MICHIGAN STATE
U N I V E R S I T Y

Project Plan
Predix Enabled Toy Train

The Capstone Experience

Team GE

Matt Sopata
Joshua Schwallier
Lucas Reynolds
Lama Aboubakr
Henok Alemayehu

Department of Computer Science and Engineering
Michigan State University

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Functional Specifications

- Use Predix Enabled Toy Train to showcase the capabilities of Predix and how it can be used to automate a railroad, factory, etc.

- Allow multiple trains to run independently and in alternate directions.

- Control GE Logo Lights according to the status of the train environment.

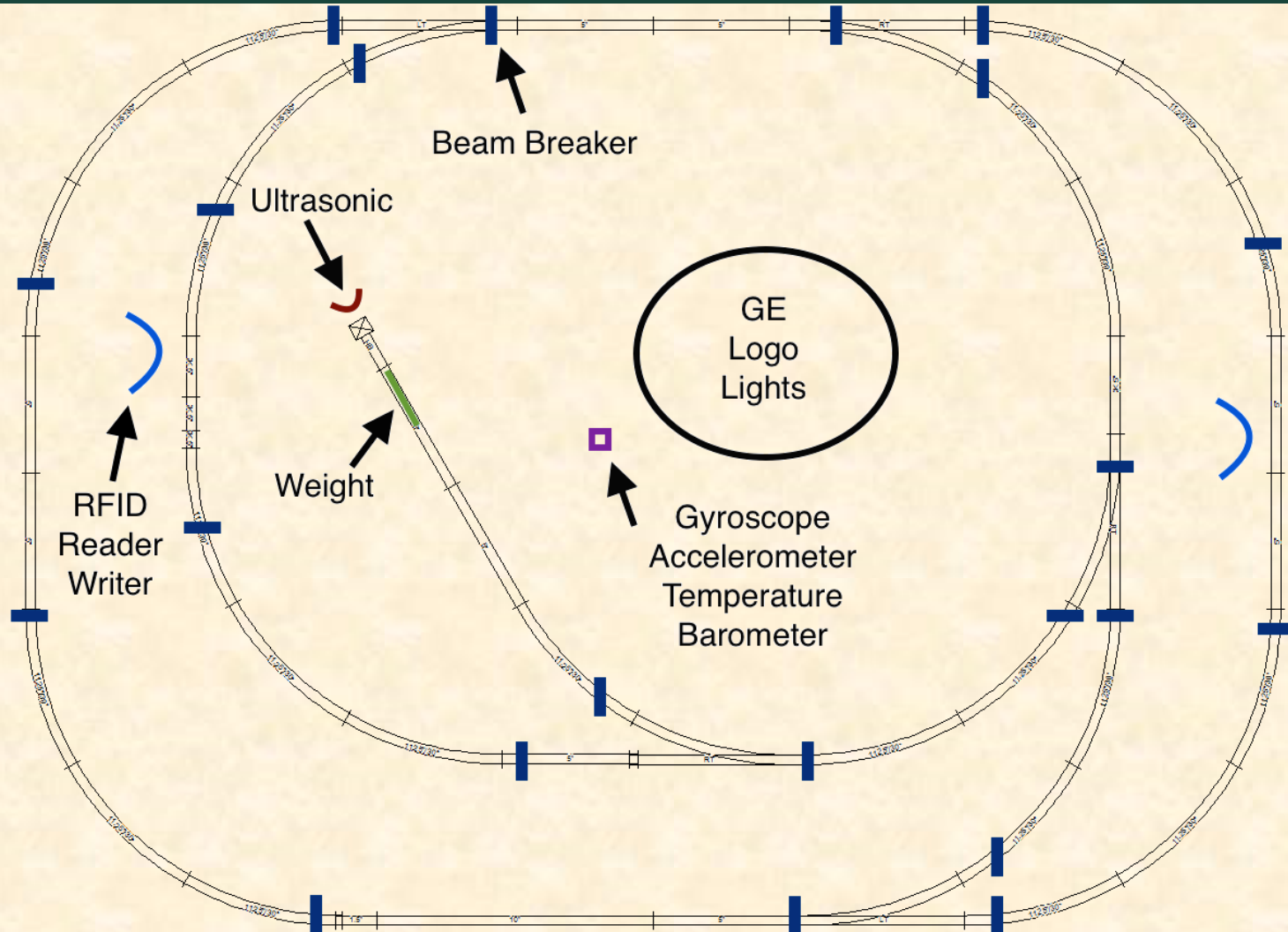- Send data collected from sensors to Predix platform to create analytics.

Design Specifications

- Train Layout
  - Sensors
  - Turnouts
  - GE Logo Lights
- Predix Dashboard Display

Train Layout

Screen Mockup: Predix Dashboard
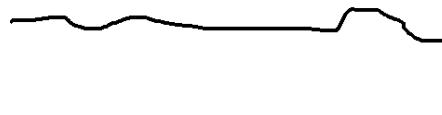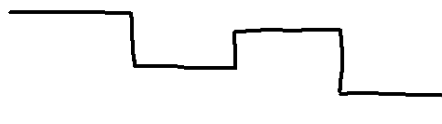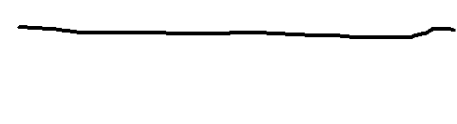
Technical Specifications

- Sensors
  - Beam breakers, RFID reader writer, Multisensor, Weight, Ultrasonic
- Turnouts
  - Relay Module
- GE Logo Lights
- Sprog ii / Booster Circuit
- Predix

System Architecture

System Components

- Hardware Platforms
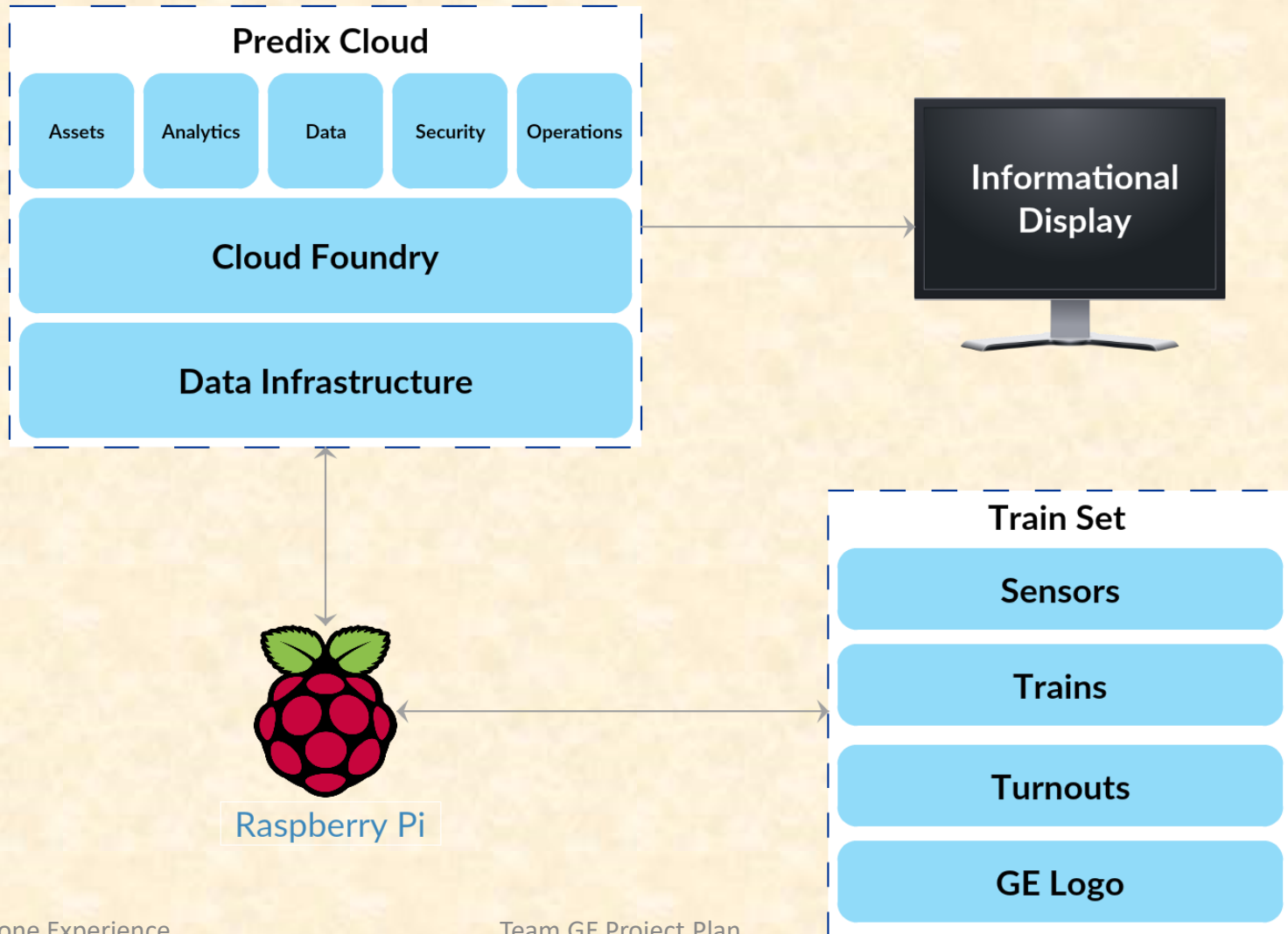 - DCC trains
    - SPROG ii/booster circuit
    - Turnouts
  - Sensors
  - Raspberry Pi
- Software Platforms / Technologies
  - Predix
  - Java Model Railroad Interface
  - Python

Testing

- Test all hardware
  - Trains and Train Track
  - Sensors
    - Accuracy, Outputting Data, Connected Correctly
  - Turnouts
  - Raspberry Pi
    - All code runs
    - Raspberry Pis communicate together
- Test Predix
  - Does sample input give desired output

Risks

- Connecting Pi to train track
  - Description – Need to physically connect Pi to the track to control the trains.
  - Mitigation – Purchased special hardware to connect Pi to the track.
- Connecting Pi to sensors, turnouts, and GE logo lights
  - Description – Must use various sensors to figure out where trains are on the track. Sensors may be unreliable, Pi has limited number of information pins.
  - Mitigation – Focus on one sensor at a time, then scale up. Use breadboards to increase pin capacity.
- Predix
  - Description – Must figure out how to store and use data collected from the sensors in Predix platform.
  - Mitigation – Read documentation and talk with Predix experts from GE.
- Automating the train
  - Description – Must automate trains with limited data from sensors, use Predix to avoid crashes.
  - Mitigation – Research Predix and DCC train tracks, prototype on smaller tracks.

Questions?

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