Project Plan
Predix Enabled Toy Train
The Capstone Experience

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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

- Beam Breaker
- Ultrasonic
- Weight
- RFID Reader Writer
- GE Logo Lights
- Gyroscope Accelerometer Temperature Barometer
Screen Mockup: Predix Dashboard

GE PETT: Predix Enabled Toy Train

Train 1 Speed
Zoom 1m 3m 6m YTD 1y All

Train 2 Speed
Zoom 1m 3m 6m YTD 1y All

Atmospheric Pressure
Zoom 1m 3m 6m YTD 1y All

Train 1 Inventory
Zoom 1m 3m 6m YTD 1y All

Train 2 Inventory
Zoom 1m 3m 6m YTD 1y All

Temperature
Zoom 1m 3m 6m YTD 1y All
Technical Specifications

• Sensors
  ▪ Beam breakers, RFID reader writer, Multisensor, Weight, Ultrasonic

• Turnouts
  ▪ Relay Module

• GE Logo Lights

• Sprog ii / Booster Circuit

• Predix
System Architecture

Predix Cloud
- Assets
- Analytics
- Data
- Security
- Operations

Cloud Foundry

Data Infrastructure

Informational Display

Raspberry Pi

Train Set
- Sensors
- Trains
- Turnouts
- GE Logo
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
    o Accuracy, Outputting Data, Connected Correctly
  ▪ Turnouts
  ▪ Raspberry Pi
    o All code runs
    o 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?