Smart Cat Door

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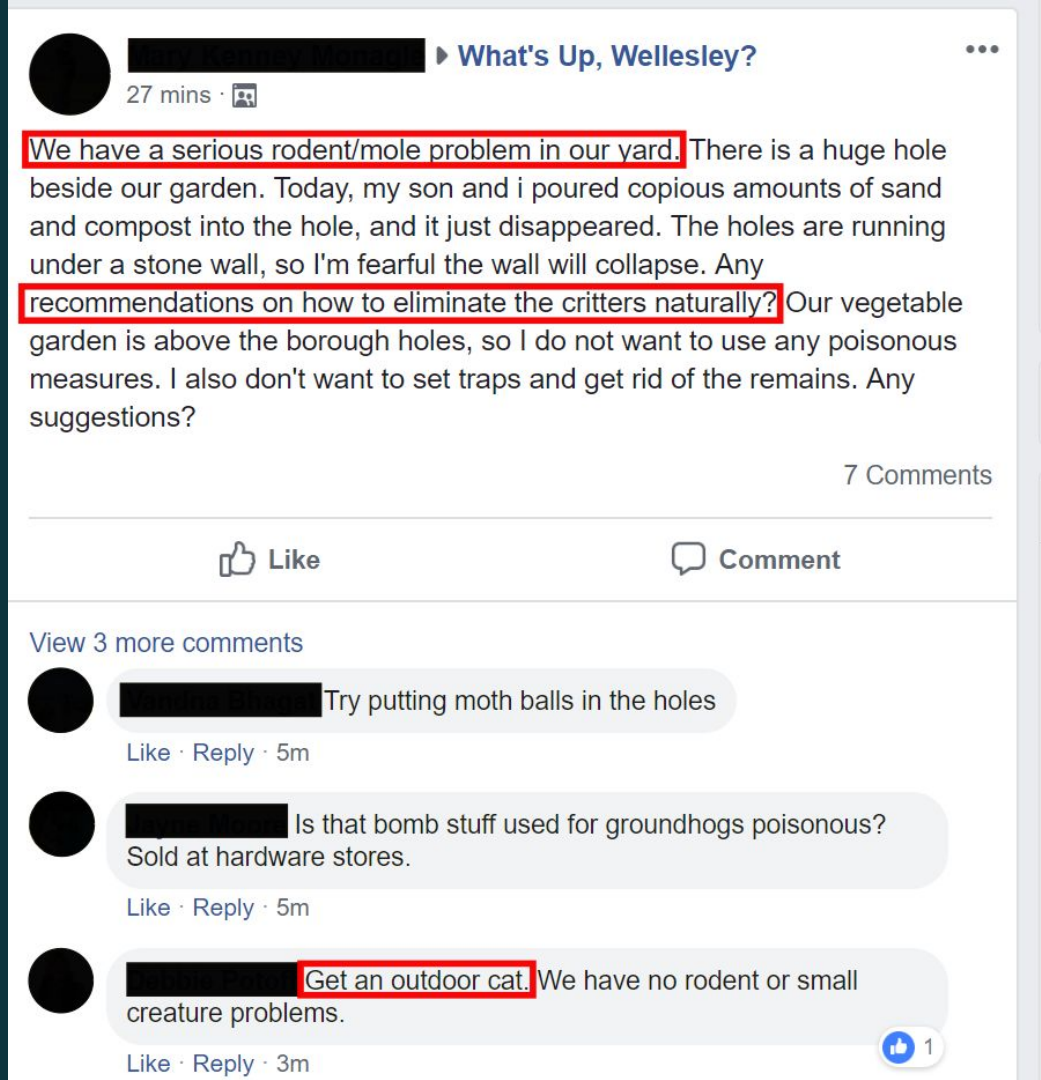
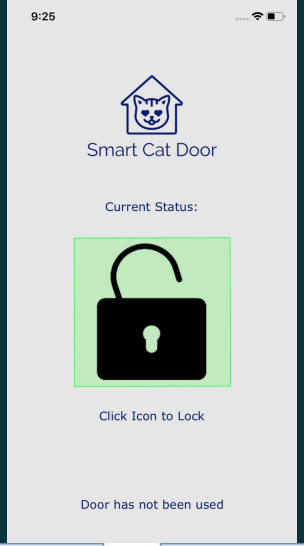
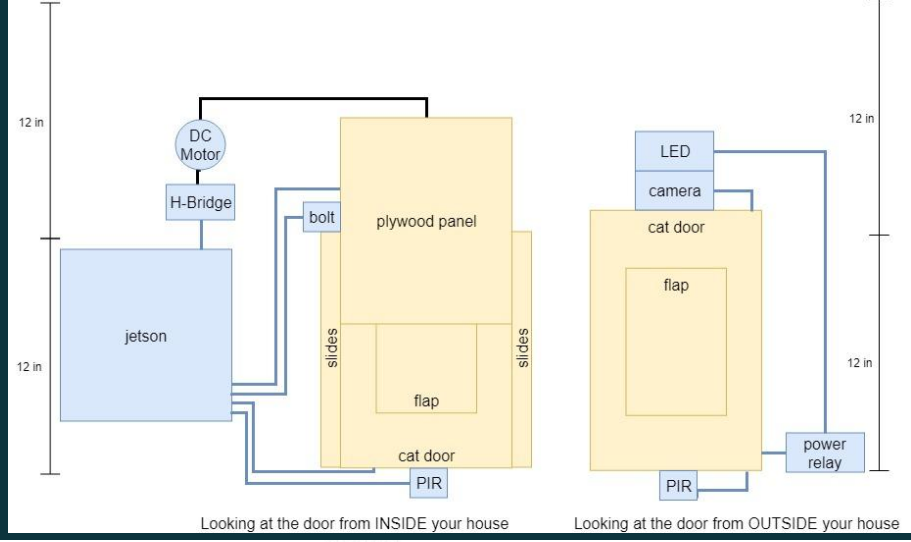
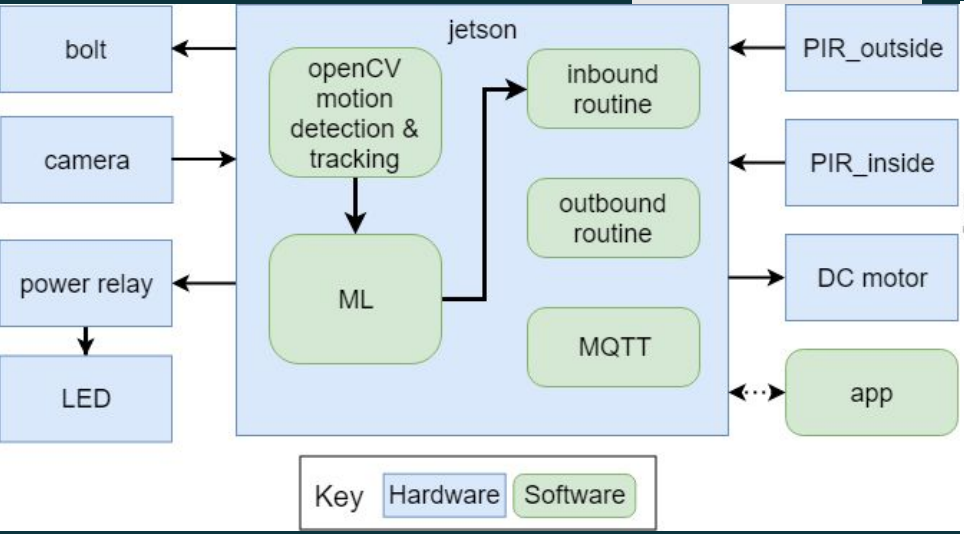
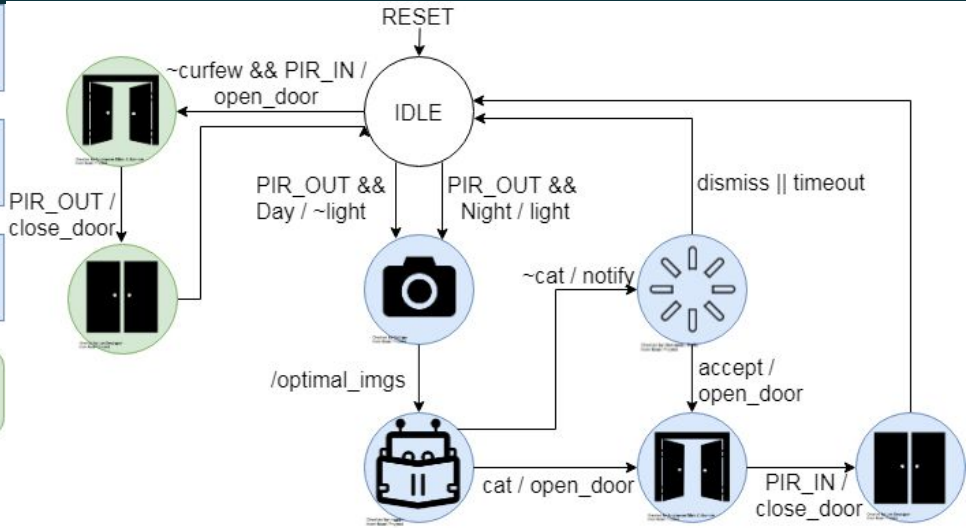


Solutions Approach









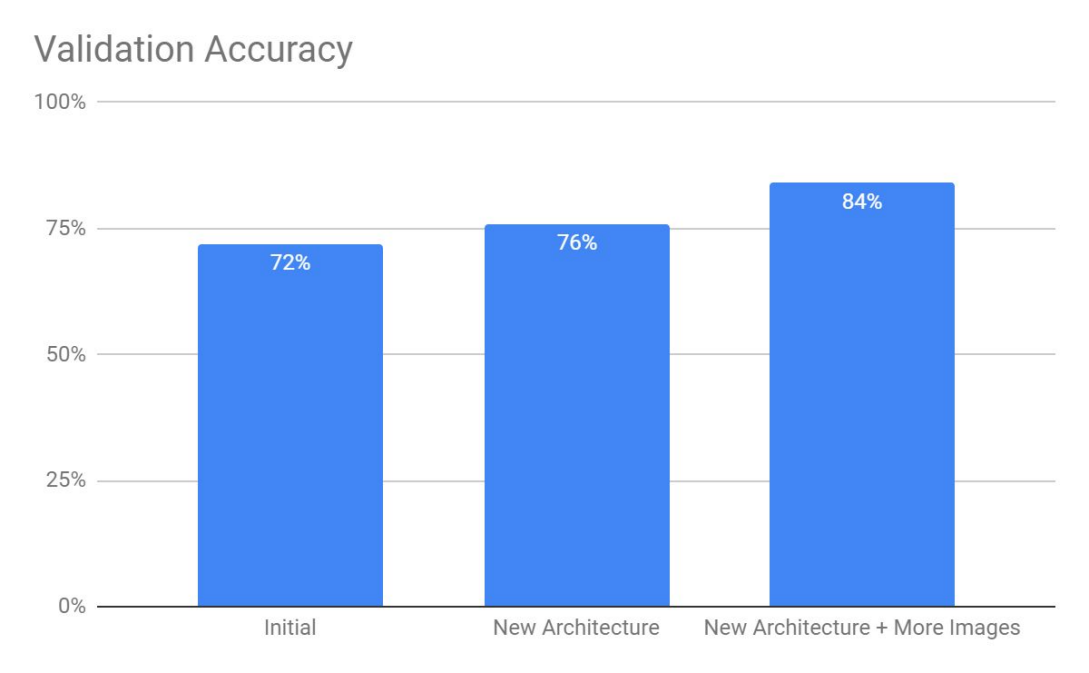
Complete Solution

ML Classification:

- 95% -> 84%
- 5200 images -> 8000 images

Classification of Breeds:

- Validation accuracy of 40%
- Viable with larger data set



Complete Solution

Computer Vision:

- Record last 10 frames taken within the last second
- If 80% are of a cat, then open the door

Mechatronics:

- DC motor
- Close if no motion is seen on both sides of the door

Advancements from Existing Products

- Keeps out raccoons more than 90% of the time
- Can lock door (in outbound direction) and view usage from iPhone App
- Automatic

Demo

Live demo with system:

- Printed images of animals to trigger classification
- Monitor to demonstrate ML and CV algorithms at work in backend
- App functionality
  - View recent usage
  - Remote locking and unlocking

Not live demo things:

- Comparison of night vs day

Testing

- Basic Capabilities:
  - Door automatically opens and closes when cat is detected
  - Locking the door with phone app
  - LED turns on when animal is near PIR sensor
- Machine Vision
  - Test on real objects
  - 50 images per animal, once at day, and once at night
  - 50 human trials
- We did NOT test with a live cat

Metrics

Metric	Goal	Actual
Sound	70 dB	43 dB spike at solenoid click
Time for door to open	1.1s	>30s 😭😭😭
Door locking strength	13.6kg	Not tested yet
FPS processed	-	~16
Holding Torque	-	More than any of our fingers

Project Management

Remaining work:

- Fix ML script for the Jetson
- Comparison of night vs day
- Fix solenoid and wire gpio

Changes in the schedule:

Week	Original Schedule	Updated Schedule
13	Integration	Debugging
14	Integration and Testing	Debugging and Integration
15	Testing and Presentation	Integration and Presentation
16	Poster and Paper	Testing and Wrap-up

Lessons Learned

- Do as much research as possible
- Ask for help on getting help