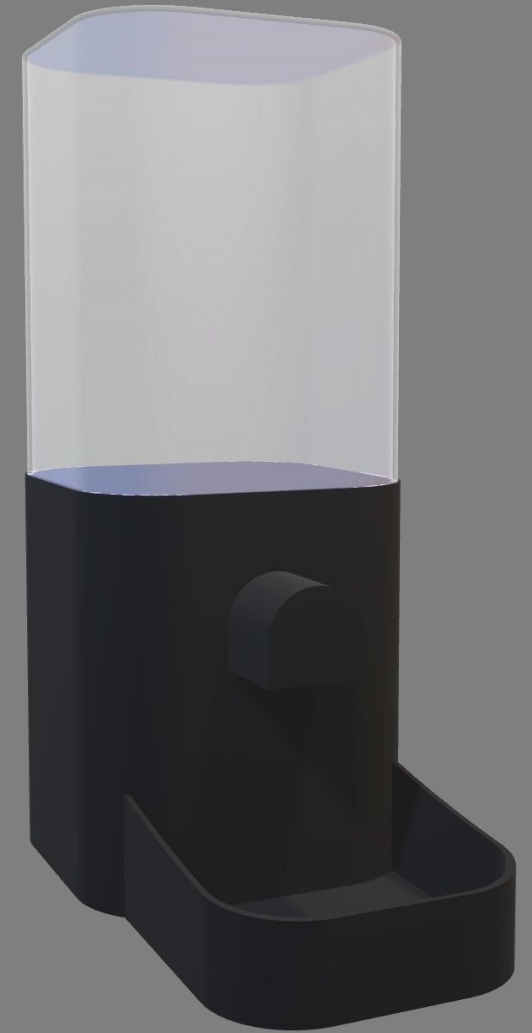


# Smart AI Cat Feeder

Automated, Smart, and Pet-Safe Feeding  
Solution

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# The Challenges of Pet Feeding

- Inconsistent feeding schedules 🕒
  - Overfeeding or underfeeding 🍽️
  - Dogs stealing cat food 🐕
  - Busy owners missing feeding times 📅
- 



# Impact of Poor Feeding Routines

- **60% of cats** are overweight due to overfeeding
  - **1 in 3 pet owners** forget to feed their pets on time
  - **Multi-pet homes** struggle with food theft, leading to health issues
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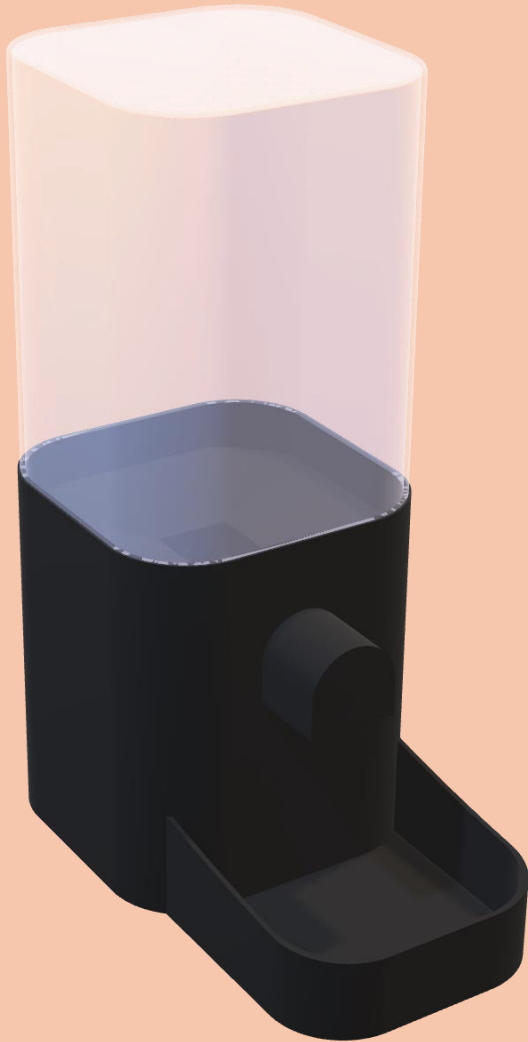


# Who it's affecting

- "I work late. I schedule my cat's feeding, but my dog eats the food before I get home. It frustrates me and I don't know what to do" - *Sarah*
- 



# System Overview



## Feeder Device

Our purpose-built autonomous feeding solution, with a high-capacity food tank. Simply place this in your feeding area of choice, and refill weekly.



## Cloud Integration

Our cloud solution will be the bridge between you and your machine. We'll use the cloud to allow you to access your machine from anywhere.



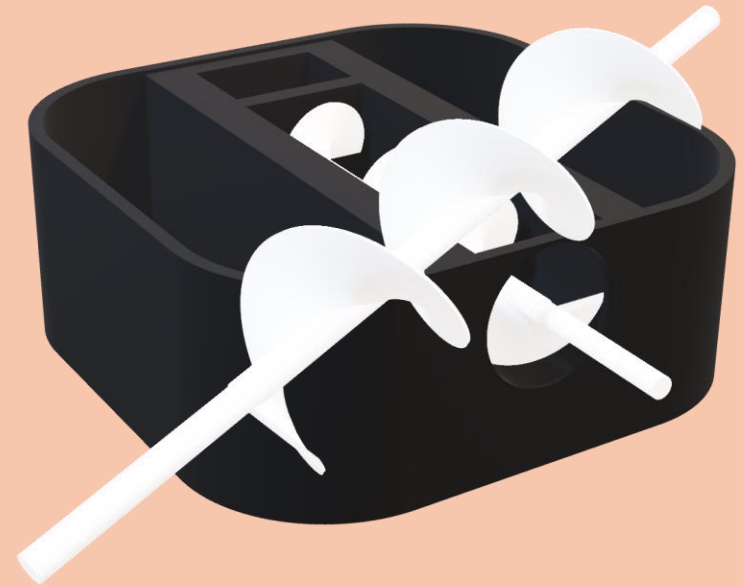
## Companion App

We'll provide both a mobile and web app to allow you to configure your device. You can also access your analytics and monitor your device.

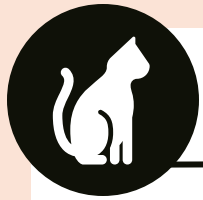


# Feeding Mechanism

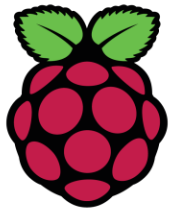
- Pushes through a **screw conveyor**.
  - **Funnels** food from the above storage compartment.
  - Allows for **granular control** of portion sizes.
  - Prevents leakage.
- 



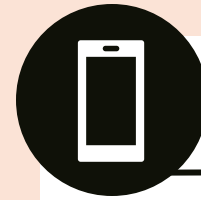
# Tech Stack



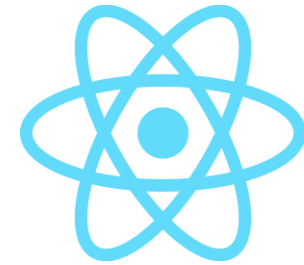
## Feeder Device



## Cloud Service



## Application



# Functional Requirements

## App Features

### Feeding Profiles

- **Feeding times:** up to **3 times per day**, with minute level precision
- **Portion sizes:** **5g accuracy**, up to a maximum of **100g** per feeding
- **Recurrence:** repeat this profile by **day of the week**, or a custom day interval
- **Date range:** users should be able to schedule a range of dates for which a profile should be active.





# Functional Requirements

## App Features

### Multi-User Support

- The application should allow **multiple user accounts**, up to **32**, to be authenticated for any given feeder.
- The designated **owner** account should be able to add or remove said users from their device.

### Food Capacity Indicator

- The mobile app should display an **estimate of remaining food capacity** – accurate to 20% capacity, updating every **minute**.



# Functional Requirements

## Device Features

### Configuration Persistence

- The active **feeding profile**, and scheduled changes should be stored on device.

### Autonomous Dispensing

- The desired **portion** should automatically start dispensing within **5 seconds** of detecting a cat at the scheduled feeding time.
- Controlled by the **feeding profile**.





# Functional Requirements

## Device Features

### Logging

- If the cat is detected eating, it should be logged and sent to the cloud within 5 seconds.
- This should include a timestamp, how long the cat was eating, and a five frame-per-second video snippet.

### Alerts

- If a cat is not detected within **30 minutes** of scheduled feeding time, a notification should be sent to the application.



# Non-Functional Requirements

## Performance

### Response Time

- From starting the dispense mechanism, the **full portion** should be fully dispensed in less than **5 seconds**.

### Load Capacity

- The tank should hold at least **1.25L** of dry cat food – this should allow for a week's supply for a large cat using typical dry foods.





# Non-Functional Requirements

## Reliability

### Reliable Dispensing

- The device should dispense with a reliability of at least **99.5%** without jamming or otherwise malfunctioning.
- Malfunctions should also be handled gracefully, **warning** the user via notification.

 Andy Hyland

★☆☆☆☆ **Doesn't work**

Reviewed in the United Kingdom on 2 June 2022

**Verified Purchase**

Entirely useless. Programmed it, left it setup up. Hasn't dispensed a single portion. Incredibly expensive for something that is totally unable to deliver on what it needs to.

4 people found this helpful



# Non-Functional Requirements

## Usability

### Input Feedback

- The app should log and notify the user of any failed commands within **5 seconds** of occurring.
- Changing settings should prompt the user for **confirmation** before syncing with the device.



### Ease of Use

- The mobile app should allow the user to adjust their feeding times in no more than **three taps** from the home screen.







# Testing Plan

-  **1.1 Unit Testing**
  - **Goal:** Test individual components before integration.
  - **Key Checks:** Portion accuracy ( $\pm 5\text{g}$ ), RFID multi-cat detection, cloud sync, app UI & notifications.
-  **1.2 Integration Testing**
  - **Goal:** Ensure smooth communication between components.
  - **Key Tests:** Feeder  $\leftrightarrow$  Cloud sync ( $< 2\text{s}$ ), API responses, data consistency, failsafe alerts ( $< 15\text{s}$ )

# Testing Plan

-  **1.3 System Testing**
  - **Goal:** Simulate real-world use.
  - **Key Aspects:** Portion accuracy, feeding logs, failsafe detection (<15s), power failure recovery.
-  **1.4 Acceptance Testing**
  - **Goal:** Validate the prototype with users.
  - **Process:** Beta testing for usability, accuracy, alerts & multi-cat functionality.

# Tools Used

Testing Phase	Tools
Unit Testing	PyTest, Jest (for UI), Arduino Serial Monitor
Integration Testing	Postman (API validation), MQTT Simulator
System Testing	LoadRunner (performance), Wireshark (network analysis)
Debugging Tools	Arduino Serial Monitor, MongoDB Compass (database inspection)

# Success Criteria

The **Smart AI Cat Feeder** will be successful if:

## 1. Automated Dispensing

- I. Food portions are dispensed with  **$\pm 5\text{g}$  accuracy** within **5 seconds**.

## 2. Cloud Integration

- I. App commands sync with the feeder **within 2 seconds**.
- II. Logs and feeding history are **retrievable and accurate**.

## 3. Failsafe Mechanism

- I. If a portion is **not verified within 15 seconds**, an **alert is triggered**.
- II. If a cat is **not detected within 30 minutes of scheduled time**, a **notification is sent**.

## 4. User Accessibility

- I. Multi-user support allows **up to 32 authenticated users**.
- II. Mobile app displays **real-time food capacity ( $\pm 20\%$  accuracy, updates every minute)**.

# Functional Requirements Testing

Functional Requirement	Testing Method	Expected Result
Feeding Profiles	Create multiple profiles with different portion sizes and frequencies	Feeder dispenses as per schedule
Portion Control	Use a scale to measure dispensed food	Portion accuracy within $\pm 5\text{g}$
Cloud Connectivity	Simulate network loss and restore	Feeder resumes and syncs data
Logging & Alerts	Disable feeding system manually	Alert sent within 15 seconds
Companion App Controls	Change feeding time via app	Change is reflected in feeder

# Non-Functional Requirements Testing

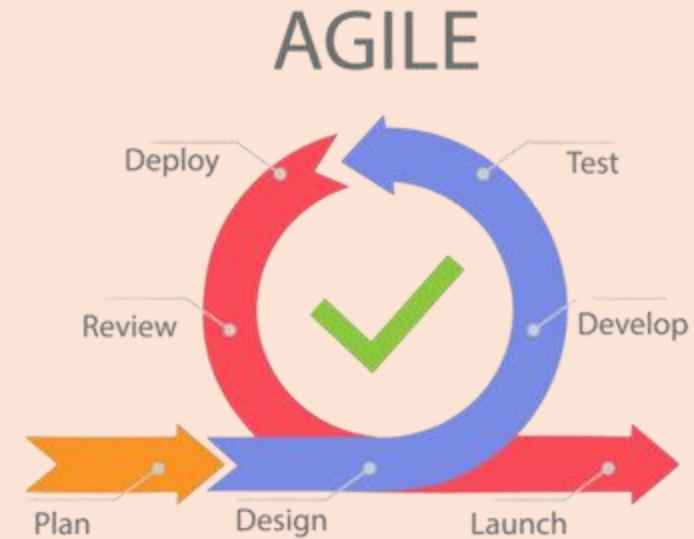
Non-Functional Requirement	Testing Method	Expected Result
Performance (Response Time)	Simulate multiple feeds in quick succession	Feeder processes all within <b>5 seconds</b>
Load Capacity	Fill with <b>1.25L of dry food</b> , track depletion over time	Food lasts for <b>1 week</b>
Failsafe Mechanism	Block dispensing and test alert system	Alert triggers within <b>15 seconds</b>
Multi-User Support	Register <b>32 user accounts</b>	All can control and monitor feeder
Food Capacity Indicator	Fill tank and check app updates	Accuracy within <b>±20%</b>



# Project Management Approach

## How will we use Agile?

- Work distribution via tickets
  - Feedback from group to refine product
  - Regular work reviews
- 



# Implementation of Agile

## Ticketing System

- Ticket on teams posted
- Description and importance level displayed
- Group can claim work
- Use of emojis for progress status



### Ticket Template

**Title:** [Brief Description]

**Priority:** [High/Medium/Low]

**Description:**

[Task Description, Bullet Points or Paragraph]

**Progress Emojis (React With Appropriate Emoji):**

Claimed: 🖐️

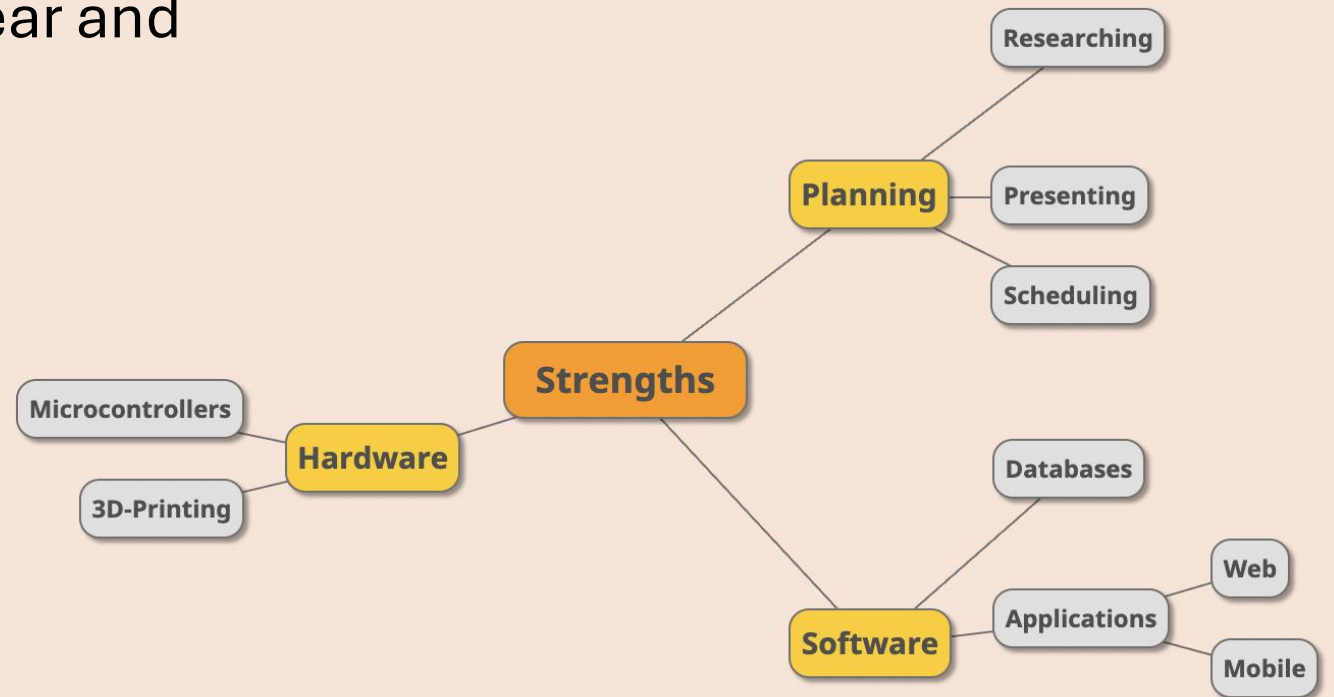
In-Progress: 🔄

Complete: ✅

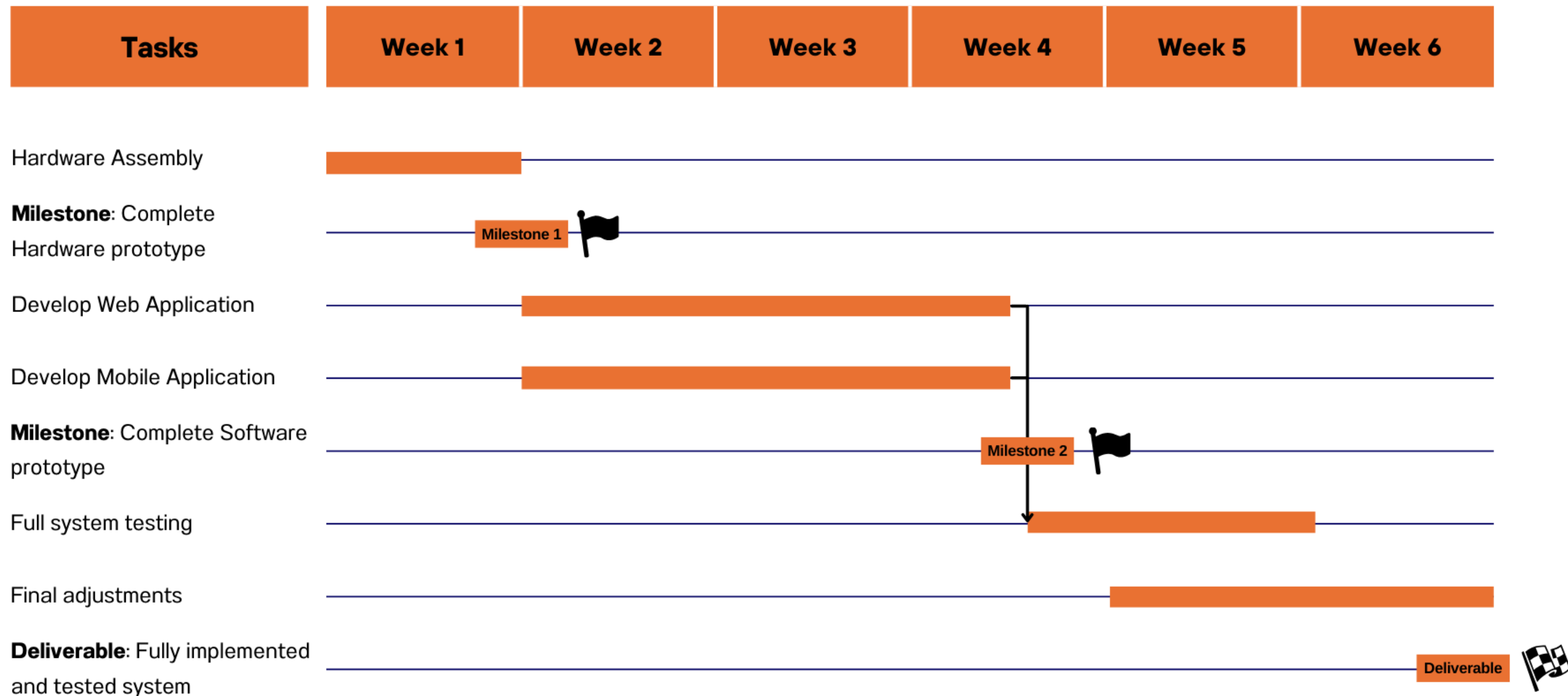


# Why have a project plan?

- Breaks down the project into clear and concise tasks
- Keeps the project on schedule
- Leveraging team strengths for better efficiency



# Development Gantt Chart



# Risk Analysis

## 1. Technical Failures

- *Risk:* Device malfunctions affecting food dispensing.
- *Mitigation:* **Failsafe mechanisms** (e.g., ultrasonic sensors) ensure successful dispensing and alert owners if an issue arises.

## 2. Connectivity Issues

- *Risk:* Wi-Fi or cloud service failures impacting remote access.
- *Mitigation:* **Local storage of feeding schedules** ensures continuous operation even if the internet is down.



### 3. Adoption & Usability Challenges

- *Risk:* Users may struggle with setup or app configuration.
- *Mitigation:* **User-friendly interface, clear instructions, and customer support** for a seamless experience










### 4. Manufacturing & Supply Chain Delays

- *Risk:* Component shortages delaying production.
- *Mitigation:* **Diversified suppliers and backup inventory management** to avoid delays.





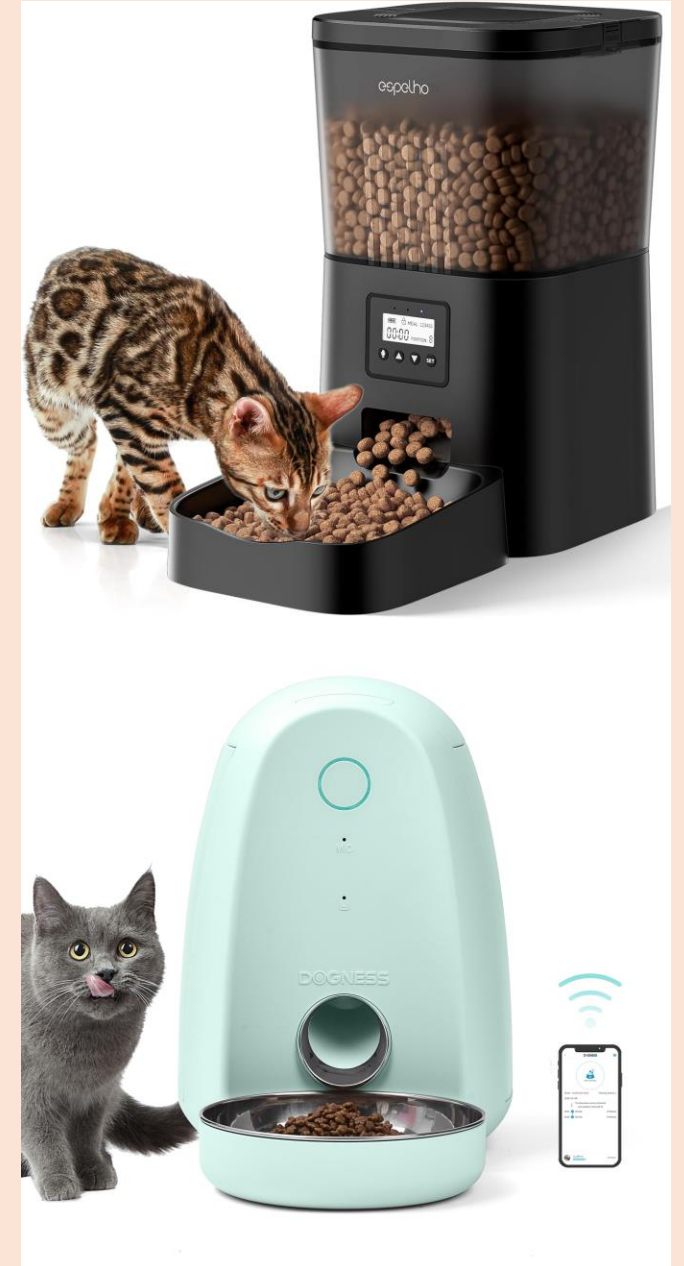
# Risk Matrix Layout

Likelihood \ Impact	Low Impact	Medium Impact	High Impact
High Likelihood	 Usability Challenges	 Connectivity Issues	 Technical Failures
Medium Likelihood	 Minor Setup Issues	 Supply Chain Delays	 Device Malfunctions
Low Likelihood	 Aesthetic Concerns	 Minor Firmware Bugs	 Customer Adoption



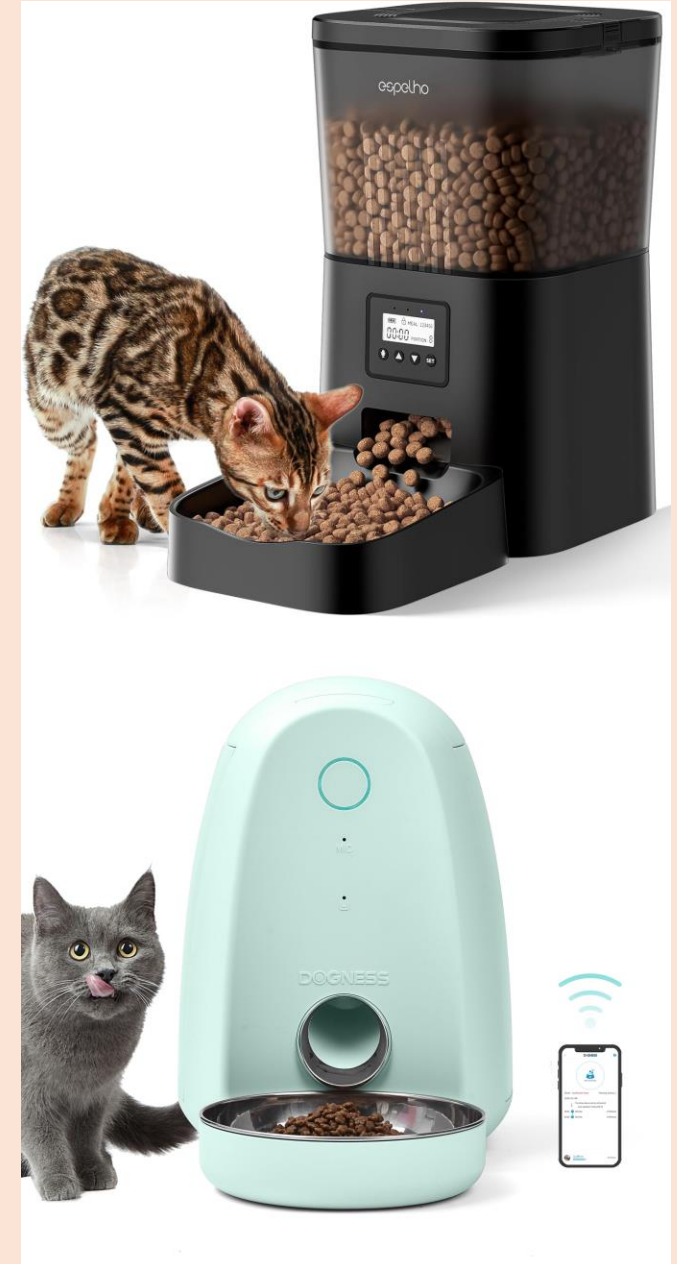
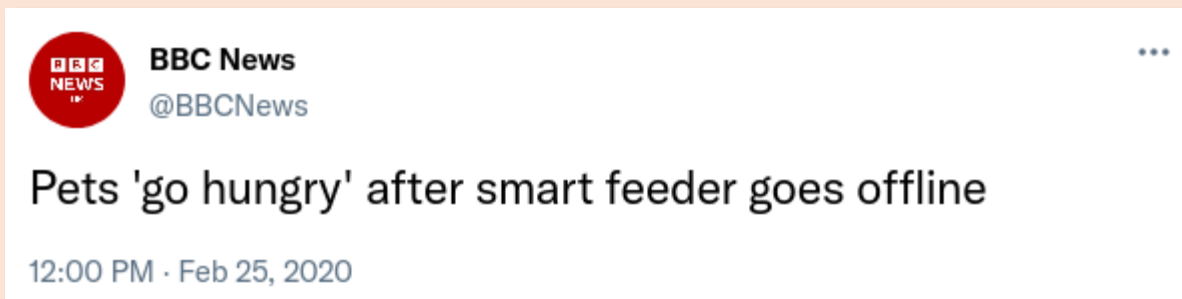
# Our Advantage

- **Local Storage of Schedules:** Ensures feeding even during Wi-Fi outages.
- **Multi-User Support :** Allows seamless access for all household members and pet sitters.
- **Failsafe Mechanisms:** Ultrasonic sensor confirms successful food dispensing, reducing the malfunctions.



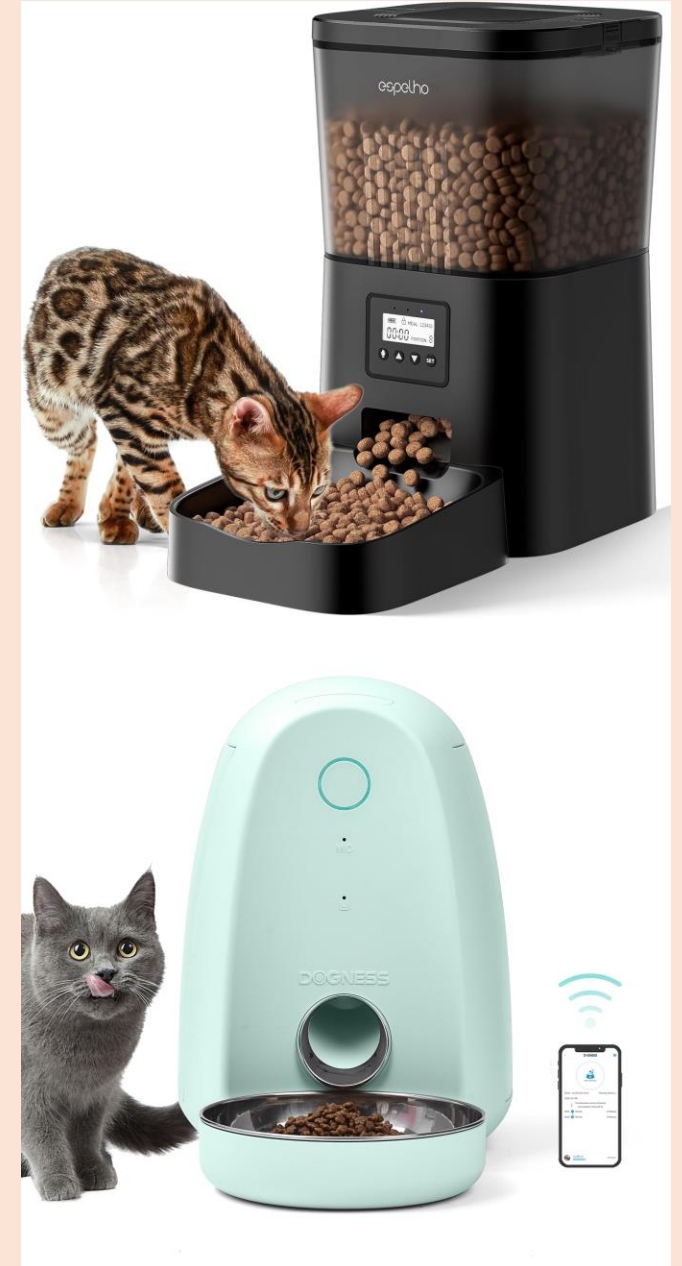
# Competitor Limitations

- Fully reliant on cloud connectivity, feeding stops if Wi-Fi is down.
- Limited or no multi-user support.
- No verification system for successful food dispensing.



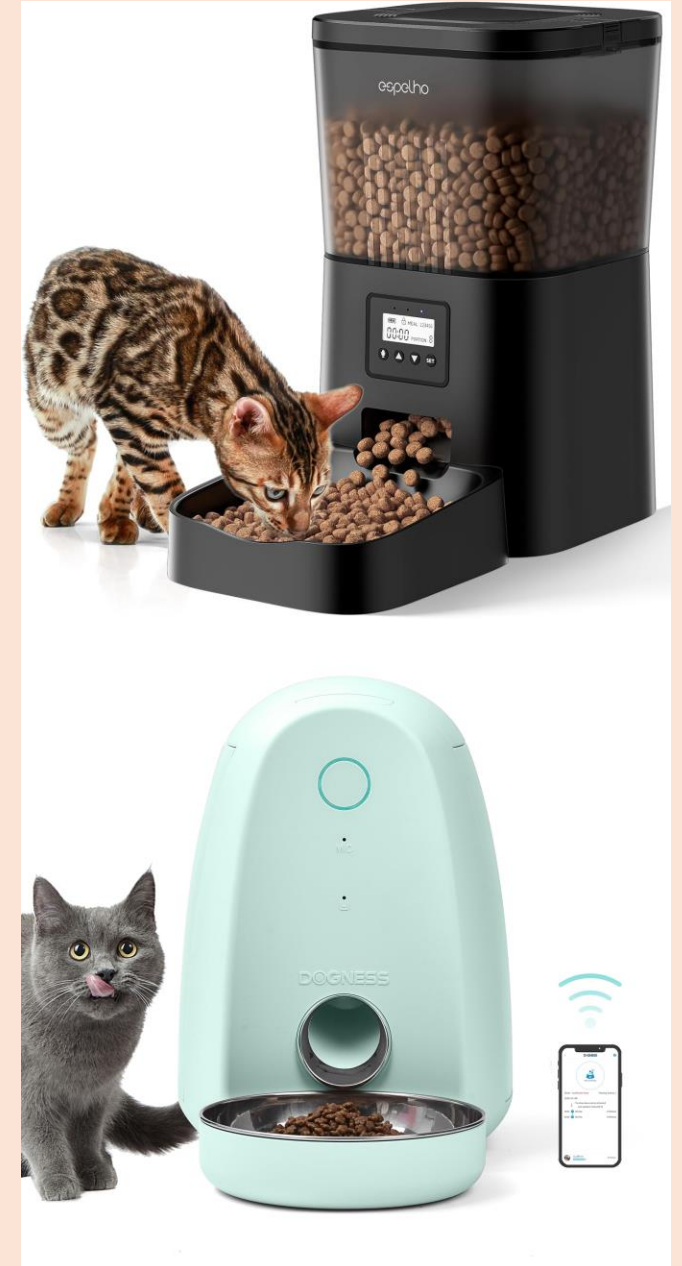
# Our Advantage

- **AI-Powered Tracking:** Logs timestamps, duration, and video snippets of each feeding.
- **Feeding Insights:** Detects trends in pet eating behavior, helping owners adjust portions.
- **Real-Time Notifications:** Alerts owners when feeding is missed or unusual patterns happen.



# Competitor Limitations

- Basic feeding logs with no advanced analytics.
  - No real-time tracking or video insights.
  - Limited feedback on pet eating habits.
- 



# Benefits for Pet Owners

- **Convenience:** Automated feeding eliminates the stress of missed meals.
- **Peace of Mind:** Real-time monitoring ensures pets are fed properly.
- **Multi-Pet Homes:** Prevents food theft and promotes **healthier eating habits**
- **Time-Saving Automation:** Eliminates the need for manual feeding, perfect for busy pet owners.
- **Customizable Feeding Plans:** Tailor meal portions based on your pet's age, weight, and dietary needs.





# Benefits for Pets

- 🐾 Healthier Diet
- 🐾 Consistent Feeding Routine
- 🐾 Smart Recognition
- 🐾 Reduces Anxiety & Stress
- 🐾 Prevents Overfeeding & Underfeeding
- 🐾 Supports Special Diets



# Impact of the Smart AI Cat Feeder

## Health & Well-being

- Prevents **obesity** with controlled portions.
- Ensures **consistent meal schedules** for better digestion.

## Convenience for Pet Owners

- **Remote monitoring & smart alerts** via the app.
- **Time-saving automation** for busy lifestyles.

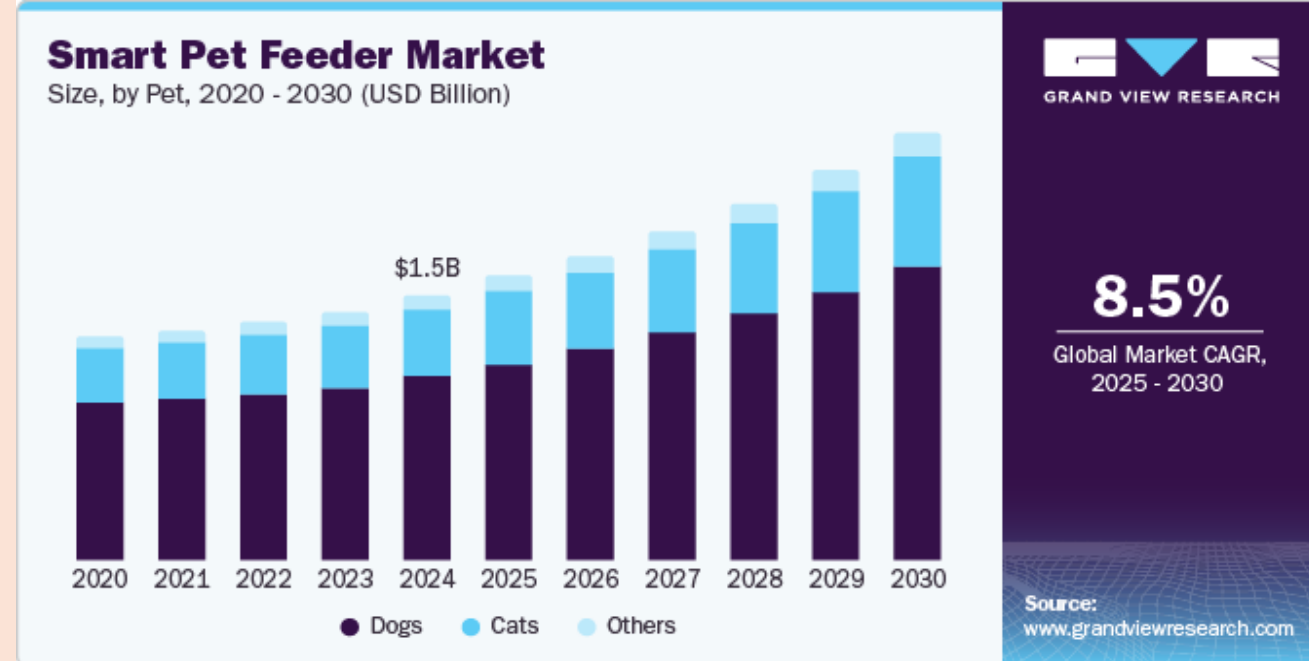


## Technological & Market Growth

- AI-powered **feeding insights & health tracking**.
- **Smart home integration** (Alexa, Google Home).

## Sustainability & Eco-Friendliness

- **Reduces food waste** with precise portions.
- **Energy-efficient & rechargeable battery backup.**  
Made with **eco-friendly materials**.



# Conclusion



## Smart Feeding, Healthier Pets

- The **Smart AI Cat Feeder** ensures **precision, convenience, and pet well-being**.
- It **eliminates overfeeding, ensures timely meals, and adapts to individual pet needs**.
- Our **smart technology** provides real-time monitoring, alerts, and AI-driven insights.

## A Game-Changer for Pet Owners

- **Peace of mind:** Never worry about missing a feeding.
- **Time-saving automation:** Smart schedules for busy pet owners.
- **Scalable innovation:** Future enhancements with AI and smart home integration

# Why Invest in Us

- **Growing pet tech market** with increasing demand for smart solutions.
- **Competitive edge** with AI-driven features and eco-friendly design.
- **A meaningful impact**—improving pet health and owner convenience.

## Join Us in Revolutionizing Pet Care!

Be part of the future of pet technology. Support us in bringing this smart solution to every pet-loving home!





Questions