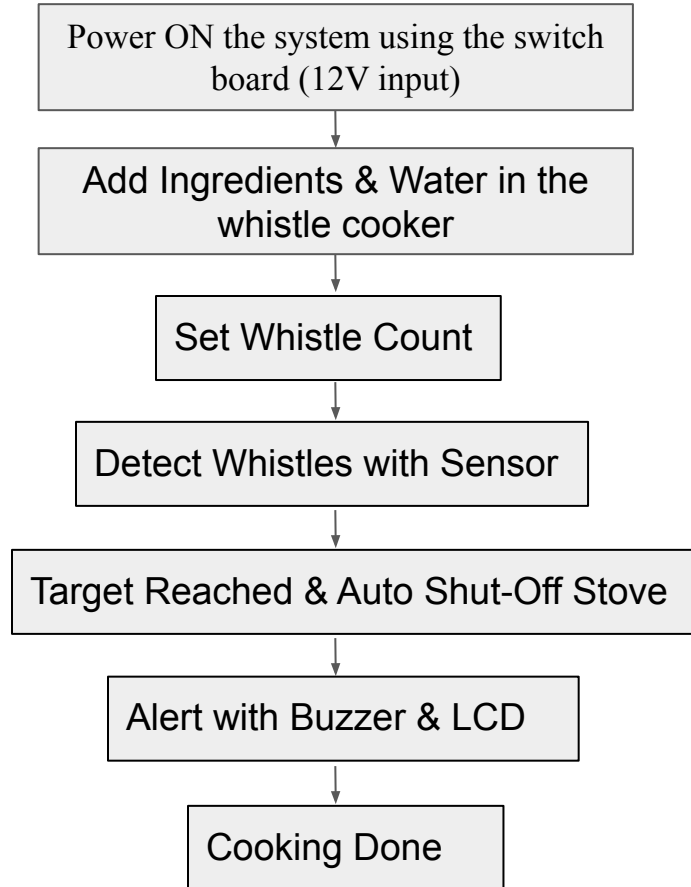
🟠 **User Dependence**: Cooking requires constant attention, making it inconvenient for busy individuals and elderly users.

Lack of Smart Alerts & Display: Traditional cookers do not have an LCD screen to show real-time cooking status, countdowns, or alerts.
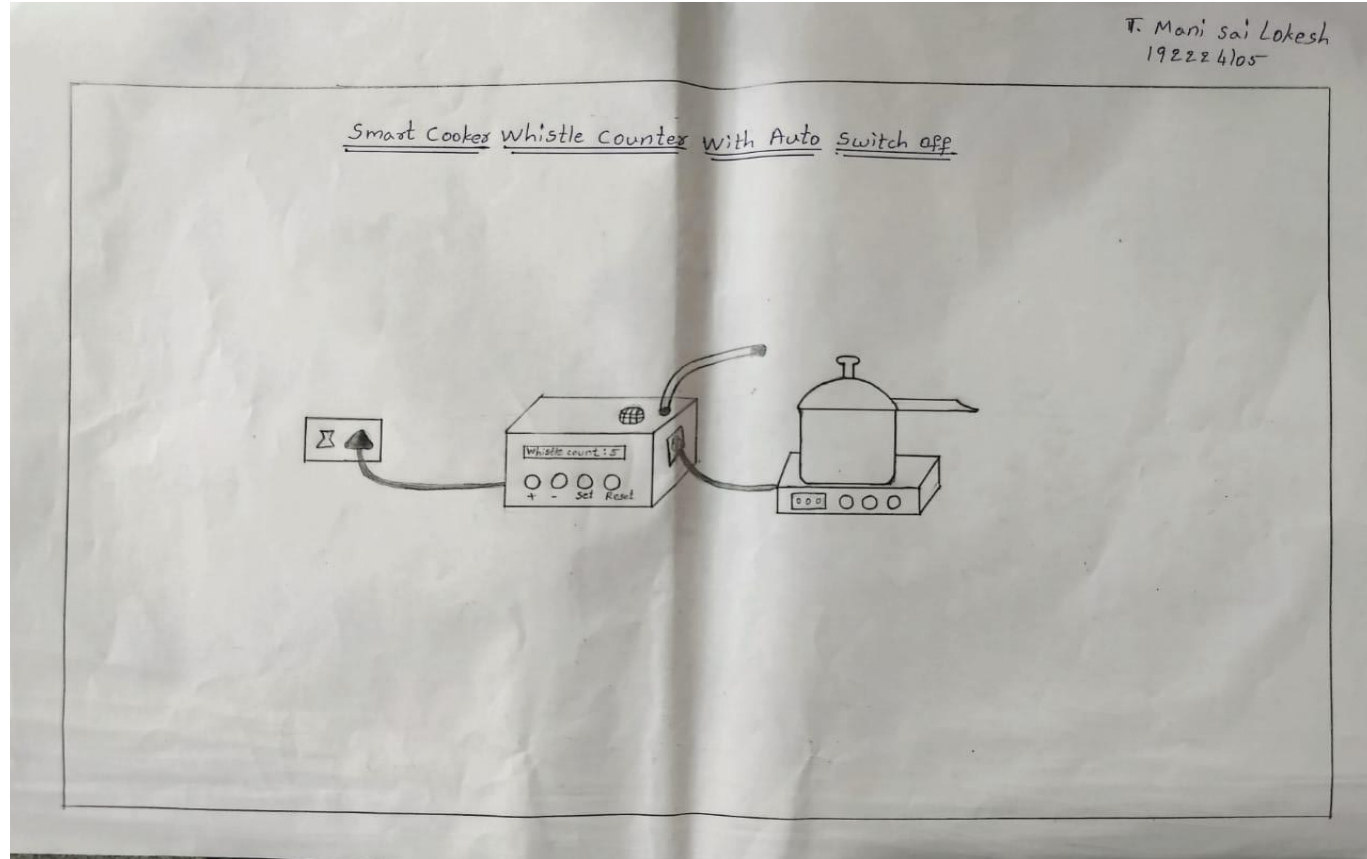
🔵 **No Automated Control**: Without a relay module, users cannot automate switching off the stove based on whistle count, leading to energy wastage.

🟣 **No Audio Notifications**: The absence of a buzzer means users must stay nearby to hear the whistles, making multitasking difficult.
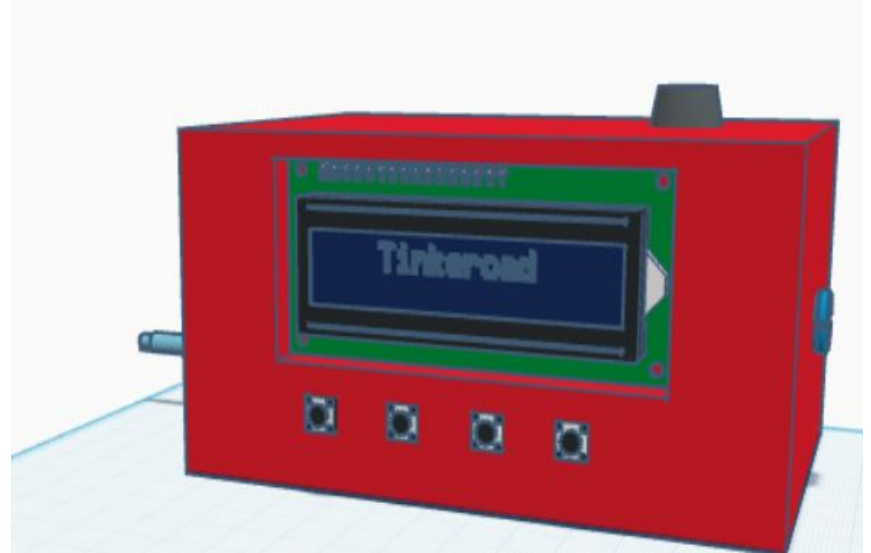
Flow Diagram

Power ON the system using the switch board (12V input)

↓

Add Ingredients & Water in the whistle cooker

↓

Set Whistle Count

↓

Detect Whistles with Sensor

↓

Target Reached & Auto Shut-Off Stove

↓

Alert with Buzzer & LCD

↓

Cooking Done

Product Sketches or Low fidelity

Product Sketches

Mockups low fidelity

Ideation alternatives

Voice Command Integration: Incorporate voice assistant compatibility (e.g., Alexa, Google Assistant) to allow hands-free operation like starting the cooker, checking progress, or setting reminders.

Mobile App Ecosystem: Develop a companion smartphone app that provides remote monitoring, whistle count tracking, recipe suggestions based on ingredients, and notifications for completed cooking.

Energy Usage Monitoring:
Track power consumption in real-time and offer suggestions for energy-efficient cooking, helping users reduce electricity bills and support sustainable living.

Iterations

Iteration 1:
 Basic pressure cooker fitted with a microphone sensor and whistle counter. It could detect whistles but had inconsistent accuracy in noisy environments.

Iteration 2:
 Integrated LCD display, buzzer alert, and improved microphone calibration. This version offered better usability and feedback but still lacked automation in heating control.
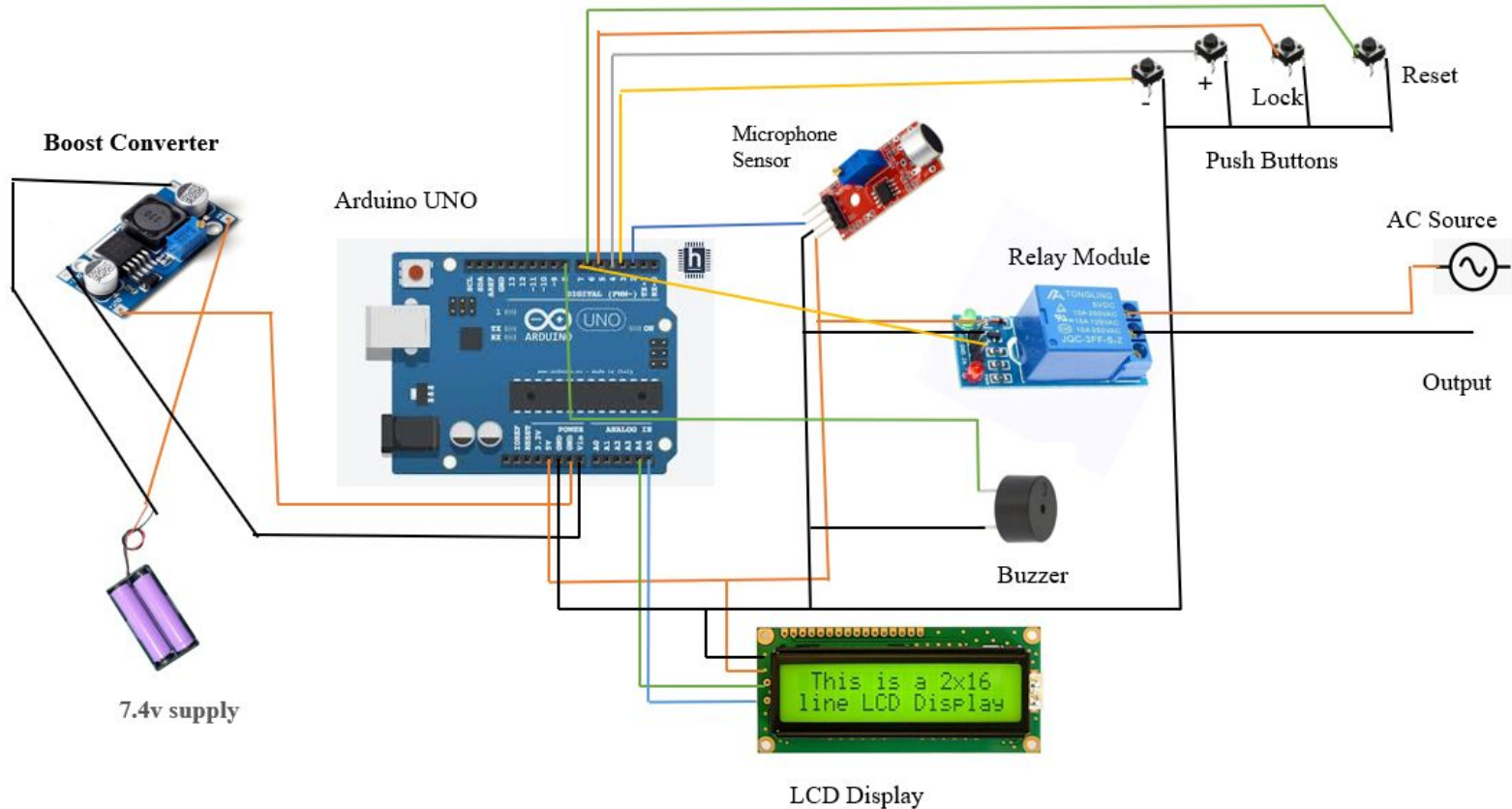
Iteration 3:
 Added relay module for smart heating control and safety cutoff. Enhanced energy efficiency and reliability, though user customization (e.g., cooking modes) was still limited.

Learnings

Creative Innovation: Foster the ability to think outside the box and generate unique, forward-thinking ideas for products. This skill enables you to differentiate your offerings in a competitive market and appeal to evolving customer needs.

Market Awareness: Improve your ability to stay attuned to current market trends, competitor strategies, and consumer behavior. This skill allows you to make informed decisions and adapt products in line with shifting industry demands.

Technical Drawings

Boost Converter

Arduino UNO

Microphone Sensor

Push Buttons

Reset

Lock

+

-

Relay Module

AC Source

Output

Buzzer

7.4v supply

This is a 2x16 line LCD Display

LCD Display

List of Components

1. **Arduino Board** – Acts as the microcontroller to process sensor inputs and control outputs.

2. **Buzzer** – Alerts the user when the whistle is detected.

3. **Microphone Sensor** – Detects the sound of the pressure cooker whistle.

4. **LCD I2C Display** – Displays the count of whistles and system status.

5. **Push Buttons** – Used for user input and system reset.

6. **Switch** – Allows manual control of the system (ON/OFF).

7. **Boost Converter** – Regulates the power supply for stable operation.

8. **Jumper Wires** – Connects various components in the circuit.

9. **Relay Module** – Controls external appliances based on whistle count.

10. **3-Pin Plug** – Provides power connection to the system.

11. **Binding Wire** – Used for securing and organizing components.
12. **Boost Converter** – Regulates and steps up the power supply for stable operation.

Product Design Hi fidelity

USABILITY STUDIES

Round 01 - Usability Findings

- **Navigation Issues:** Users found the cooker interface and button layout unintuitive, making it difficult to access key functions like whistle counting or cooking mode selection.

- **Tutorial Effectiveness:** First-time users were unsure how to operate the cooker features, especially the whistle counter and auto shut-off settings, highlighting the need for a better guided onboarding or demo mode.

- **Function Clarity:** Users were confused about the visual indicators (LEDs/beeps) for cooking progress or whistle status, indicating a need for clearer, more descriptive feedback.

Round 02 - Usability Findings (Smart Cooker)

- **Whistle Counter Accuracy:** Users reported inconsistent whistle counting during pressure cooking, especially in noisy environments, highlighting the need for improved microphone sensitivity and filtering.

- **Display Readability:** The LCD screen was hard to read under different lighting conditions. Increasing font size, contrast, or adding a backlight could improve visibility.

- **Button Feedback:** Some users weren't sure if a button press had registered due to the lack of tactile or audio feedback, suggesting a need for enhanced button responsiveness or beeps.

Project learning

Project Impact

- **Enhanced Cooking Efficiency** – The Smart Cooker Whistle Counter with Auto Shut-Off eliminates the need for manual whistle counting, ensuring precise cooking.

- **Convenience & Automation** – Users can rely on automated whistle detection and shut-off, reducing supervision time.

- **Improved Safety** – Prevents risks of overcooking, gas wastage, and overheating, making cooking safer.

- **Smart Home Integration** – Potential for future compatibility with IoT and voice assistants for a seamless kitchen experience.

- **Energy & Cost Savings** – Reduces gas or electricity usage by automatically stopping cooking at the right time.

What I learnt

- **IoT & Sensor Implementation** – Worked with microphone sensors, buzzers, and relay modules for whistle detection.

- **Embedded System Programming** – Developed automation logic for whistle counting and shut-off using microcontrollers.

- **Product Optimization** – Enhanced accuracy and efficiency of the system to ensure reliable performance.

- **User-Centered Design** – Focused on ease of use, compatibility with various cookers, and affordability.

- **Market Research & Feasibility** – Analyzed market demand, pricing, and potential consumer adoption of smart cooking solutions.

Product Design Patent

Claim: Wherein the system incorporates a **microphone sensor** to detect whistle sounds, ensuring precise whistle counting for accurate cooking time.

Claim: Wherein the **relay module** automatically triggers the shut-off mechanism after the desired whistle count, preventing overcooking and enhancing safety.

Claim: Wherein an integrated **LCD screen** displays real-time whistle count and cooking status, providing users with clear cooking progress updates.

Claim: Wherein the **buzzer alert system** notifies the user upon reaching the pre-set whistle count, ensuring convenience and efficiency.

Claim: Wherein the system features a **calibration mode** allowing users to adjust sensitivity levels for different types of pressure cookers, improving compatibility.

Next Steps

Step A: Product Refinement

1. User Feedback Integration – Gather insights from initial users and refine features for better performance.
2. Sensor Calibration – Fine-tune the microphone sensor to accurately detect different pressure cooker whistles.
3. Energy Efficiency Optimization – Improve the relay module function to minimize power consumption.
4. Material Selection – Ensure durable and heat-resistant materials for long-lasting use.
5. User Interface Enhancement – Optimize the LCD screen layout for better readability and usability.

Step B: Prototyping and Testing

1. Prototype Development – Assemble the microcontroller, microphone sensor, relay module, buzzer, and LCD screen into a working model.
2. Functionality Testing – Validate accurate whistle detection and auto shut-off reliability.
3. Real-World Simulation – Test the product with different pressure cookers, heat levels, and environments.
4. Durability Testing – Assess long-term performance under repeated cooking cycles.
5. User Experience Trials – Gather feedback from testers and make necessary adjustments.

Step C: Documentation and Compliance

1. Technical Documentation – Create detailed circuit diagrams, wiring instructions, and user manuals.
2. Regulatory Compliance – Ensure adherence to kitchen appliance safety standards and IoT device regulations.
3. Patent Filing – Secure intellectual property rights for unique design and functionality.
4. Quality Assurance Reports – Document all testing results and improvements.
5. Market Readiness Assessment Prepare the product for mass production and commercial launch.

Step D: Automation and Software Integration

1. **Microcontroller Programming** – Develop and optimize firmware to control **relay module, sensors, buzzer, LCD screen, and switches** for seamless operation.
2. **Smart Whistle Counting** – Implement **microphone and vibration sensors** to accurately detect and count cooker whistles, reducing human error.
3. **Automatic Shut-Off Mechanism** – Use **relays and timers** to cut off the heat source once the desired whistle count is reached, preventing overcooking.
4. **Error Detection & Alerts** – Integrate **buzzer notifications** and LCD display alerts for errors like sensor malfunctions or abnormal cooking conditions.
5. **Connectivity & Expansion (Optional)** – Enable **Bluetooth/Wi-Fi** integration for real-time monitoring, voice assistant support, and mobile app control.

Industry Certificates:

1. **CE Certification** – Compliance with European safety, health, and environmental requirements.
2. **FCC Certification** – Approval for electronic components to meet US communication regulations.
3. **BIS Certification (ISI Mark)** – Bureau of Indian Standards approval for product safety and quality.
4. **ROHS Certification** – Restriction of Hazardous Substances compliance for eco-friendly electronic manufacturing.
5. **ISO 9001 Certification** – Quality management certification for ensuring reliable and efficient electronic production.

THANK YOU!

Let's connect

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