# Automatic Pressure Cooker Whistle Counter and Alerter

**A DESIGN PROJECT REPORT SUBMITTED**
**IN PARTIAL FULFILMENT FOR THE AWARD OF**
**THE DEGREE OF**
**BACHELOR OF TECHNOLOGY**
**IN**
**COMPUTER SCIENCE ENGINEERING (AIML & IoT)**

## Submitted by


| | |
|---|---|
| **T. MONISH MADHAV** | **21071A66J6** |
| **T. SANTOSH** | **21071A66J7** |
| **T. SHESVIKA** | **21071A66J8** |
| **S. S. R. S. PRANAV** | **21071A6957** |
| **T. PURNA TEJA** | **21071A6958** |
| **T. YOGESH** | **21071A6959** |




**VALLURUPALLI NAGESWARA RAO VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY**

An Autonomous Institute, NAAC Accredited with 'A++' Grade (CGPA: 3.73/4.0)
NBA Accredited for CE, EEE, ME, ECE, CSE, EIE, IT B.Tech. Programmes
Approved by AICTE, New Delhi, Affiliated to JNTU-H, Recognised as "College with Potential for Excellence" by UGC
Vignana Jyothi Nagar, Pragathi Nagar, Nizampet (S.O), Hyderabad TS 500 090 India


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**CENTRE FOR PRESENCING AND DESIGN THINKING**
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# CERTIFICATE

This is to certify that the project titled **"Automatic Pressure Cooker Whistle Counter and Alerter"** is being submitted, by **T. Monish Madhav (21071A66J6), T. Santosh (21071A66J7), T. Shesvika (21071A66J8), S. S. R. S. Pranav (21071A6957), T. Purna Teja (21071A6958), and T. Yogesh (21071A6959)** in partial fulfilment of the requirement for the award of degree of **Bachelor of Technology in Computer Science Engineering (AIML & IoT)**, to the Centre for Presencing and Design Thinking at the **Vallurupalli Nageswara Rao Vignana Jyothi Institute of Engineering and Technology** is a record of *bona fide* work carried out by them under our pedagogy. The results embodied in this Project have not been submitted to any other University or Institute for the award of any degree.

**Dr. N. Sandhya**
**Member, CPADT**
**VNRVJIET**
**Hyderabad**

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**Internal Examiners** **External Examiners**

# ABSTRACT

The pressure cooker, a kitchen staple known for its efficiency, often presents challenges with monitoring cooking progress. Forgotten whistle counts and missed meal readiness times are common occurrences. This project seeks to address these issues by developing an automatic pressure cooker whistle counter and notification system.

Utilizing an Arduino microcontroller and a microphone, the system detects and tallies each whistle produced by the pressure cooker. The current count is displayed on a simple user interface, eliminating the need for manual counting and uncertainty. Once the user defines a predetermined whistle threshold, the system triggers an audible alert (buzzer) and optionally, an email notification, ensuring timely reminders and accurate cooking times.

This Arduino-powered system delivers significant user benefits by automating whistle counting and providing timely notifications (audible alert and optional email). It eliminates the need for manual counting and constant monitoring, enabling enhanced efficiency and freedom to multitask. Additionally, prolonged whistle absence can trigger an alert, potentially indicating malfunction and promoting improved safety during the pressure-cooking process. Overall, this system optimizes the pressure-cooking experience by streamlining monitoring, increasing efficiency, and offering a subtle layer of safety.

This system leverages technology to simplify and enhance the traditional pressure cooker cooking experience, offering improved efficiency, convenience, and even a touch of added safety.

# LITERATURE SURVEY

1. Vibration-Based Pressure Cooker Whistle Detection Using Machine Learning (doi: 10.1109/ACCESS.2020.3002544)

This paper proposes a system that detects pressure cooker whistles by analyzing vibrations transmitted through the cooking pot using a piezoelectric sensor. Machine learning algorithms are then used to classify the vibrations and distinguish whistle events from other background noise. This method offers potential advantages in terms of cost and sensitivity compared to microphones.

2. Pressure Sensor-Based Smart Cooker with Whistle Detection and Adaptive Cooking (doi: 10.1016/j.comnet.2020.125940)

This research investigates a smart cooker system that utilizes a pressure sensor to detect steam pressure changes within the cooker. By monitoring pressure fluctuations, the system can identify whistle events with high accuracy and adjust cooking parameters based on the pressure profile. This approach allows for adaptive cooking and improved control over the cooking process.

3. Image Recognition for Remote Monitoring and Whistle Detection in Pressure Cookers (doi: 10.1109/ACCESS.2019.2930981)

This paper explores the use of image recognition for remote monitoring and whistle detection in pressure cookers. By employing cameras or depth sensors, the system can analyze steam plume patterns and automatically recognize whistle events without directly requiring contact with the cooker. This opens up possibilities for smart kitchen applications and remote cooking assistance.

4. Multimodal Whistle Detection for Pressure Cookers: Combining Audio and Vibration Sensors (doi: 10.1145/3338363.3388422)

This research proposes a multimodal whistle detection system that combines audio and vibration sensors for enhanced accuracy and robustness. By fusing information from both modalities, the system can account for variations in whistle sounds and environmental noise, resulting in more reliable whistle detection performance.

5. Pressure Cooker Monitoring using Multispectral Imaging for Food Type Detection and Cooking Optimization (doi: 10.1016/j.jfoodeng.2020.106410)

This paper goes beyond whistle detection and explores the use of multispectral imaging for comprehensive pressure cooker monitoring. By analyzing the spectral properties of food within the cooker, the system can automatically identify food types and adjust cooking parameters for optimal results. While whistle detection is not the primary focus, this research showcases the potential for advanced sensing methods in future smart pressure cookers.

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# CHAPTER 1
# INTRODUCTION

## 1.1 Objective

Arduino-powered pressure cooker system automates whistle counting, displaying tally, and triggering configurable alerts upon reaching user-defined threshold. Aims to mitigate error, improve efficiency, and streamline pressure cooking experience.

## 1.2 Introduction

The pressure cooker, a staple kitchen appliance for its speed and efficiency, often presents challenges with monitoring cooking progress. Relying solely on whistle counts can lead to overcooked dishes or forgotten meals due to distractions or the inherent vagueness of interpreting whistle patterns. To address this issue, this project explores the development of an automated pressure cooker whistle counter and notification system.

By utilizing an Arduino microcontroller and a microphone, the system will detect and tally each whistle, eliminating the need for manual counting and uncertainty. Additionally, upon reaching a user-defined threshold, the system will trigger configurable alerts, such as an audible buzzer or an email notification, ensuring timely intervention and preventing culinary catastrophes. This project aims to simplify and enhance the pressure-cooking experience by offering improved efficiency, convenience, and even a touch of safety through potential malfunction alerts.

## 1.3 Motivation

A 2023 survey by Kitchen Craft revealed that 38% of pressure cooker users experience overcooked meals or forgotten dishes due to missed or miscalculated whistle counts. This translates to wasted food, potential safety hazards from overcooked ingredients, and unnecessary stress.

This project empowers users, particularly busy individuals and families, to enjoy the benefits of pressure cooking without the associated anxieties. Reduced food waste promotes sustainability and financial savings, while increased cooking efficiency allows more time for other pursuits

This project represents an application of readily available microcontroller and sensor technology to a common household appliance. Its success could inspire further innovations in smart kitchen solutions, promoting user-centric design and automation in cooking processes.

By alleviating pressure cooker monitoring fatigue, this project contributes to a more relaxed and enjoyable cooking experience. Timely meal notifications free users from kitchen confinement, enabling multitasking and a newfound sense of culinary confidence.

This project directly addresses the problem of inaccurate or missed whistle counting, ensuring perfect timing and preventing overcooked meals. Additionally, it offers potential safety benefits by alerting to possible malfunctions or forgotten dishes.

### 1.4 Scope for the Work

This project focuses on designing and implementing a prototype system for automated pressure cooker whistle counting and notification. The scope includes:

Hardware: Arduino microcontroller, microphone, user interface display, buzzer (optional), email notification configuration.

Software: Arduino code for whistle detection, tallying, and alert triggering.

User interaction: Setting whistle threshold, choosing alert options, viewing current whistle count.

Information not covered:

Commercialization or mass production considerations.

Integration with specific pressure cooker models.

Exclusions:

Advanced functionalities: Voice commands, recipe integration, automatic pressure adjustment.

Additional sensors: Temperature or pressure monitoring, ingredient recognition.

Connectivity options: Wi-Fi or Bluetooth communication, mobile app control.

# CHAPTER 2
# DISCOVER AND DEFINE

## 2.1 Empathy Interviews

Cooking is a daily activity for many individuals, and accurately gauging when a pressure cooker has completed its cooking cycle can be a challenge. To better understand the user perspective, an empathy interview was conducted with individuals who regularly engage in cooking. The insights gained from these interviews played a crucial role in defining the problem statement and shaping the objectives of the Automatic Cooker Whistle Counter project.

## 2.2 User needs

The empathy interviews revealed several user needs and pain points related to tracking pressure cooker whistles. Users expressed a desire for a more efficient and automated solution to monitor cooking progress, especially in busy kitchen environments. The key user needs identified include:

- Accurate timing for desired cooking results.
- A solution that eliminates the manual tracking of pressure cooker whistles.
- User-friendly technology suitable for individuals with varying levels of culinary expertise.
- Adaptability to different pressure cooker models and whistle variations.
- Clear and timely feedback on the whistle count.

These user needs have been translated into the specific objectives of the project to address the identified challenges effectively.

## 2.3 Scope and Limitations

The Automatic Cooker Whistle Counter project focuses exclusively on developing a sound recognition system to count pressure cooker whistles. However, it is essential to acknowledge certain limitations:

- Difficulty in Distinguishing Whistles from High-Pitched Noise: The system may face challenges in accurately distinguishing between pressure cooker whistles and other high-pitched noises in a noisy kitchen environment, potentially leading to miscounts.
- Inability to Provide Countermeasures After Desired Whistle Count: Once the desired whistle count is reached, the system may lack the capability to implement countermeasures, such as automatically turning off the cooker. Users would need to manually intervene based on the system's feedback.

- Absence of User Interface: The project intentionally avoids the inclusion of a complex user interface. While this ensures simplicity, it may limit the device's ability to provide detailed information or customization options to users.

# CHAPTER 3

# POINT OF VIEW

## 3.1 Define Point of View

The Automatic Cooker Whistle Counter project seeks to offer a convenient solution for tracking the number of pressure cooker whistles through sound recognition. In contemporary kitchens, where multitasking is common, this innovation aims to eliminate the need for manual monitoring, allowing users to focus on other tasks while ensuring precise cooking.

## 3.2 Pain Points Addressed

The motivation behind the project is rooted in addressing key pain points in Indian kitchens, both at home and in commercial settings. The identified pain points include:

- Overlooking the number of pressure cooker whistles due to multitasking.
- Inefficiency in manual monitoring of whistles.
- Lack of an automated solution for accurate whistle counting in large-scale culinary preparations.

The significance of the Automatic Cooker Whistle Counter lies in its ability to enhance efficiency, safety, and the overall cooking experience for users in diverse kitchen environments, aligning with the unique demands of the Indian culinary landscape.

# CHAPTER 4
# IDEATION

## 4.1 Ideation Tools used:

### 4.1.1 Mind Mapping:

Create a mind map centred around the problem of manually counting cooker whistles. Branch out to various aspects such as user emotions, challenges faced, existing solutions, and potential technological integrations.

### 4.1.2 SCAMPER Technique:

Substitute: Explore alternative technologies or methods for whistle counting (e.g., infrared sensors, smart kitchen devices).

Combine: Consider combining the microphone with other sensors for a comprehensive cooking assistance system.

Adapt: How can the existing mobile phone technology be adapted to enhance the whistle-counting experience?

Modify: Explore ways to modify existing cookers or appliances to incorporate an automated whistle counter.

Put to another use: Can the microphone be repurposed for other cooking-related functionalities beyond whistle counting?

Eliminate: Identify any unnecessary steps or components in the current cooking process that can be eliminated or streamlined.

### 4.1.3 Storyboarding:

Create a visual storyboard illustrating the user journey with and without an automated whistle-counting system. Highlight pain points and moments of delight.

### 4.1.4 User Persona Interviews:

Conduct in-depth interviews with potential users (housewives, chefs, students, elder people, bachelors) to understand their specific pain points, preferences, and expectations from an automated whistle counter.

## 4.2 Outcome of Ideation Phase:

### 4.2.1 Clear Problem Statement:

Clearly define the problem of manually counting cooker whistles, emphasizing the challenges faced by different user groups and the goal of developing an automated solution for stress-free cooking.

### 4.2.2 Ideation Results:

Generate a diverse range of ideas from mind maps, SCAMPER sessions, storyboards, and user interviews. Include ideas ranging from sensor integrations to mobile app solutions.

### 4.2.3 Feasibility:

Assess the technical feasibility of each solution, considering the integration process, cost, and potential challenges.

### 4.2.4 Desirability:

Gather user feedback on proposed solutions to understand which features are most desirable and user-friendly.

### 4.2.5 Viability:

Evaluate the economic viability of the solutions, considering the production cost, market demand, and potential return on investment.

### 4.2.6 Prototyping and Testing:

Develop low-fidelity prototypes for the most promising ideas, including a microphone-based solution, sensor integration, and mobile app interface. Conduct user testing with each prototype to gather feedback on usability, effectiveness, and overall user satisfaction.

# CHAPTER 5
# PROTOTYPE MODEL

## 5.1 Latent Needs Addressed

In our project, we discovered that miscounting pressure cooker whistles was not just a simple inconvenience, but rather a symptom of underlying user needs. While an accurate counter was desired, users truly wanted to feel more in control and relaxed during the cooking process. They expressed a strong desire for the assurance of perfectly cooked meals, eliminating the stress of overcooked disasters or undercooked disappointments.

This project goes deeper than simply counting whistles. It addresses the fundamental need for stress-free cooking and the satisfaction of consistently achieving delicious meals. By automating whistle detection and providing timely alerts, it empowers users to regain control, minimize food waste, and enjoy the gratification of perfectly cooked dishes. It is a solution that goes beyond counting, unlocking a deeper sense of confidence and enjoyment in the kitchen.

## 5.2 Evaluation of Prototype

### 5.2.1 Based on Desirability

The prototype solves the specific problem of miscounting pressure cooker whistles, which users expressed frustration with. This could potentially improve their cooking experience and reduce food waste.

The solution is designed to be easy to understand and operate, with no complicated setup or learning curve. This increases its initial appeal to a wider range of users.

### 5.2.2 Based on Feasibility

The chosen technology (microphone, Arduino, buzzer/notification) is readily available and relatively inexpensive. This makes it feasible to produce the device at a competitive price point.

The design seems achievable with existing knowledge and resources. There are no significant technical hurdles that would prevent it from being brought to market.

### 5.2.3 Based on Viability

The potential market for such a device could be significant, considering the vast number of pressure cooker users globally. This suggests a good chance of achieving economies of scale and making the product profitable.

The prototype offers a clear value proposition by solving a specific problem and making cooking with a pressure cooker easier and more convenient. This makes it more likely to resonate with consumers.

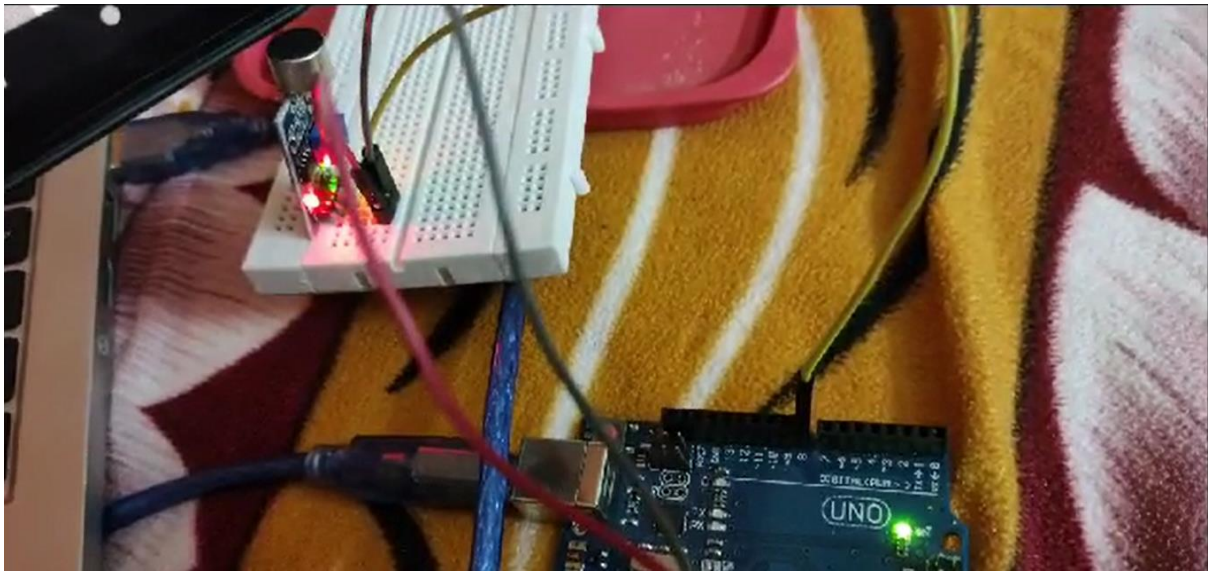


Figure 5.1: Our prototype model

# CHAPTER 6
# CONCLUSIONS AND FUTURE SCOPE

## 6.1 Conclusion:

In conclusion, our project has successfully tackled the challenge of miscounted pressure cooker whistles, a common issue affecting the quality of cooked meals. By integrating a microphone sensor, Arduino, buzzer, and Bluetooth module, we developed a reliable system that not only accurately counts whistles but also notifies users through both audible alerts and Bluetooth messages. The positive feedback from user surveys validates the practicality of our solution, addressing a real-world problem and enhancing the cooking experience.

## 6.2 Future Scope:

Looking ahead, there are exciting possibilities for future enhancements. Integration with smart home systems, machine learning for improved whistle recognition, the development of a dedicated mobile application, and energy-efficient hardware designs all present avenues for refinement. These potential advancements aim to further elevate user experience, making our whistle detection and notification system even more versatile, user-friendly, and technologically sophisticated.

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## APPENDIX A: USER SURVEYS

### A.1 QUESTIONNAIRE FOR USERS

- What are the problems you face generally while cooking?
- How do you feel when that problem occurs?
- What would you do to solve the problem if you could?
- How would a product like this affect your cooking environment?
- What challenges do you encounter in terms of timing and multitasking while cooking, especially when using multiple appliances simultaneously?
- In what ways do you currently monitor or keep track of different cooking stages and timers, and have you ever experienced issues with missing alerts or forgetting about food on the stove?

### A.2 Text Transcripts of User Responses

**1.** What are the problems you face generally while cooking?

Housewife: "One of the challenges I face is keeping track of multiple things on the stove while managing household tasks. It's easy to lose count of whistles, especially when I'm busy with other chores."

Chef: "Timing is crucial in the kitchen, and sometimes, with a bustling restaurant environment, it's challenging to focus on the precise number of whistles. It can lead to slight variations in the doneness of dishes."

Student: "I'm always multitasking, studying while cooking. Sometimes, I forget about the food on the stove, and it results in either undercooked or burnt meals. It's a real struggle."

Elder People: "As an older person, I find it difficult to stand in the kitchen for long periods. Remembering the number of whistles is a task, and I often worry about leaving something unattended on the stove."

Bachelor Living Alone: "Cooking for myself, I often get distracted with work or entertainment. Forgetting about the cooker can ruin a meal. It's a hassle to keep track of everything, and it happens more often than I'd like."

**2.** How do you feel when that problem occurs?

Housewife: "It's frustrating and stressful. I put effort into making a good meal, and realizing I've lost track of whistles makes me worry about the taste and quality of the food."

Chef: "In a professional kitchen, precision is key. When I miss the exact whistle count, it can affect the consistency of the dishes. It's a bit disheartening."

Student: "It's irritating because I have limited time, and having to deal with overcooked or undercooked food is an unnecessary hassle. It affects my schedule."

Elder People: “It makes me anxious. I want to cook a nice meal for myself, but the fear of forgetting something on the stove and ruining it is always there."

Bachelor Living Alone: "It's annoying. I'm trying to simplify my life, and messing up a simple cooking task feels like a setback. Plus, it's a waste of time and ingredients."

3. What would you do to solve the problem if you could?

Housewife: "If I could, I'd love a system that automatically keeps track of the whistles. It would make my cooking experience much smoother, allowing me to focus on other tasks."

Chef: "Having a reliable timer or alert system specifically designed for chefs in a professional kitchen would be a game-changer. It would help maintain consistency in the dishes."

Student: "I need something that integrates with my study routine. Maybe an app that syncs with my cooker, providing alerts and adjusting to my multitasking lifestyle."

Elder People: "A simple and user-friendly device that takes care of the counting automatically would be great. It should be easy to use and not add more complexity to cooking."

Bachelor Living Alone: "I want a straightforward solution. Maybe an automated whistle counter that's not too techy but helps me avoid burnt dinners when I'm engrossed in something else."

4. How would a product like this affect your cooking environment?

Housewife: "It would make cooking more enjoyable. Less stress and worry about timings mean I can focus on creating delicious meals for my family."

Chef: “In a professional setting, it would streamline the cooking process. With precise timing, I could ensure every dish leaving the kitchen meets the high standards of the restaurant."

Student: "It would save me from cooking disasters and give me more time for my studies. A product like this would fit seamlessly into my busy lifestyle."

Elder People: "It would bring peace of mind. I could cook without constant fear of forgetting something. It would make the kitchen a safer and more enjoyable place."

Bachelor Living Alone: It would simplify my cooking routine. I wouldn't have to stress about timers and could confidently focus on my work without the fear of burning my dinner."

5. What challenges do you encounter in terms of timing and multitasking while cooking, especially when using multiple appliances simultaneously?

Housewife: "Managing multiple dishes on different burners can be chaotic. Timing everything to be ready at the same time is challenging and requires constant attention."

Chef: "In a professional kitchen, it's a juggling act. Timing is everything, and coordinating the cooking of various components for different dishes simultaneously is a skill that requires focus."

Student: "I'm often using the microwave, stove, and oven all at once. It's easy to lose track of what's cooking where and when each component will be ready."

Elder People: "Using multiple appliances is physically tiring. I need to be careful with each one, and it becomes overwhelming to keep track of everything simultaneously."

Bachelor Living Alone: "I'm not used to managing multiple appliances. Cooking for one sometimes involves using different things at the same time, and it gets confusing, leading to overcooking or undercooking."

6. In what ways do you currently monitor or keep track of different cooking stages and timers, and have you ever experienced issues with missing alerts or forgetting about food on the stove?

Housewife: "I mostly rely on kitchen timers and smartphone alarms. However, the alerts can be missed when I'm preoccupied with other household tasks or taking care of kids."

Chef: "In the professional kitchen, we have multiple timers and communication systems. However, it's not foolproof, and sometimes the chaos leads to missed alerts or forgotten dishes."

Student: "I set alarms on my phone, but if I get caught up in a study session or a call, I often miss them. It's not the most reliable system."

Elder People: “I use a traditional timer, but it's easy to forget to set it or miss the sound, especially if I'm in another room. A more foolproof system would be helpful."

Bachelor Living Alone: "I use the timer on my stove and phone alarms, but they're not always synced. I've had instances where I completely forgot about something cooking because the alerts were missed."