

2025 Capstone Project

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Introduction

- PetPal is an **AI-powered** smart feeder that uses camera, sound, and weight sensors to identify different cats and automatically dispense food based on breed and body size. The system provides real-time analysis and feeding records via mobile updates, ensuring accurate and adaptive pet care.
- Initially designed for cats, the modular framework allows future support for other animals in homes, shelters, and clinics.
- Motivation:** Traditional feeders lack customization. PetPal solves this by promoting healthier, breed-specific feeding while reducing the burden on pet owners.

System Modules



The Pet Detection Module utilizes a YOLO pre-trained model for accurate and efficient pet detection.



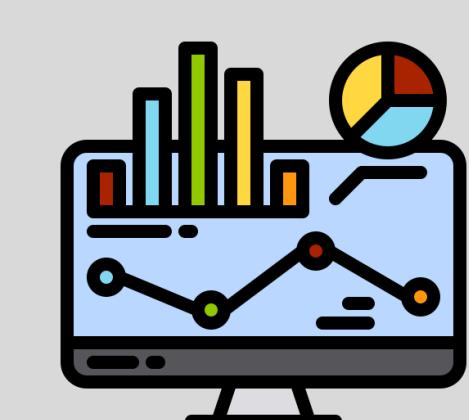
MeowTrack Module: No Meow Left Behind – AI That Listens and Detects



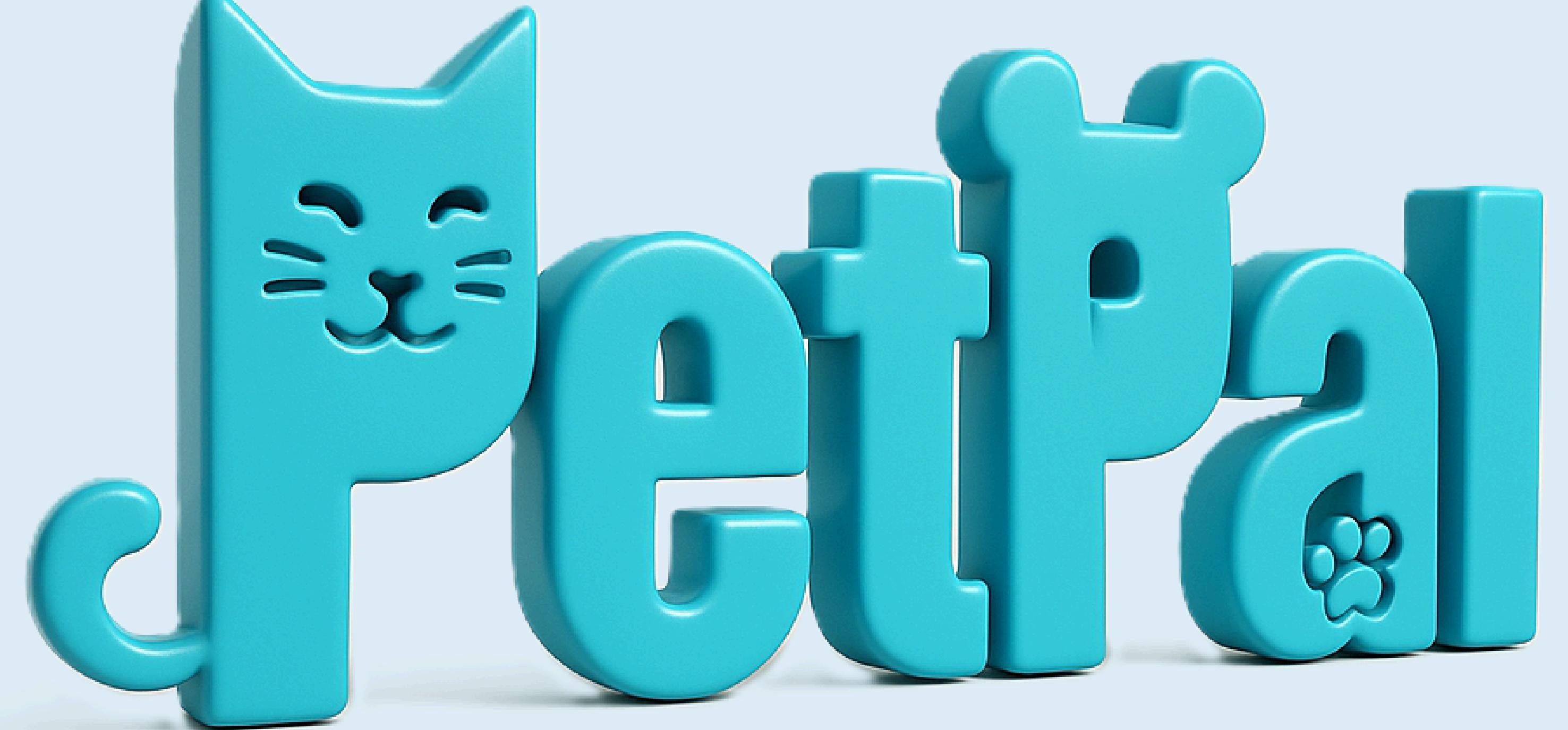
Cat Breed Recognition Module identifies Orange Tabby and Tuxedo cats using a lightweight CNN model, enabling accurate and automatic breed detection.



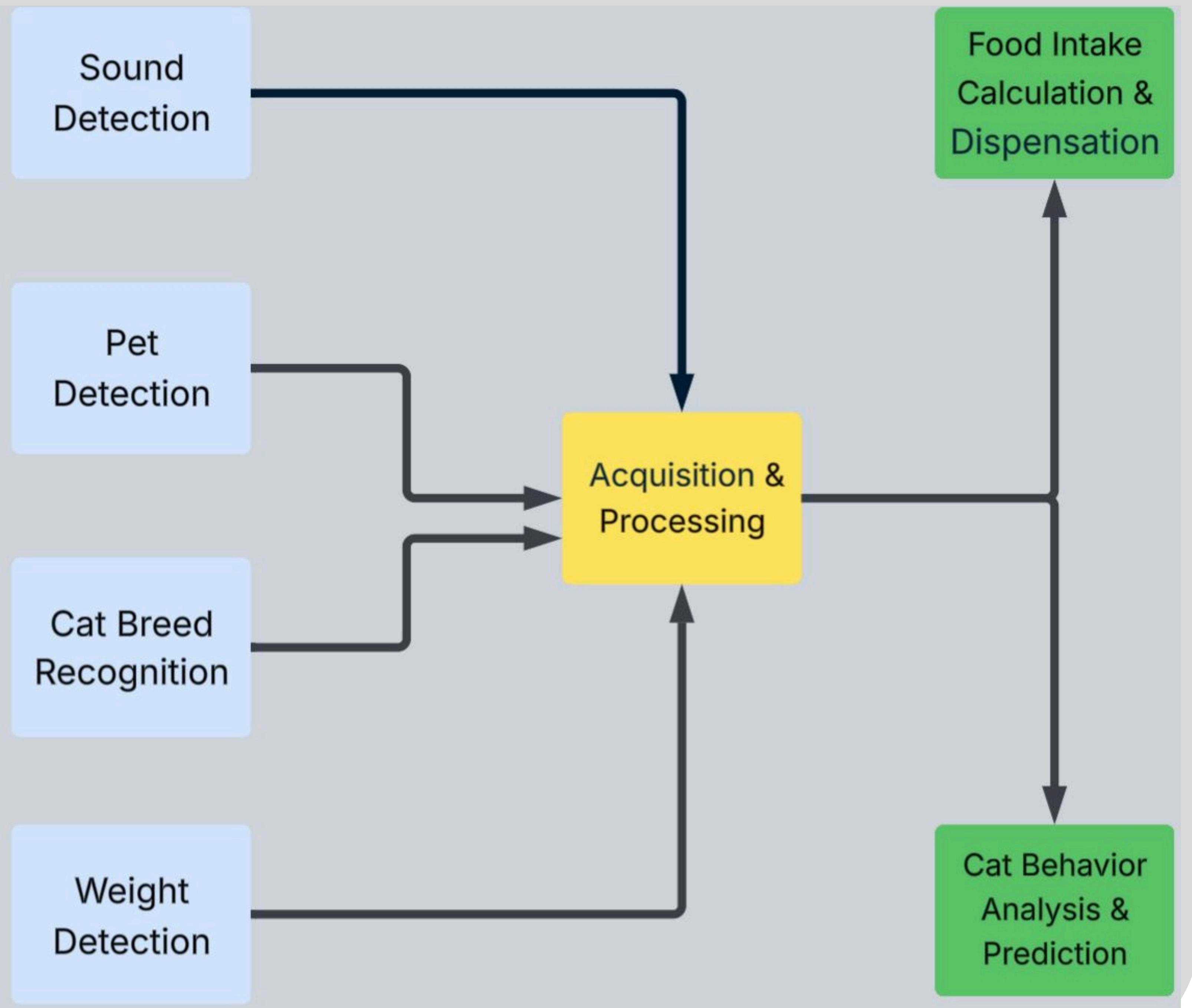
The Weight Sensor Module filters noisy readings using Median, EMA, and Standard Deviation checks, ensuring only stable measurements trigger motor-controlled food dispensing.



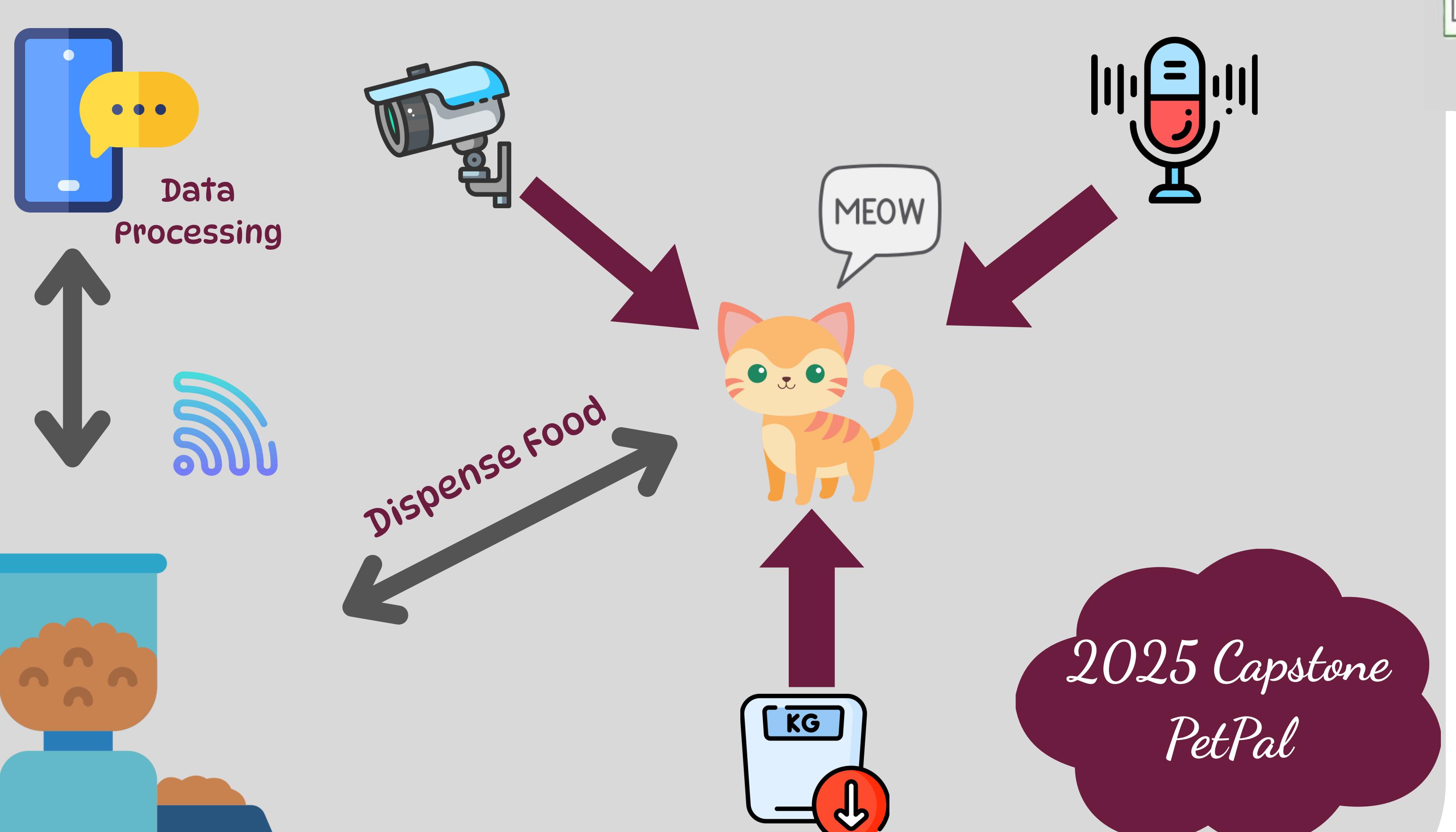
The cat behavior analysis and prediction module receives data from the previous module, uses Tensorflow's neural network to analyze and predict, and sends the results to the user's mobile phone



System Workflow



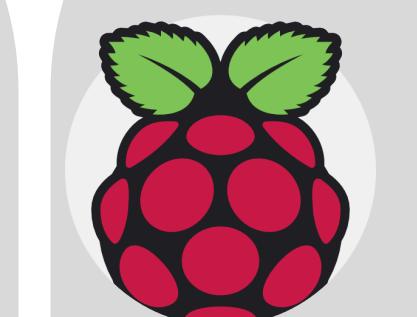
Design Presentation



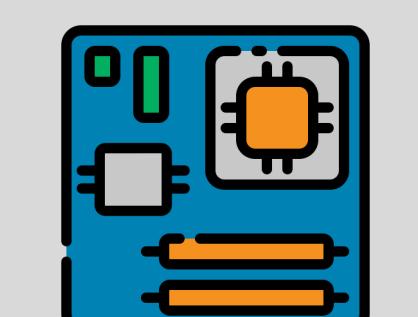
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Realization

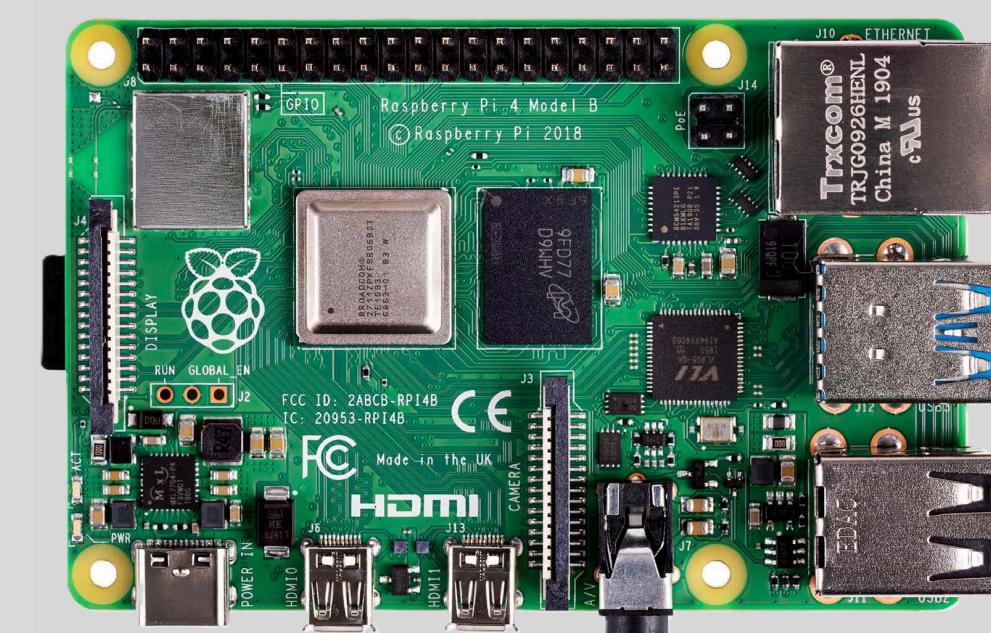


Raspberry Pi

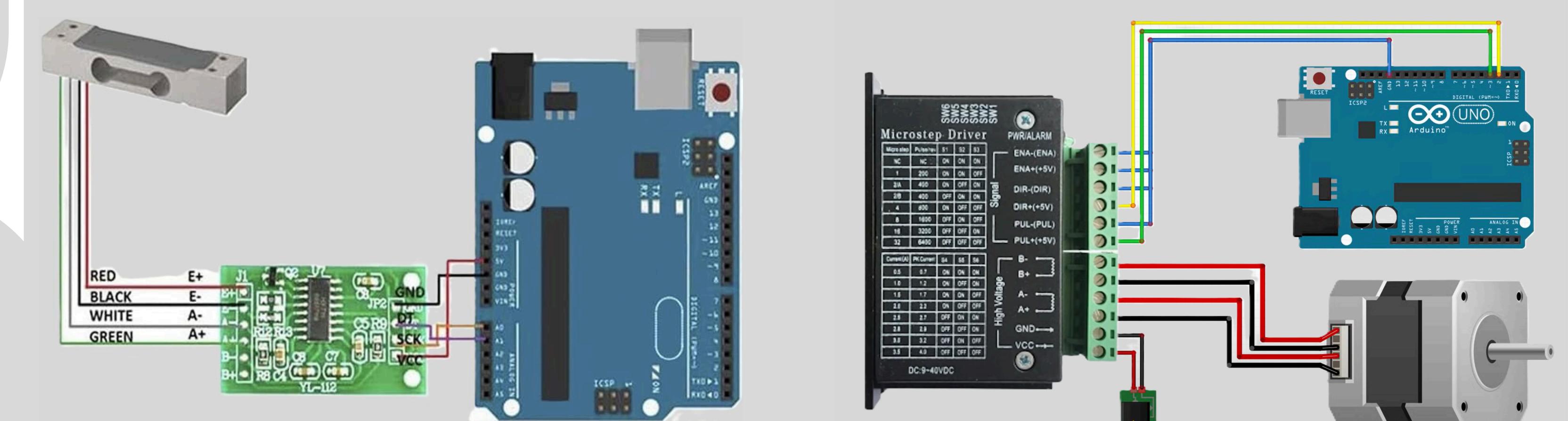


Arduino Uno

- Executes** AI inference for pet detection and sound/breed classification using lightweight models deployed on Raspberry Pi.
- Transfers** control commands to Arduino via Wi-Fi (TCP) for real-time actuation.



- Measures** pet weight with filtered sensor data to ensure stable, accurate readings before food dispensing.
- Analyzes** behavioral patterns using neural networks to predict feeding needs and notify the user in real time.



Conclusion

- Petpal enhances autonomous pet care by integrating AI model, weight sensing, and precise data analysis.
- Modular components ensure accurate pet identification, breed classification, and adaptive portion dispensing based on real-time data.
- Project success highlights the potential of embedded AI systems in improving convenience, personalization, and pet well-being.