Lab 1 - Pest Patrol Product Description

Andrew Undercoffer

Old Dominion University

CS 410

Professor James Brunelle

Apr 10, 2022

Version 2

Table of Contents

List of Figures

1.   Introduction

Pest encounters are a common occurrence in most communities. These encounters are often dealt with on an individual basis. However, a pest encounter is rarely an isolated incident. Many pests, such as ticks, mosquitoes, and rats, are often a problem for the whole community and not just for an individual (Parkman, 2021). A problem that affects a community requires a community based solution.

Unfortunately, communities often lack the necessary tools needed to deal with pests holistically (Community Approach to Managing Pests in Homes and Schools, 2017). Members of a community have no reliable way to stay informed on local pest encounters, they often don't share information on how to deal effectively with pests, and what information that does exist isn't consolidated. While there are tools available to an individual, these tools treat the problem as an isolated incident.

Pest Patrol is an application designed to protect communities from pests by allowing communities to consolidate and share information about pest encounters. The application keeps community members informed on all reported pest encounters in their community. It also allows community members to track pest outbreaks with customizable heat mapping. Additionally, the application canl aggregate already existing knowledge on specific pests. All of these functions are implemented in real time, so that community members are always kept up to date.

2.   Pest Patrol Product Description

Pest Patrol provides real-time location information on local pests, based on information submitted by local community members. This location information is displayed as a heat map that shows the concentration of various pests. Additionally, users of the application can post pest related questions to the application, to which other users can respond. The overall goal of the application is to consolidate all local pest related information in one easy and convenient location.

2.1   Key Product Features and Capabilities

Key Features of Pest Patrol include, incident mapping, heat mapping, incident alerts, discussion board. Incident mapping and heat mapping provide the user with an overview of pest activity in their local area, as reported from fellow local users. The incident alert is a mobile device notification that alerts users to particularly hazardous pests that have been reported near the users proximity. The discussion board allows for posting and commenting on local pest incident reports.

The incident map provides the user with an overview of pest encounters in their local community. Pest encounters are pinned to a map of the local area and display an icon indicating what type of pest was encountered. A question mark indicates that the species of pest is unknown. This map. shown in Figure 1, can be filtered by incident date, pest type, and the incident reporter.

Figure 1

Pest Patrol Incident Map
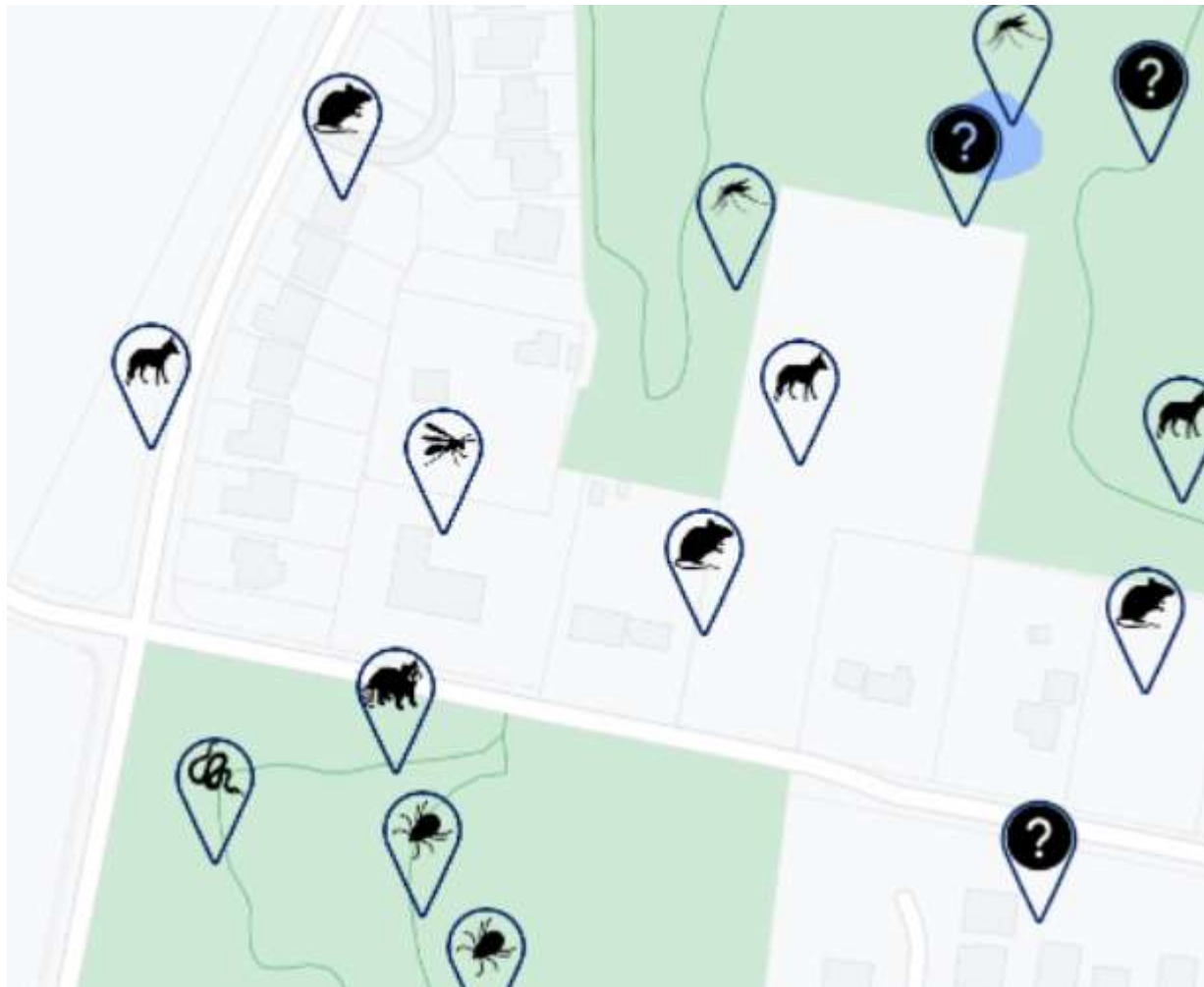
This incident map also has an alternative heat map view. This view is designed to showcase emerging pest trends for specific pests. Cooler colors on the alternative view indicate a lower probable concentration of specific pests, while warmer cooler indicate a higher probable concentration of a specific pest. These predictions are based on user reports, local historical data, and known pest behavior.

Closely associated with incident mapping is incident alerts. Incident alerts are mobile popup notifications. These notifications alert users to dangerous and persistent

pest encounters that are in their vicinity. An incident report of a rabid dog, rattlesnake

nest, or a bear would trigger an automatic incident alert for all local users. A user may

opt out of this service, if they so choose.

The application also has a basic discussion board. This discussion board has a

comment section for each pest incident report for a local community. Figure 2 provides

an example of the application's discussion board/comment section.

Figure 2

Pest Patrol Discussion Board View

This comment section displays the initial incident report at the top. Blue colored

icons near the incident picture indicate that the report has been verified by geo-location.

Associated comments are displayed under the "Replies" section. Thumbs up/down

icons allow the user to rate the initial post and the subsequent comments. Each post

and comment is tagged with the username and a date/time stamp. A quality rating is

also associated with each post and comment. This shows their overall quality rating.

2.2   Major Components (Hardware/Software)

The application will be primarily web based. No specialty hardware is required to access the application beyond a camera and an internet enabled device. The frontend of the application is created through the Angular web framework. This Angular framework connects to the middleware Node.js. Middleware services handle a variety of tasks including, geo-location, peer messaging, and machine learning. This middleware section is also an interface between the frontend and backend. Figure 3 provides an overview of the application's major components.

Figure 3

Pest Patrol Major Functional Component Diagram
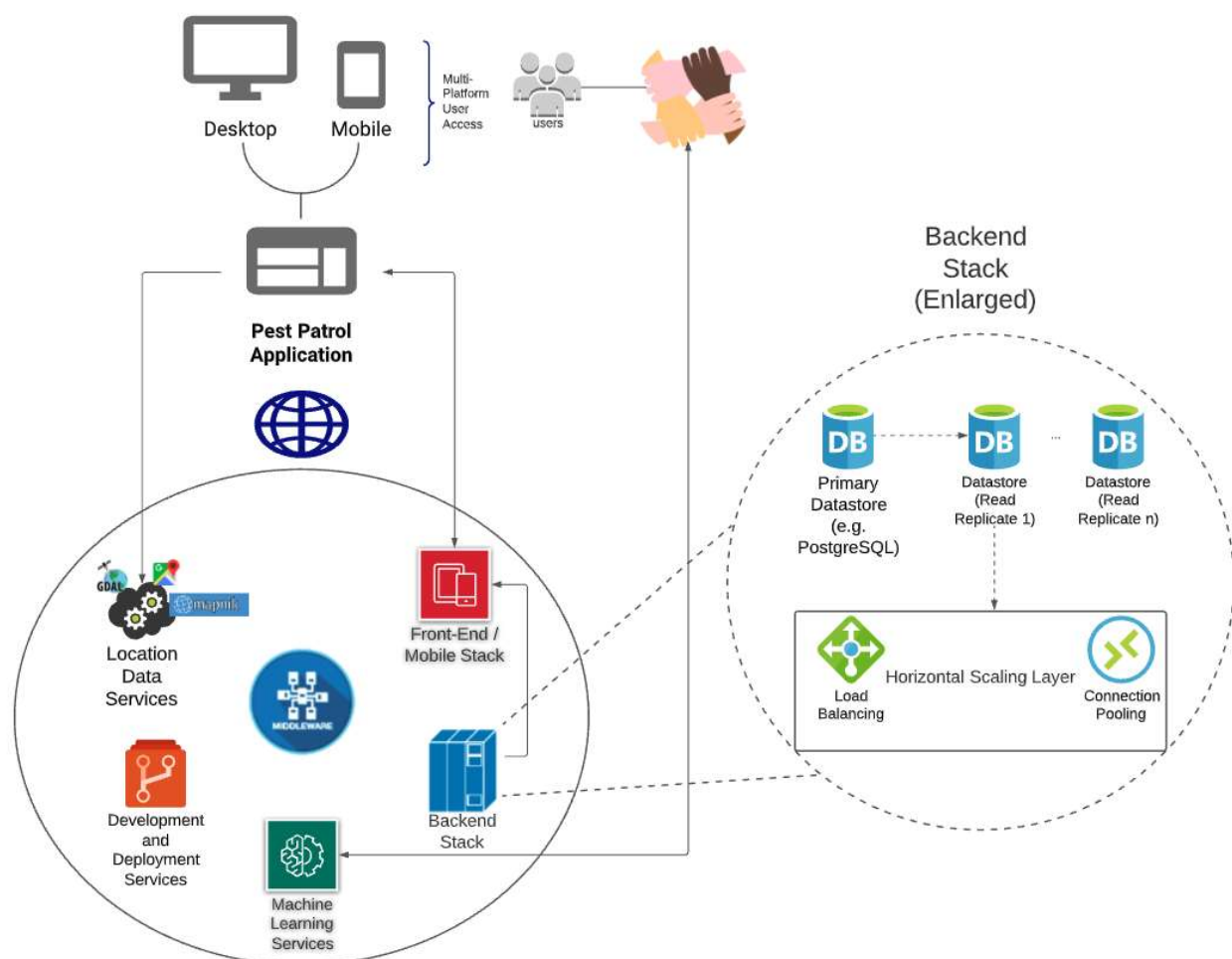
The frontend desktop/mobile sections connect the user to the pest patrol application, which connects to the middleware section. The middleware interfaces with the backend stack. This backend stack consists of several datastores, which implement load balancing and connection pooling. All of this then connects back to the frontend/mobile stack, which connects back to the frontend.

3. Identification of Case Study

Pest Patrol is primarily intended for use by community members, hikers, campers, and local governments. These groups all have a vested interest in avoiding and/or eliminating pests. Community members wish to protect themselves and their property. Hikers and Campers also wish to protect themselves and their property, but they also spend a great deal more time outside and this time is often spent in unfamiliar locations. The application will allow these outdoors people to better avoid pests, which will greatly improve their outdoor experience. Local governments have a duty to protect their citizens and their property from pests as much as possible. The application will allow them to better monitor and control pests that negatively affect community welfare.

The case study group for this application will be a simulated suburban neighborhood consisting of several families. This simulated community will demonstrate how pest patrol can be used to safeguard communities from pests.

Pest control companies, homeowners associations, government agencies, and researchers will all benefit indirectly from the Pest Patrol application. The application will give exterminators a better understanding of how to target a neighborhood's pest problems and better pest management will allow homeowners associations to more effectively maintain neighborhood home prices and the data gathered by the application will prove invaluable to both government agencies and researchers.

4. Product Prototype Description

Intentionally left blank

4.1   Prototype Architecture (Hardware/Software)

Intentionally left blank

4.2   Prototype Features and Capabilities

Intentionally left blank

4.3   Prototype Development Challenges

Intentionally left blank

5. Glossary

Bot Moderation: The automatic screening of user content to ensure proper user behavior.

Community Member: A member of a community, see Community definition.

Community: The people with common interests living in a particular area broadly the area itself.

Geo-targeting: Method of determining the geolocation of an application user and delivering different content to that visitor based on their location.

Geo-tagging: The process of appending geographic coordinates based on the location of a mobile device.

Heat Map: A data visualization technique that shows magnitude of a phenomenon as color in two dimensions.

Incident: An occurrence or sighting of a pest reported by a user.

Pest: Any animal or plant harmful to humans or human concerns.

6.   References

Abell, J. (n.d.). Nuisance Wildlife Encounters on the Rise.

https://www.homestead.org/lifestyle/homesteading-life/nuisance-wildlife-
encounters-on-the-rise/

Bugg, S., Colborne, S., & Haerther, D. P. (2020, March 2020). Great Lakes
Invasives: Sea Lampreys. https://www.sheddaquarium.org/stories/great-
lakes-invasives-sea-lampreys

Coyle, D. (2021, September 10). Not So Fast! International Biosecurity Program
Succeeds in Preventing Spread of Invasive Moth.
https://entomologytoday.org/2021/09/10/international-biosecurity-program-
succeeds-preventing-spread-invasive-moth-lymantria-dispar-asiatica/

Community Approach to Managing Pests in Homes and Schools. (2017, September
14). https://extension.psu.edu/community-approach-to-managing-pests-in-
homes-and-schools

Herring, D. (2012, March 6). Climate Change: Global Temperature Projections.
https://www.climate.gov/news-features/understanding-climate/climate-
change-global-temperature-projections

How Warmer Winters Affect Pests. (2018, January 15).
https://varmentguard.com/blog/warmer-winters-affect-pests

Japanese Beetle Repeatedly Eradicated from California. (n.d.).
https://www2.ipm.ucanr.edu/Invasive-and-Exotic-Pests/Japanese-Beetle/

Lyme Disease Costs Up to $1.3 Billion Per Year to Treat, Study Finds. (2015,

February 5). https://publichealth.jhu.edu/2015/lyme-disease-costs-more-than-

one-billion-dollars-per-year-to-treat-study-finds

Parkman, K. (2021, September 23). Pest control statistics and trends.

https://www.consumeraffairs.com/homeowners/pest-control-statistics.html

U.S. Census Bureau. (2021, April 21). Residents of 14 million housing units reported

seeing roaches, 14.8 million saw rodents in last 12 months.

https://www.census.gov/library/stories/2021/04/how-many-american-homes-

have-pests.html