EPICS SMART CITY

Fall 2018

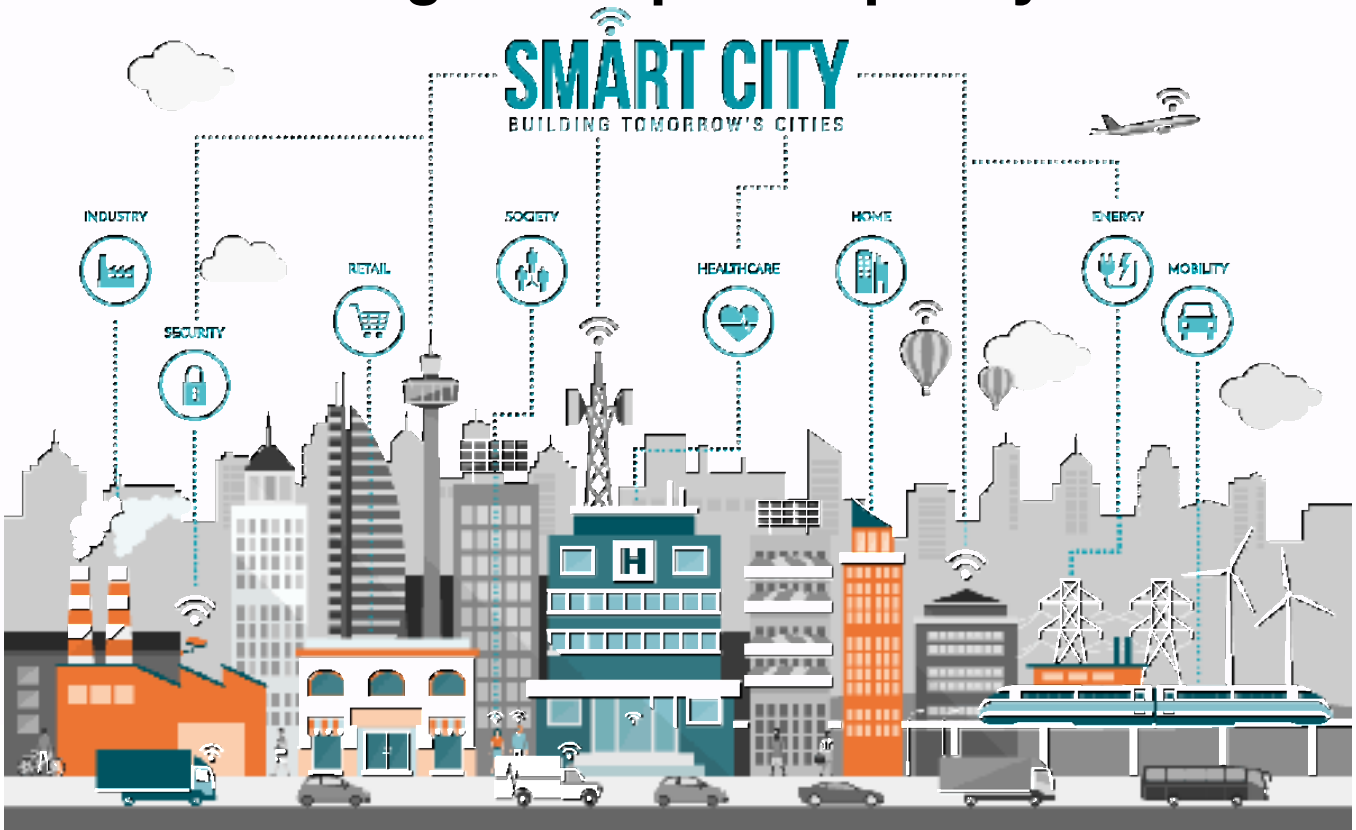
EPICS PURDUE

Presentation Agenda

- What is a Smart City?
- Project Background
- Fall 2018 Teams:
  - Application Development Team
  - Visualization Team
- Future Development

What is a Smart City?

- **The ultimate goal: Implement technology and the internet of things to improve quality of life.**

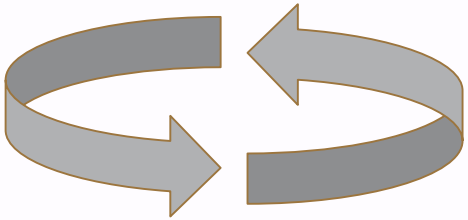


Project Background - The Problem

CITY OF
WEST LAFAYETTE

Project Background - The Solution

Phone Application



Website

Citizens of West Lafayette

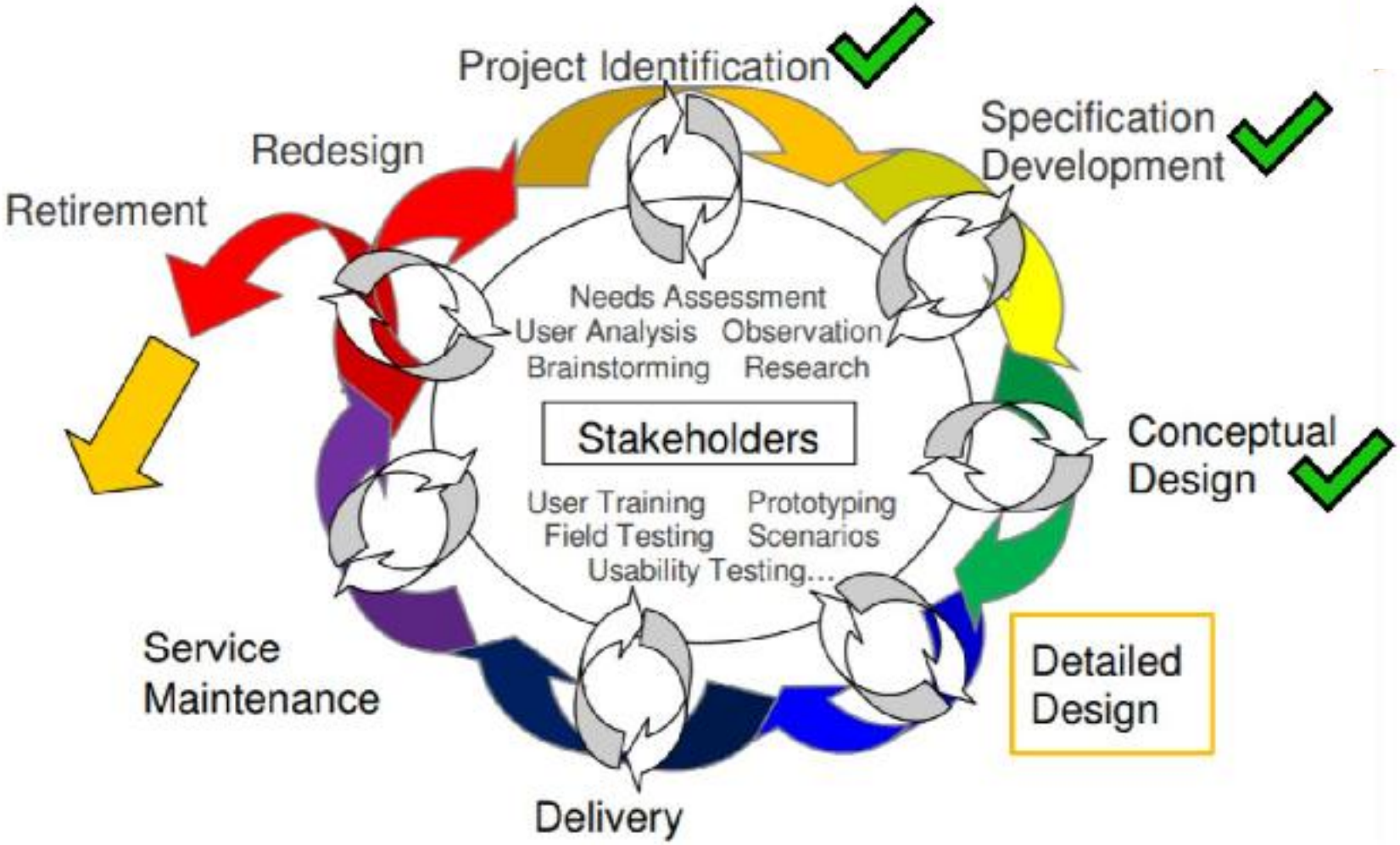
Engineers of the City of West Lafayette

Smart Cities Fall 2018 Teams

Application Development Team

Visualization Team

Smart Cities Design Approach



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Application Development Team

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Meet the App Team

Name	Role
Sahil	Design Lead
Alex	Project Partner Liaison
Kirthi	Back-End Developer
Sultan	Back-End Developer

Meet the App Team

Name	Role
Aaref	Team Member
Connor	Team Member
Zhichao	Webmaster
Yu-Shen	Team Member

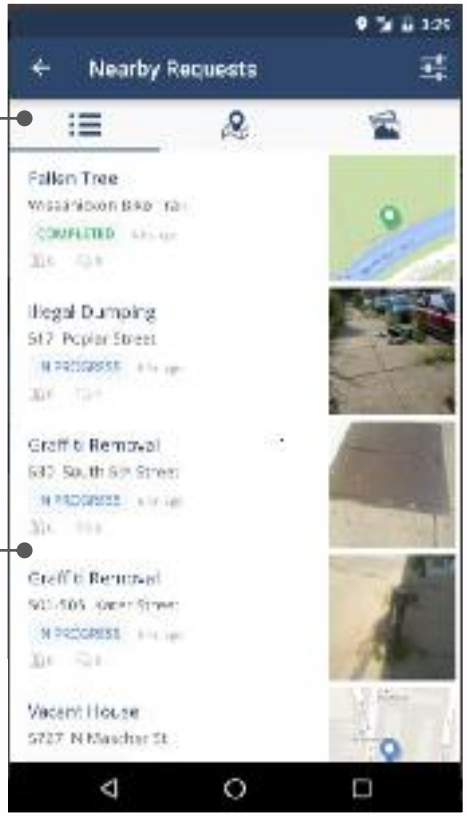
Competitive Analysis

Published: PublicStuff company
Launch Time: 2017/2/23
Download: 10000+
Rate: 114 users
Ratings: 4.1 stars

Published: City of Boston
Launch Time: 2010/11/5
Download: 10000+
Rate: 116 users
Ratings: 4.1 stars

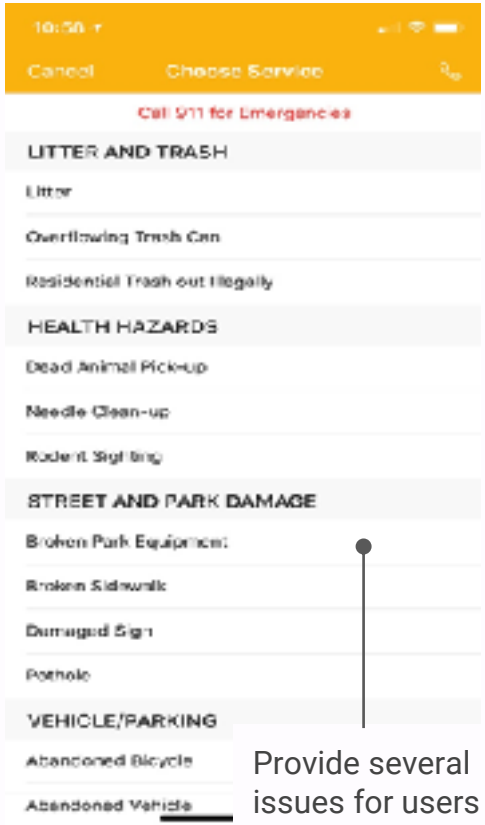
Published: City of Seattle
Launch Time: 2013/5/9
Download: 10000+
Rate: 93 users
Ratings: 3.5 stars

Competitive Analysis

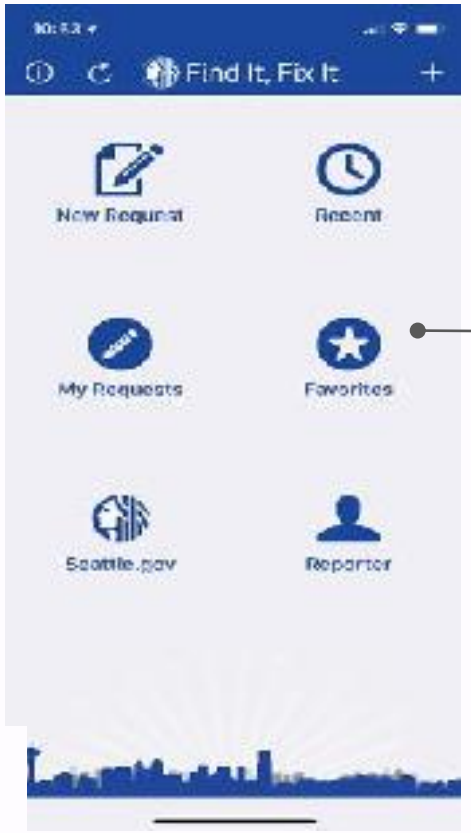


Provide different modes (list, map and pictures archive)

Provide status for users to know the progress



Provide several issues for users to select, including pothole



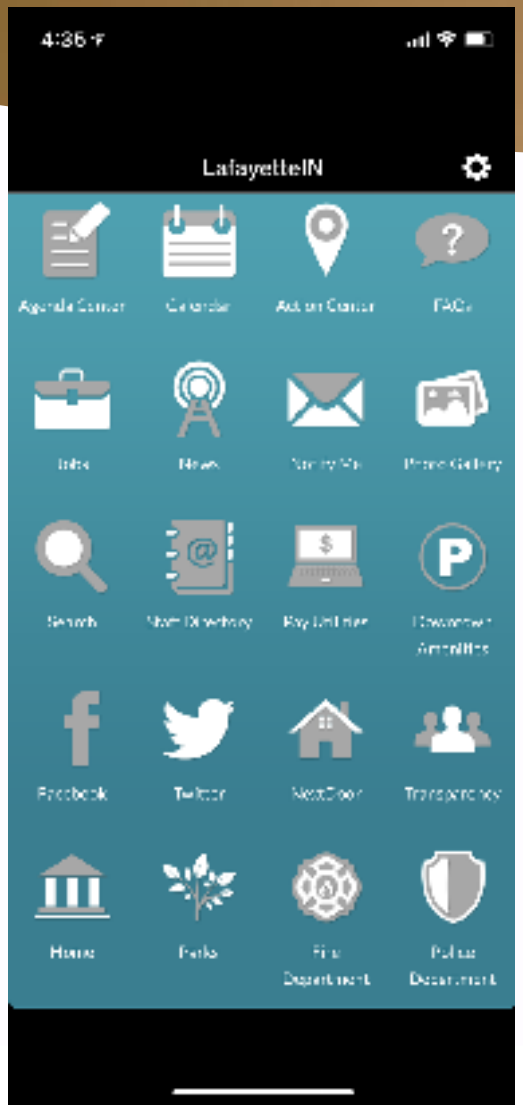
Users can archive their own requests and favorite requests

Interview Findings

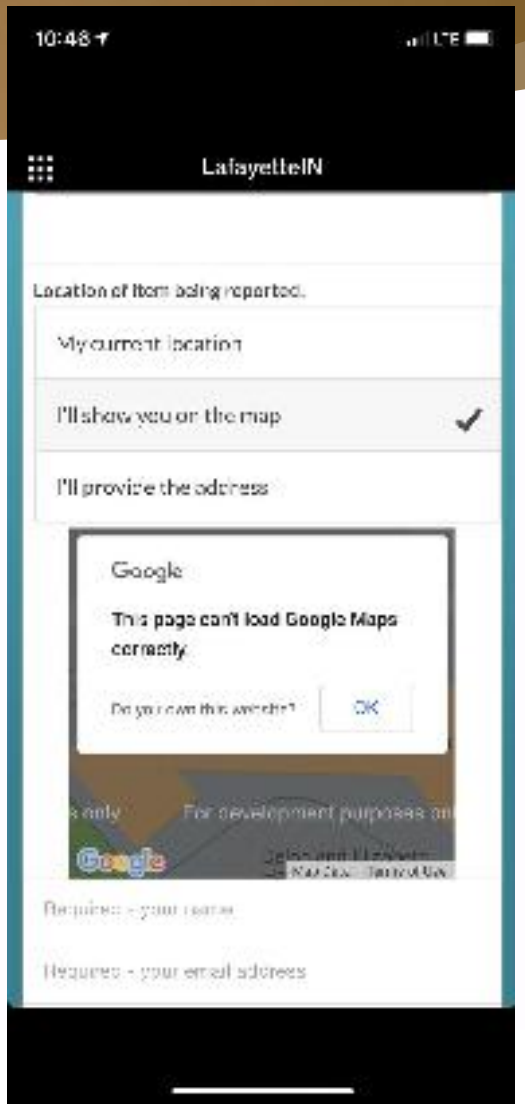
- Features to be implemented this semester:
  - Drop down menu for issues selecting
  - Photo of the issue
  - Progress updates
  - “Like” issues to avoid duplicating reports

- Features for the coming semesters:
  - User mode
  - Tutorial

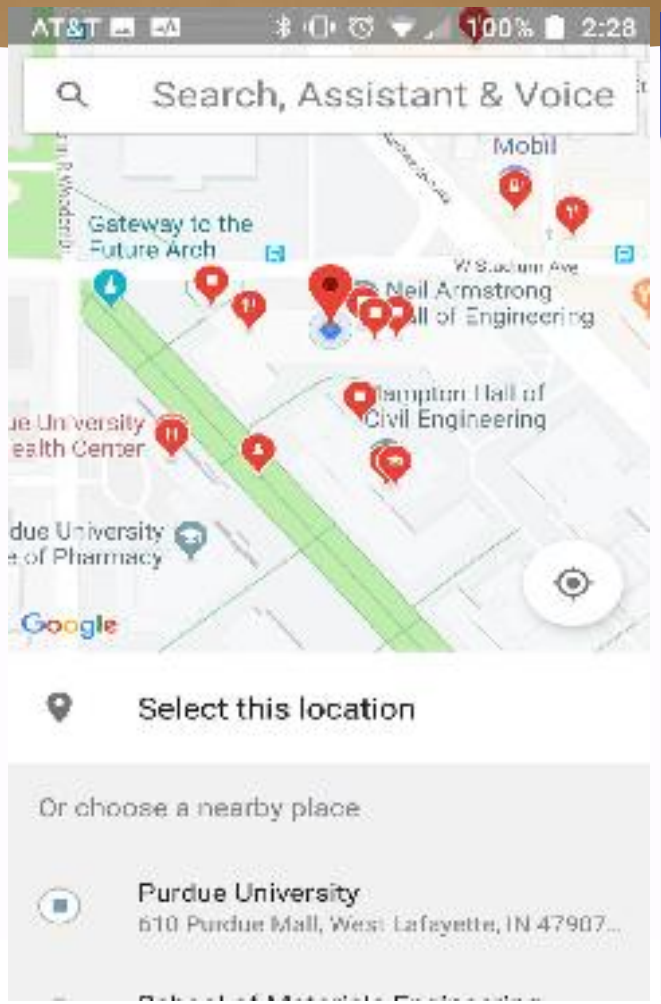
Current App Used -- By Neighbor City

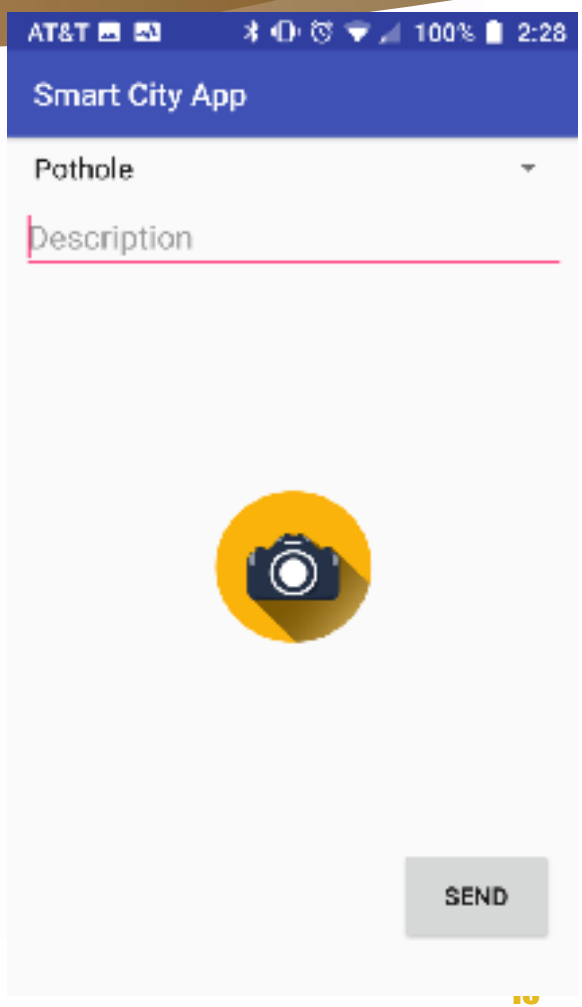


- App for the City of Lafayette
- Lot of things going on on homescreen
- Bugs
- Mainly just links to website



Our App and Demo





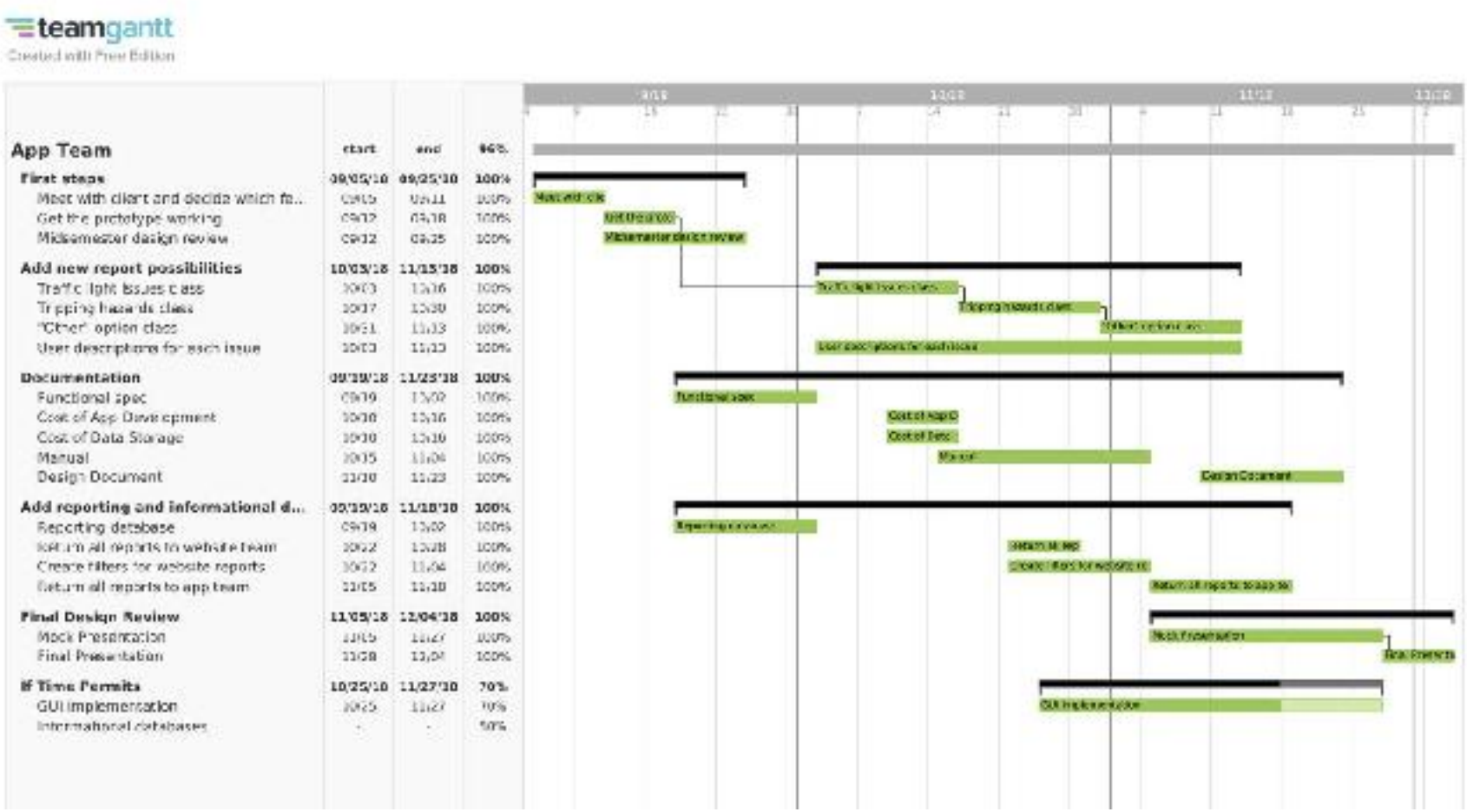
Cost Analysis of App Development

Website	Platform	Development Cost	Maintenance Cost (~20% of development cost)
Otreva Calculator	Android and website	$93,000	$18,600
Otreva Calculator	Multi-platform and website	$167,400	$33,480
Estimate My App	Android and website	$89,100	$17,820
Estimate My App	Multi-platform and website	$130,500	$26,100

AWS vs Firebase

	Pros	Cons	Cost of storage
AWS (Amazon Web Services)	• Experience in the market (7 years) • Flexibility of data storage location	• Higher learning curve • Billing is confusing • Have experienced high level outages	• 5 GB of free storage each month for the first year • $0.023/GB for the first 50 TB • $0.022/GB for the next 450 TB
Firebase (Google)	• Lower learning curve • Ease of migrating into another service • Easier to scale • Highly secure	• Relatively new service • Expensive when scaling	• 5 GB of free storage per month • $0.026/GB for any consecutive GB of storage

GANTT Chart & Our Goals



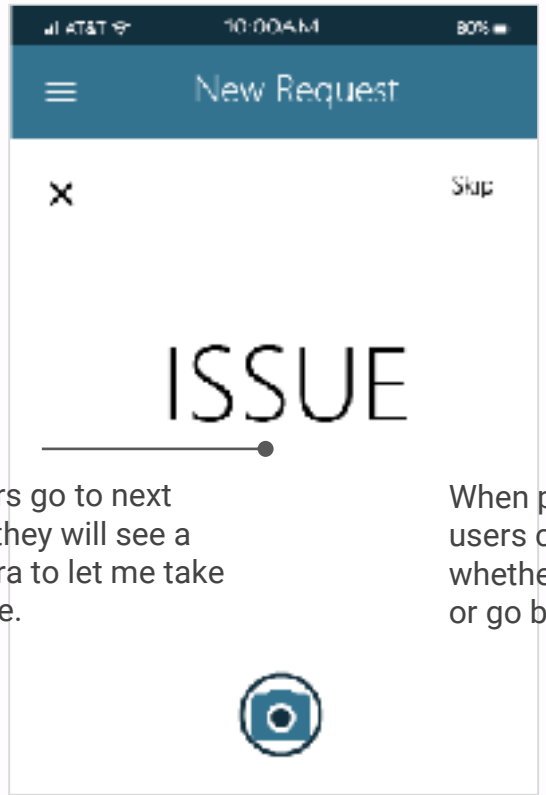
Layout Introduction

On the homepage, users will see announcements from government. There are two categories, problems reported and solved, which are labeled for green and red color.

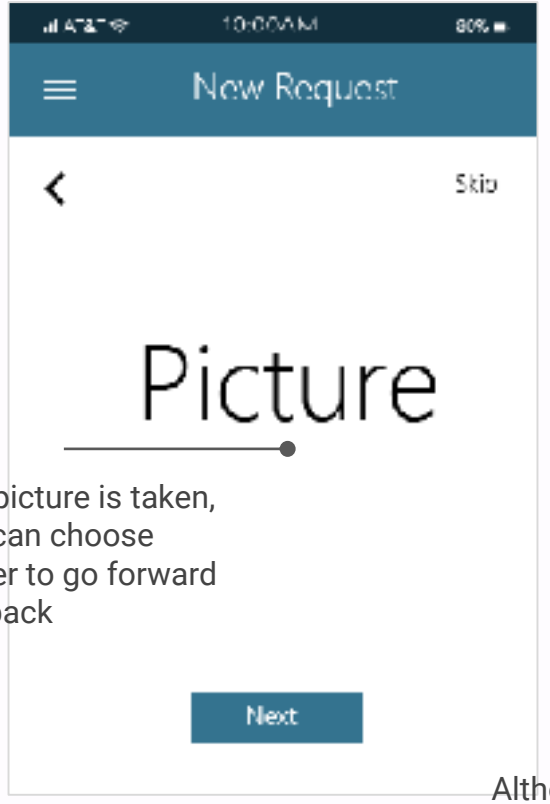
On the bottom of page, we provide shortcut keys to allow users easy to initiate a request.

When users start a new request, it will show the nearby requests, users can click “thumb up” icon to save time and avoid duplicating report.

Layout Introduction



If users go to next step, they will see a camera to let me take picture.



When picture is taken, users can choose whether to go forward or go back

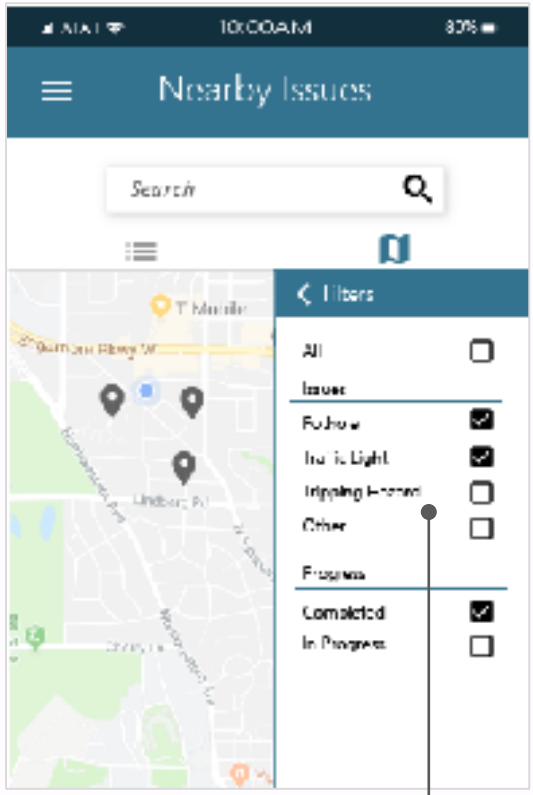
Offer drop-down menu for users to choose issue, including Pothole, Traffic Light, Tripping Hazard, and Other.

Although location is automatically detected by system, users still can click the button to change it

Layout Introduction

There are two modes, list and map.

Provide drop down menu, including Distance, Progress (In progress/ completed), Date, Issues (Name ascending). Users can change orders to easily find what they want to see.



Provide filters to let users choose what issue they want to see.

Database Info

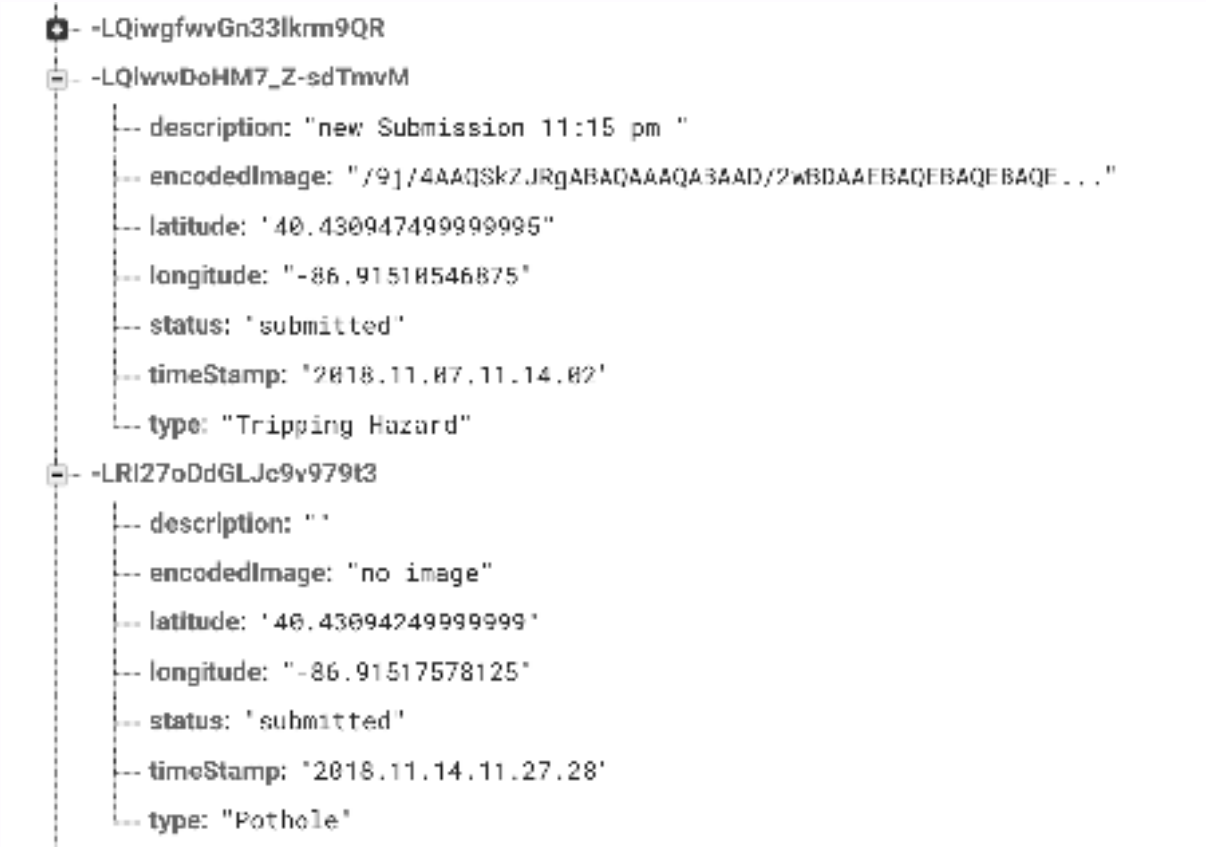
Database currently storing:

- Description
- Location
- Report status
- Report type
- Time reported
- Image

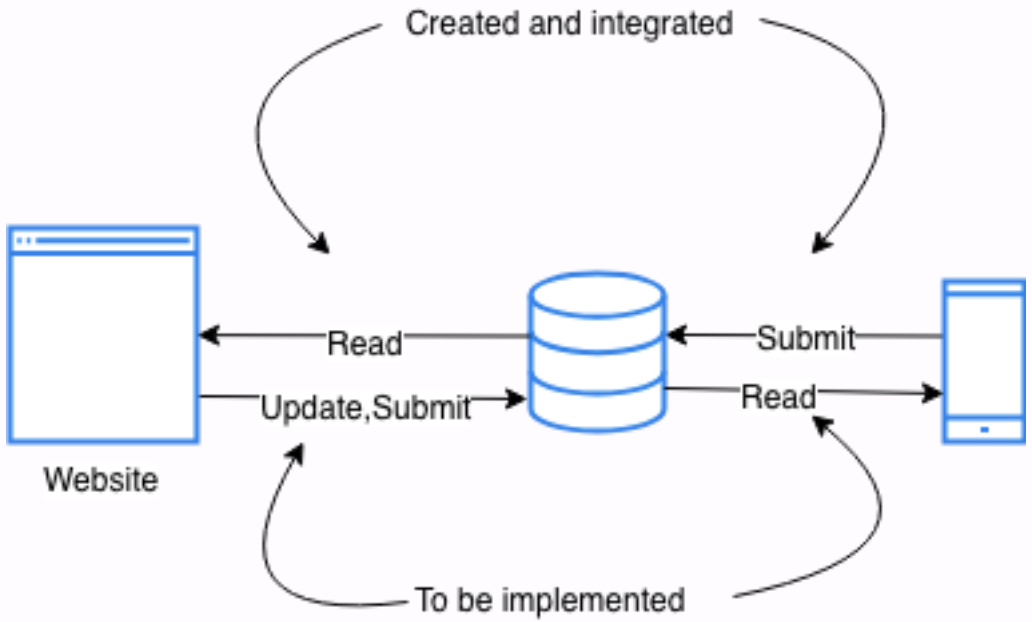
Fields that could be added:

- User (the user reporting the issue)
- Contact information

Sample of the data sent to Firebase



Current Communications



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Visualization Team

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Meet the Visualization Team

Name	Role
Jason	Design Lead
Reese	Project Archivist
Reece	Team Member
Javier	Team Member

Previous Semester Highlights

- Initiated server conversion from AWS to Firebase
  - More features
- Created a website prototype
  - Laid groundwork
- Hard coded data
  - Idea of how website should work

Current Semester Goals

- Connect the website and the app using the database
- Make sure the rest of the website elements are functional (viewing issues, Google Maps, etc.)
- Make website useable for city of West Lafayette engineers
- Engineers can visualize issues

Current Semester Progress

- Created a Github File Repository
- Setup Filter Table
- Implemented Map Markers
- Connected Website to Database

Current Website

- Table
  - Real Time Data
  - Filter
    - Location
    - Date
    - Issue Type
- Map
  - Functional
  - Markers

Purdue EPICS

West Lafayette Smart City

App Data
Data Analysis Data
All Data

Reports

Status	From Date	Issue	Location1	Location2	Image	Description
submitted	2018.11.09.11.11.21	Pothole	40.43102250000001	-86.91506640624999		newer
submitted	2018.11.07.11.13.01	Pothole	40.43094249999999	-86.91513671874999		newTest
submitted	2018.11.07.11.14.02	Tripping Hazard	40.430947499999995	-86.91510546875		new Submission 11:15 pm
submitted	2018.11.14.11.27.28	Pothole	40.43094249999999	-86.91517578125	no image	
submitted	2018.11.14.11.32.10	Pothole	40.43095250000002	-86.91515234375001	no image	hello
submitted	2018.11.14.11.33.17	Pothole	40.43095250000002	-86.91515234375001	no image	
submitted	2018.11.14.11.55.21	Pothole	40.43095250000002	-86.91517578125	no image	
submitted	2018.11.14.14.28.36	Pothole	40.431037499999995	-86.91509765625	no image	

Issues

- Compatibility Issues
  - Combination of different languages
- Glitches
  - Google Maps
- Documentation
  - Took time to orient project

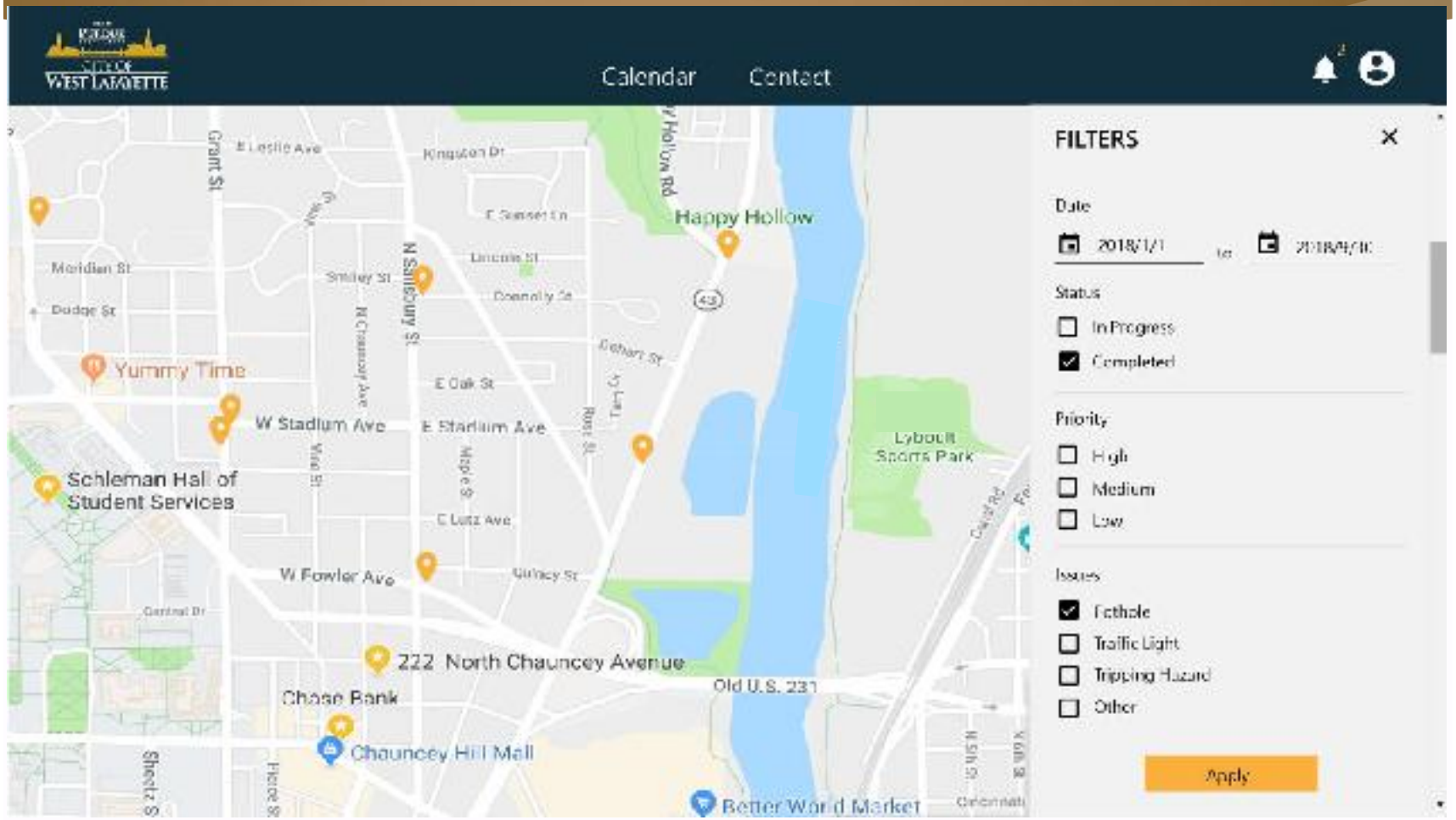
Future Website Development

- Take input from the website and upload to the database
  - Update Issue Status
  - Push notifications
- Polish website
  - Visually
    - CSS
  - Functionality
    - Javascript

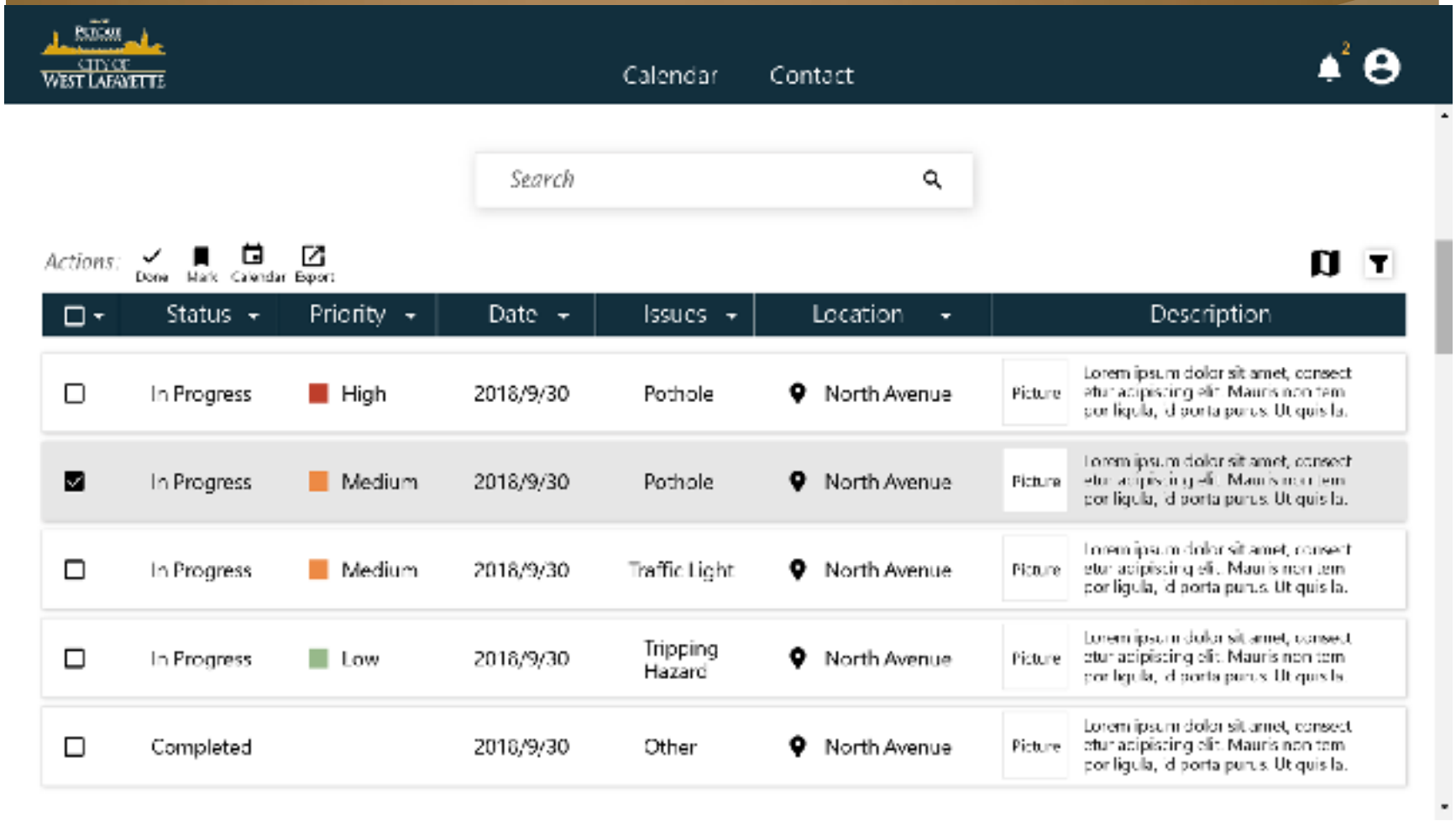
Future Website Development

- Add reverse geolocation function
- Add map markers (colored)
- Add filters to map

Digital Mockups



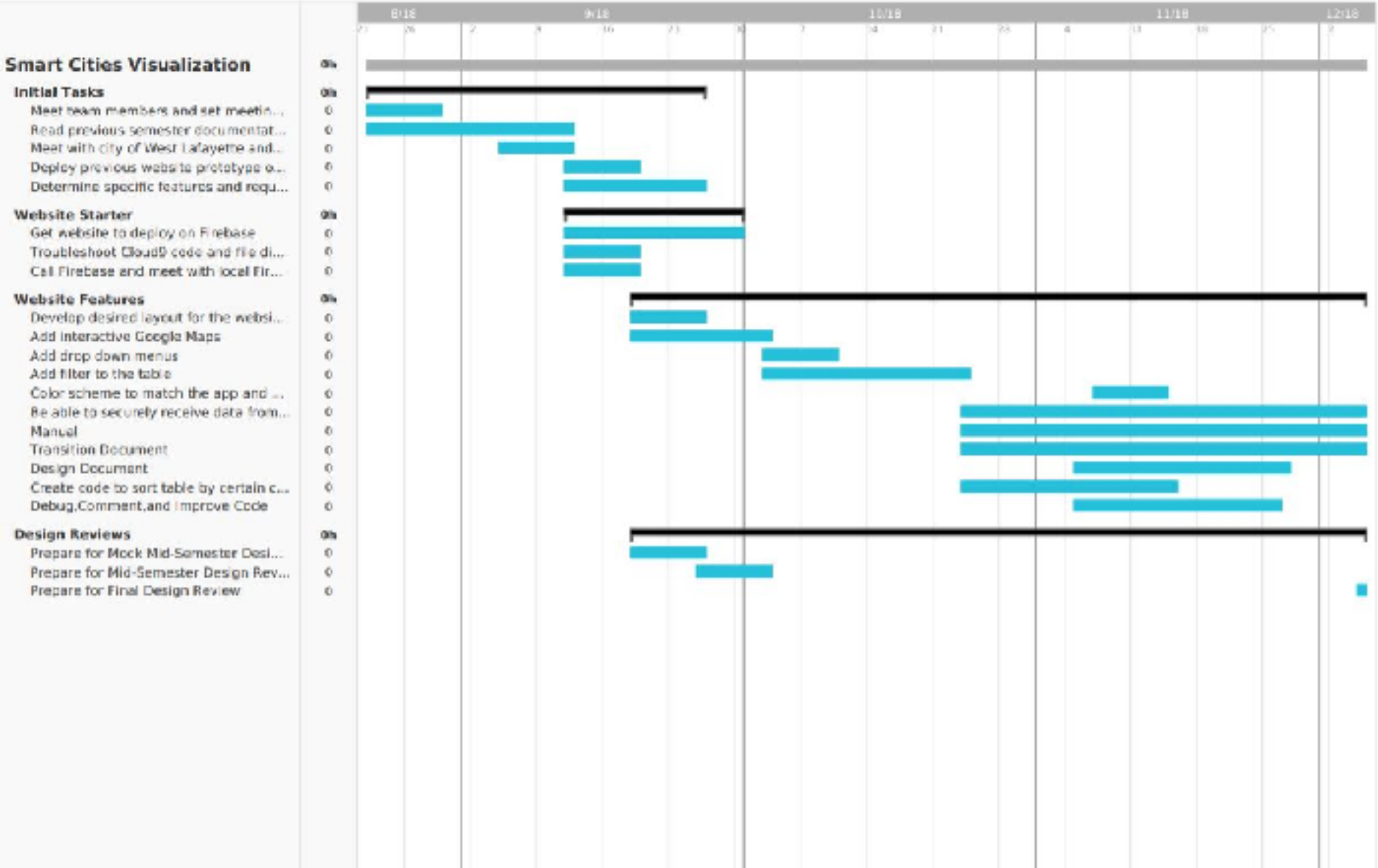
Digital Mockups



Website Demo

DEMO

Gantt Chart


8/18
9/18
10/18
11/18
12/18
Smart Cities Visualization
Initial Tasks
Meet team members and set meetin...
Read previous semester documentat...
Meet with city of West Lafayette and...
Deploy previous website prototype o...
Determine specific features and requ...
Website Starter
Get website to deploy on Firebase
Troubleshoot Cloud9 code and file di...
Call Firebase and meet with local Fir...
Website Features
Develop desired layout for the websi...
Add interactive Google Maps
Add drop down menus
Add filter to the table
Color scheme to match the app and ...
Be able to securely receive data from...
Manual
Transition Document
Design Document
Create code to sort table by certain c...
Debug,Comment,and Improve Code
Design Reviews
Prepare for Mock Mid-Semester Desi...
Prepare for Mid-Semester Design Rev...
Prepare for Final Design Review

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Summary

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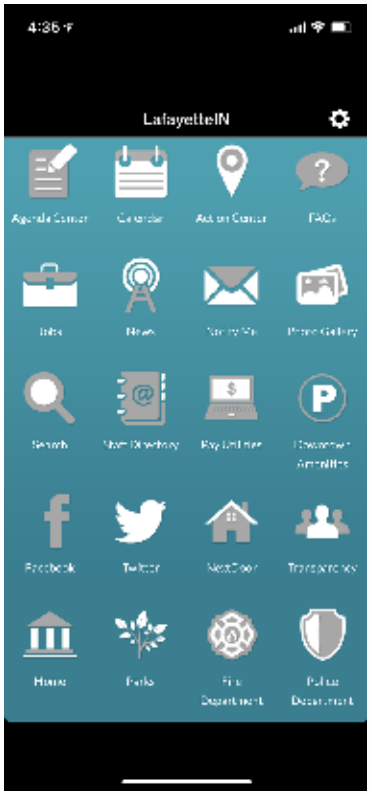
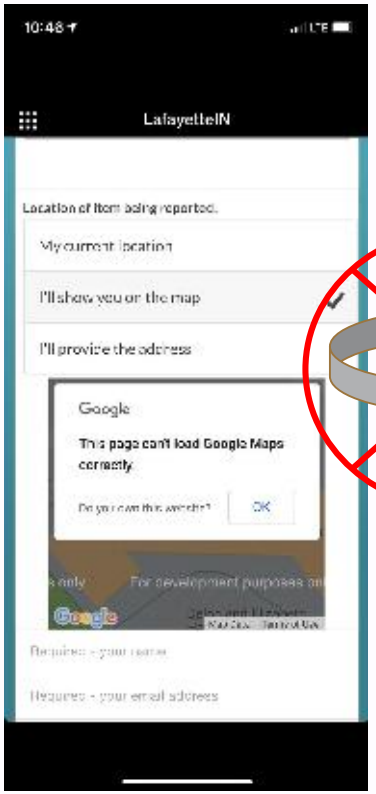
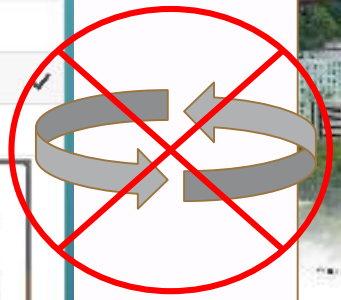
Problem


LafayetteIN

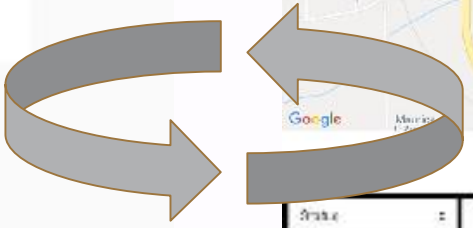

LafayetteIN
Location of item being reported:
My current location
I'll show you on the map
I'll provide the address
Google
This page can't load Google Maps correctly.
OK

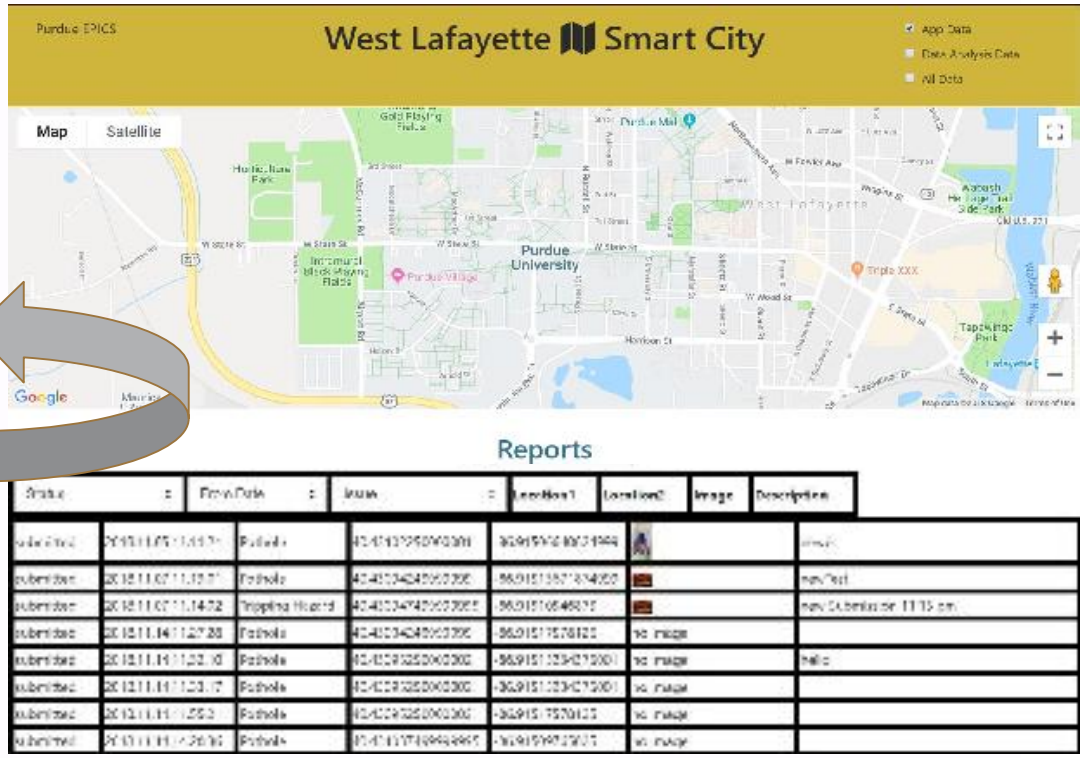



West Lafayette
Report a Pothole

Solution


AT&T
100%
2:28
Home
CITY OF
WEST LAFAYETTE
Home
NewSubmission
Notifications




Purdue EPICS
West Lafayette Smart City
App Data
Data Analysis Data
All Data
Map
Satellite
Purdue University
Google
Reports

Future Development

Accessible

Informative

Reliable

Future Development

Future Development

CITY OF
WEST LAFAYETTE

Thank you!

Questions or comments?