MICHIGAN STATE UNIVERSITY

# Project Plan

## #BIKES4ERP Tracking Initiative

### The Capstone Experience


Team Evolutio

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*From Students…*
*…to Professionals*

# Functional Specifications

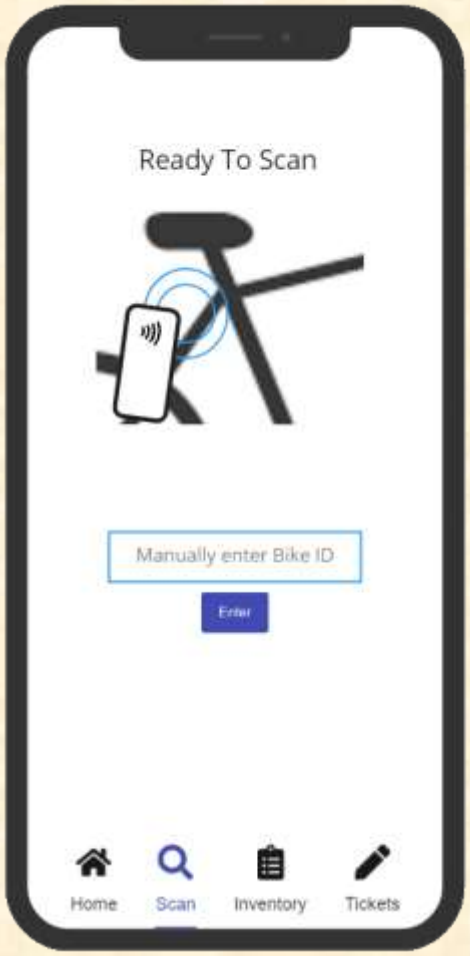
- Three distinct groups of users: teachers, mechanics, and ERP admins
- ERP teachers are tasked with overlooking bikes assigned to students. A useful tool to quickly log each bike daily by scanning the unique NFC tag with the app
- ERP mechanics' job is to ensure the continued functionality of the student's bicycles. Using the log data and bike repair data, the app provides a predictive model to help mechanics anticipate future repairs and parts needed
- ERP Admins are provided with a web app that gives useful data and analytics about the teacher and mechanic activity.
- ERP admins can view statistical data online regarding bike repairs and student grades to evaluate the program's success

# Design Specifications

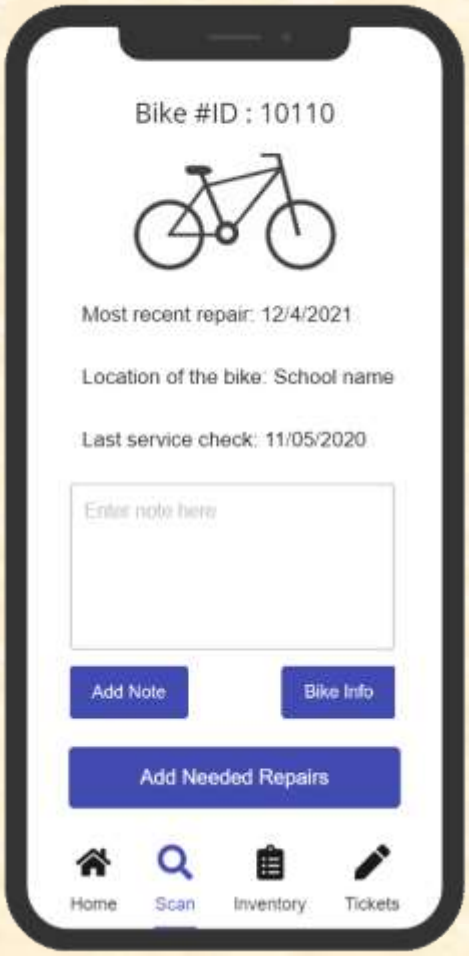
- Teacher will use ERP provided phones to scan NFC chips attached to each bicycle.
- Scanning the NFC chip will verify the bicycle's presence and allow the teacher to note its condition.
- The mechanic will receive updates on bicycle status and will perform repairs as needed.
- ERP will use the data gathered from the teachers and mechanics to create a predictive model for bicycle maintenance and part ordering.

# Screen Mockup: Scanning Screens

Scan Screen

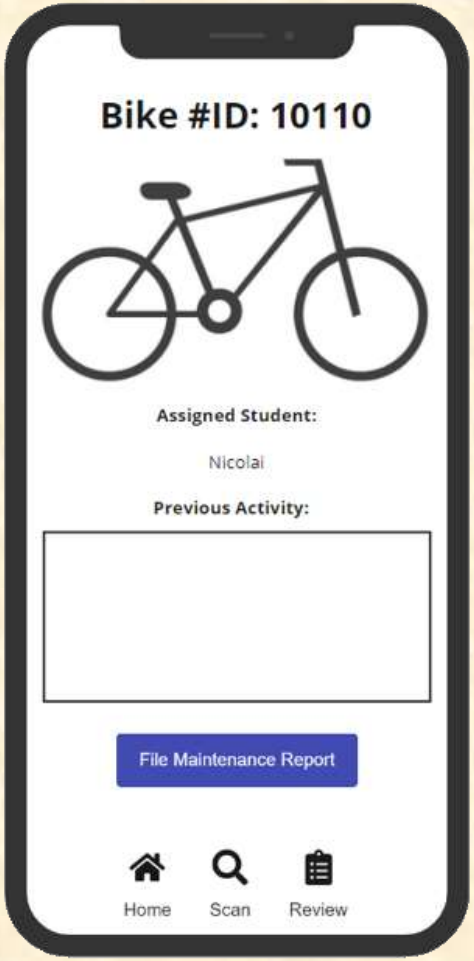



Successful Scan

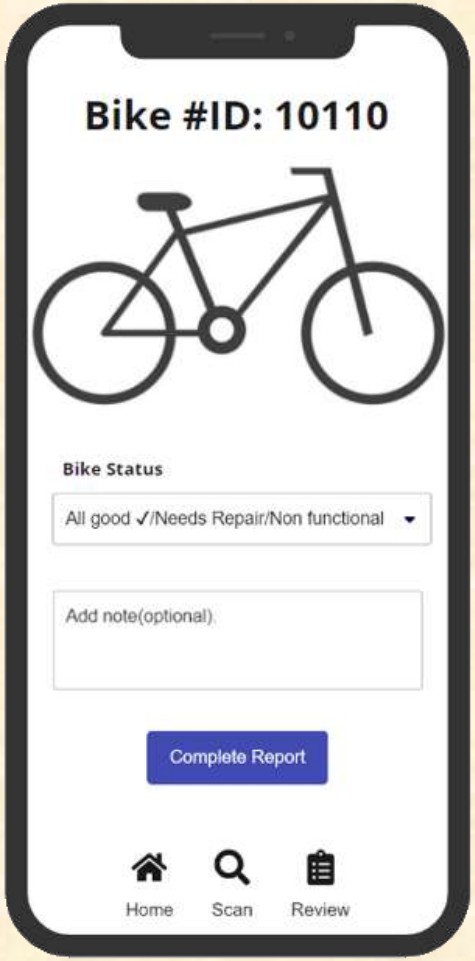


# Screen Mockup: Bike Status Screens

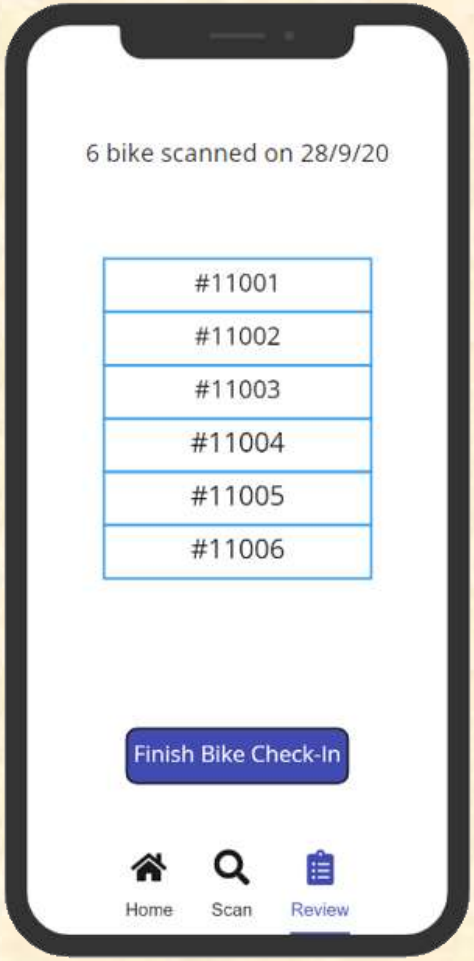
Bike Info




File Report

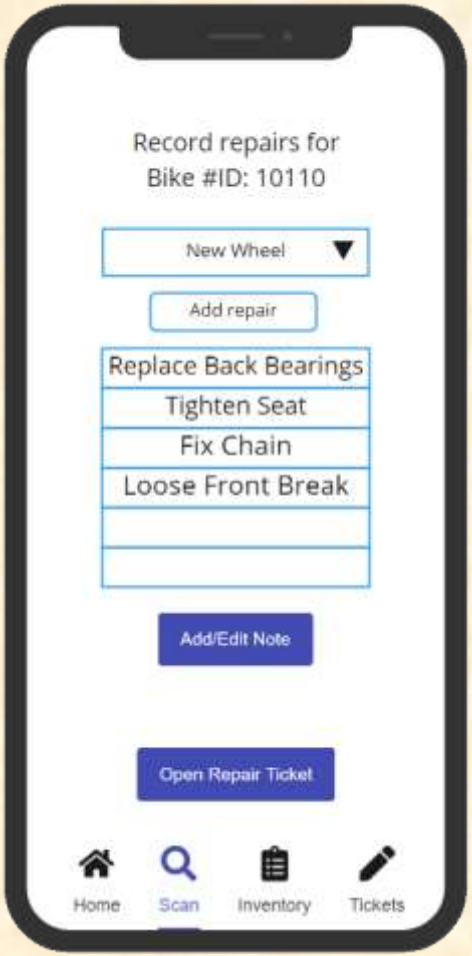



Review and Finish



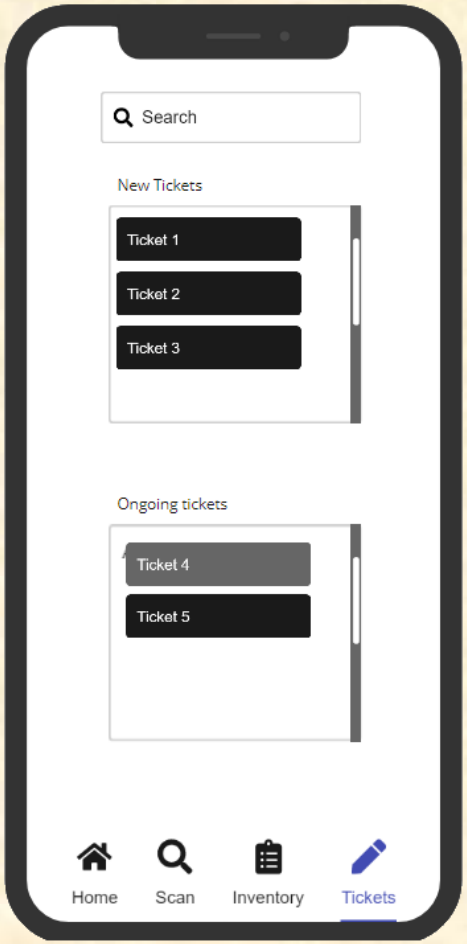
# Screen Mockup: Repair List Screen

Repair List

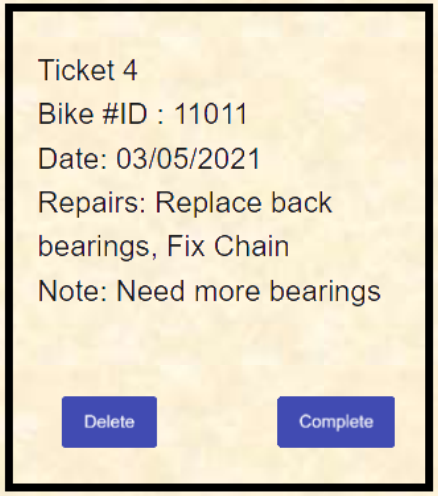


# Screen Mockup: Repair Ticket Screen

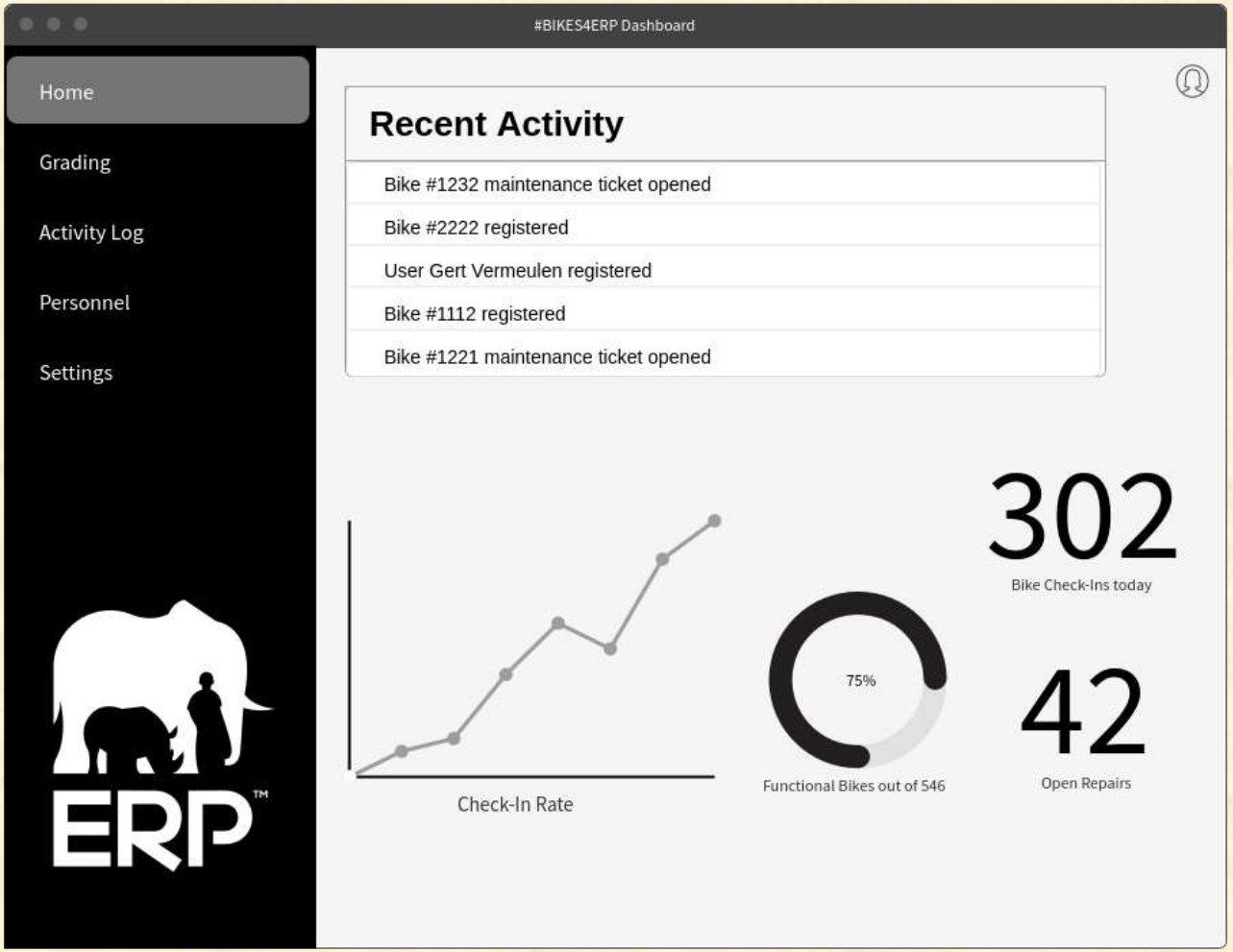
Repair Ticket




Repair Ticket Pop-Up



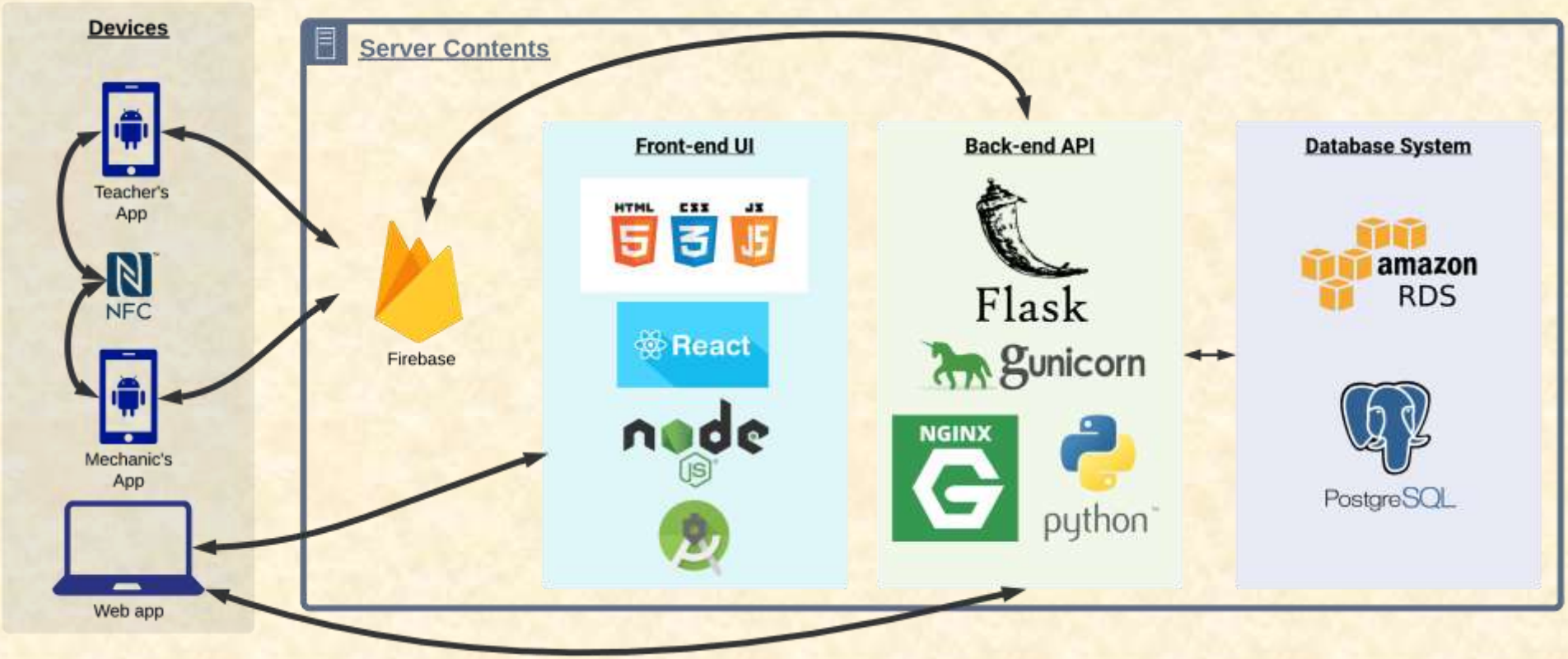
# Screen Mockups: Web Dashboard



# Technical Specifications

- 2 native android apps for mechanics and teachers
- NFC tags attached to bikes, communicate with Android devices
- Web app built with ReactJS
- Firebase Cloud Messaging used for communication between the back-end and the Android apps.
- Data stored in PostgreSQL database which is accessed by RESTful flask API.

# System Architecture



# System Components

- Hardware Platforms
  - Android Phone
  - NFC
  - Laptop
- Software Platforms / Technologies
  - Firebase
  - React
  - Node.js
  - Android Studio
  - Flask
  - Gunicorn
  - NGINX
  - Python
  - Amazon RDS
  - PostgreSQL

# Risks

- **Creation of Data**
  - There was no data provided to us. The mechanic writes his repairs on pieces of paper along with his inventory.
    - ✓ Building the application(s) to learn as database grows, finding relevant data about the bike models and repairs.

- **Limited internet reception for end users**
  - Internet is a scare resource in South Africa. Teachers and mechanics relying on school Wi-Fi or cellular data.
  - Limited amount of data can be sent to and from apps.
    - ✓ Firebase Cloud Messaging service to send data when connectivity is available that would deliver a 4KB message directly to the database and the apps.
    - ✓ Sub-set of data stored locally on app for mechanic's convenience.

# Risks

- **Communication with contacts**
  - Time differences between our team and our clients.
  - Our team was concerned about a language barrier with the main mechanic.
  - There was a complicated chain of communication with oversea contacts, taking several days for a response.
    - ✓ Handling our meetings early and directly contacting them immediately with Slack.
    - ✓ Our team has created a group chat in WhatsApp to keep consistent communication with the mechanic.

- **Authentication system**
  - Authentication system for both teachers and mechanics app. No confirmation if ERP has their own authorization/authentication system.
    - ✓ ERP is going to create erp.ngo addresses for the teachers.
    - ✓ Our team would need to create Gmail addresses to test the authentication system.
    - ✓ If ERP does not have such system, our team needs to implement one in-house.

# Questions?