Feasibility Study

By Audrey Park, Magen Mozeh, Kat Flynn
01/22/2025

User Need

- In the recent Los Angeles wildfires, many pets were left behind or were unable to evacuate due to their owners not being home
  - The nonprofit Pasadena Humane has taken in more than 400 animals, including dogs, cats, birds, and goats [1]
  - Approximately 40,000 pets die in residential fires each year, most from smoke inhalation, and 500,000 pets are affected overall [2]

[1] https://www.nbcnews.com/news/us-news/california-rescue-groups-open-doors-pets-burns-rcna187184
[2] https://www.avma.org/javma-news/2018-02-15/when-fire-strikes-home

Market Survey

- **Consumers:**
  - Pet owners with caged animals (e.g., birds, reptiles, small mammals like rabbits or hamsters).
  - People who work long hours or travel frequently
- Currently many temperature and humidity pet cage sensors are on the market, but they don't include air quality sensors
- Some currently include the capability to open and close the cage doors remotely, depending on the environment [3]

[3]
https://www.lacrossetechnology.com/products/d111-101-e1-dpet

Conceptualization

- **Safety functions:**
  - Monitors environmental conditions — temperature, air quality, humidity — and release pets from cages in case of emergency.
  - Alerts pet owners via text/email on current environmental conditions and crate state.
  - Having automatic calls to emergency contacts (ie. animal rescue, emergency response units, pet owner themselves, friends & family) integrated is a nice new feature to include
  - Customizable emergency list
- **Everyday functions:**
  - Allows owners to remotely control their pet's cage state
  - Automatic timers on door for everyday pet care

Requirements

- **Specifications:**
  - Sensors to detect humidity, temperature, air quality, and smoke
  - Electromechanical lock to unlock and open the door to the pet cage for quick escape
- **Constraints:**
  - Detection range
  - Device only releases pet from the cage but not from the house
  - Sensors must reliably detect hazardous conditions but avoid false alarms
  - The device must operate within a specific temperature and humidity range
  - Emergency response time relies on owner availability and listed emergency contacts
- **Shall:** The device *shall* monitor environmental conditions and trigger alerts.
- **Will:** The device *will* send automatic notifications to the owner and emergency contacts upon releasing the pet from cage.
- **Should:** The device *should* have a threshold and include customizable emergency contacts with an automatic call feature.

Feasibility

SWOT: Strengths are remotely saving pets' lives by detecting hazards and automatically releasing them from cages while providing real-time monitoring and alerts. **Weaknesses** are potential false alarms, **Opportunities** are a growing demand for pet safety technology, smart home integration, and partnerships with organizations to expand market research. **Threats** are reliability concerns for system malfunctions, where pets could be released at the wrong time.

- **Technical**: There is hardware (sensors, actuators, etc...) and software available for this project.
- **Economic**: Since these hardware components are widely available, the economic feasibility is attainable as these sensors are inexpensive and easy to replace during the prototyping process.
- **Legal**: Legally, this product is feasible.
- **Organizational**: This project is fairly simple in terms of difficulty, making its creation attainable for this team.
- **Schedule**: It is possible for this project to be developed within our given schedule.