Project Plan

#BIKES4ERP Tracking Initiative

The Capstone Experience

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Fall 2020
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
Screen Mockup: Bike Status Screens

Bike Info

Bike #ID: 10110

Assigned Student:
Nicolai

Previous Activity:

File Report

Bike #ID: 10110

Bike Status:
All good

Needs Repair
Non functional

Add note (optional):

Complete Report

Review and Finish

6 bike scanned on 28/9/20

Finish Bike Check-In
Screen Mockup: Repair List Screen

Record repairs for
Bike #ID: 10110

- New Wheel
- Add repair

Replace Back Bearings
Tighten Seat
Fix Chain
Loose Front Break

Add/Edit Note

Open Repair Ticket
Screen Mockup: Repair Ticket Screen

Repair Ticket

Repair Ticket Pop-Up

Ticket 4
Bike #ID: 11011
Date: 03/05/2021
Repairs: Replace back bearings, Fix Chain
Note: Need more bearings
Screen Mockups: Web Dashboard

Recent Activity

- Bike #1232 maintenance ticket opened
- Bike #2222 registered
- User Gert Vermeulen registered
- Bike #1112 registered
- Bike #1221 maintenance ticket opened

Check-In Rate

- Bike Check-Ins today: 302
- Functional Bikes out of 546: 75%
- Open Repairs: 42
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?