Bird Deterrent Robot

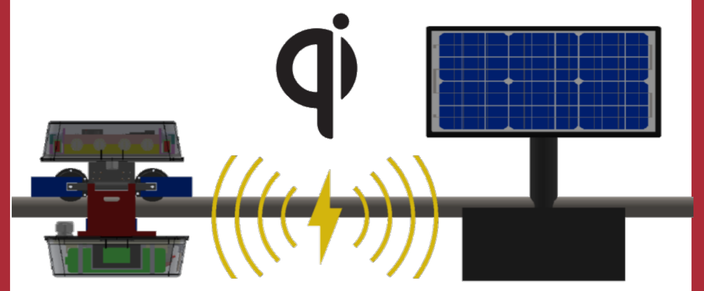
Brandon Chong (ECE), Jack Leserman (RBE),
Jake Mercier (ECE), Jeremy Trembley (RBE), Jolie Walts (RBE)
Advisors: Prof. Greg Lewin (RBE), Prof. William Michalson (RBE/ECE),
Prof. Jing Xiao (RBE)

ABSTRACT

Ravens continue to damage equipment at Eversource Energy's Rimmon Substation in Goffstown, New Hampshire, causing power outages for up to 10,000 customers. In an effort to deter ravens from high voltage equipment, we have created a robot that patrols a transmission line, detects ravens using computer vision and an artificial intelligence (AI) model to facilitate bird detection. The integration of sensors, power systems, and waterproofing methods allow for reliable bird deterring operations.

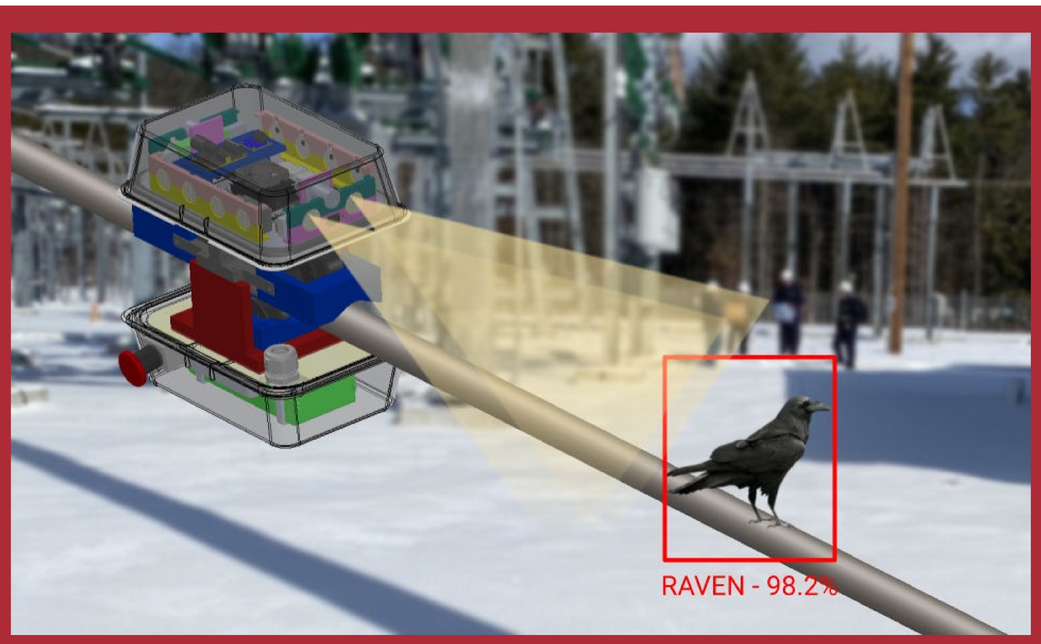
SYSTEM CHARGING

A solar panel connected with a solar regulator will wirelessly charge the robot's battery when near the end of the wire using the Qi Wireless standard.

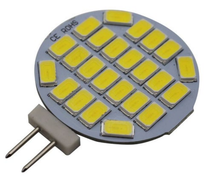


MOBILE APPLICATION

- Allows for Eversource officials to arm, disarm, and view robot data
- Reports position on the wire and system status
- Uses REACT, a flask server and a mobile hotspot to communicate with the robot
- Allows for tele-operation



DETERRENTS

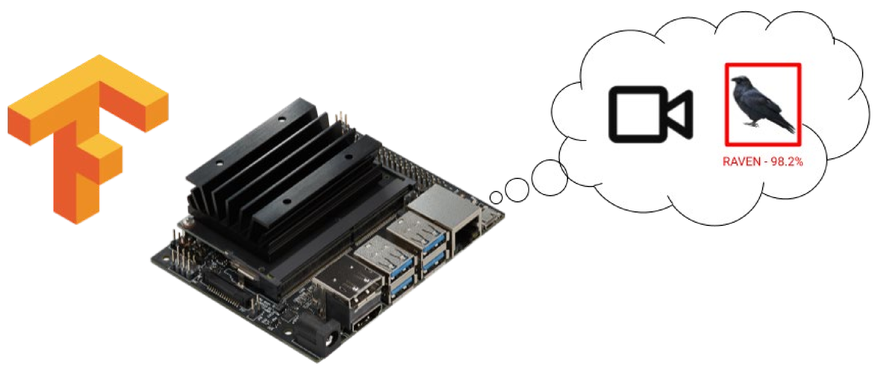


LED-Based Visual Deterrents flash bright lights at ravens

Speakers produce directional sound deterrents

BIRD DETECTION

Using Tensorflow and OpenCV, we created an AI model that can detect a raven in the field of view of the robot's camera. We trained the AI with model ravens in different scenery and lighting conditions from various angles.



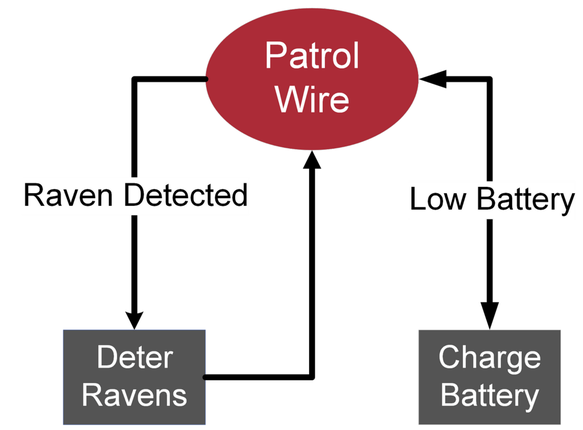
ACKNOWLEDGMENTS

We would like to extend our gratitude to:
Thelma Brown and Umair Zia at Eversource
Kristen Keane, Julia Toplyn and Kunal Nandanwar at WPI.

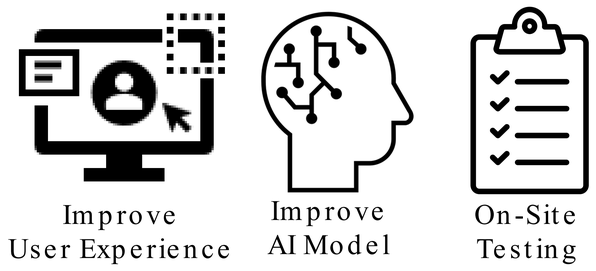
PROBLEM STATMENT

- Autonomously discourage ravens from tampering with high-voltage switches
- Detect and classify birds using an AI
- Avoid harming wildlife
- Withstand inclement weather
- Communicate with a mobile app

SYSTEM FLOW



FUTURE WORK



- Extended testing at substation
- Compatibility with additional birds and locations
- Continue Improving AI Model
- 360° Deterrents and AI Detection
- Additional Deterrents
- Improved Human Robot Interaction
  - Additional Mobile App Functionality
  - LED Visual Signaling System