User Interface Design

for

North Shore Extension

Version 1.0 approved

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Table of Contents

Table of Contents ii

Revision History ii

1. Introduction 1

1.1 Purpose 1

2. User Interface Design 1

2.1 CTC Office 1

2.2 Track Controller 1

2.3 Track Model 3

2.4 Train Model 3

2.5 Train Controller 4

Revision History

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| --- | --- | --- | --- |
| **Name** | **Date** | **Reason For Changes** | **Version** |
| Garrett Grube | 9/24/16 | Document Created | 1.0 |
| Garrett Grube | 9/25/16 | Added Train Controller section | 1.1 |

# Introduction

## Purpose

The purpose of this document is to detail the user interface design of the North Shore Extension project software. This document will include an image of each UI, and describe it.

# User Interface Design

## CTC Office

### Intended User

### Screenshot

### Description

## Track Controller

### Intended User

### Screenshot

A:

B:

C:

D:

E:

### Description

There are 5 sections of the UI labeled on the screenshot. Each has their own components and functionality

Section A: Menu Bar

* Consists of two pull down menus, “File” and “Help”
* Displays file and help menus when clicked on

Section B: PLC Updater

* Allows user to enter PLC code from their computer into the wayside controller
* Consists of the “PLC text box” and the “enter button”
  + The PLC code’s file location is entered into the “PLC text box”
  + When the “enter button” is pressed the wayside controller will find the PLC code and save it into its memory
  + If the PLC code’s file location does not exist then an error message will appear on the text box

Section C: Wayside Controller Selector

* Used to select which wayside controller, will be viewed
* Consists of the “Section Label” and two buttons, “Next section Button (>)” and “Previous Section Button (<)”
  + Section Label: displays the current wayside controller being viewed
  + Next Section Button: Loads in the next wayside controller for viewing, the next controller being the one that controls the section an inbound train will go to next
  + Previous Section Button: Loads in the previous wayside controller for viewing, the previous controller being the one that controls the section an outbound train will go to next

Section D: Block Display

* Displays the internal variables for each block within the wayside controller’s section of track blocks
* Displays blocks in order of a train moving from right to left while going in the inbound direction
* Consists of individual “Block Panels”
  + Each Block Panel consists of labels displaying the following:
    - Block Number: the number assigned to the block by the track model
    - Occupancy: displays information about track occupancy
      * If there is a train it displays that trains’ number
      * If there is no train then it is blank
    - Type: displays what type of track is located on this block
      * If the block is just track then the label is blank
      * If the block contains a railroad crossing then the label displays “crossing” and the current state of the crossing, either “inactive” or “active”
      * If the block contains a station then the label displays “Station”
      * If the block contains a switch then the label displays “Switch” and two numbers indicating which tracks the switch connects to
        + The number with a “>” before it is the block the switch track is connected to
      * If the block contains a light then the label displays “Light” and the current state of the light, either “Green” or “Red”
    - Failure Status: failure status for a given track block
      * If the track is working properly the label is blank
      * If there is a failure detected then the label displays a red “FAILURE”
    - Heater Status: the state of a blocks track heater, is either “ON” or “OFF”
    - Speed Limit: the speed limit for a train on a given section of track, received from the CTC office
    - Authority: the maximum authority of a train on a given section of track, received from the CTC office

Section E: Current Action Label

* Display’s what the wayside controller is doing at any given time
* Consists of the “current action label”

## Track Model

### Intended User

### Screenshot

### Description

## Train Model

### Intended User

### Screenshot

### Description

## Train Controller

### Intended User

The train controller is designed to be used by a transit operator.

### Screenshot

### Description

The train controller consists of three main components: a central text area, and two control panels.

#### Central Text Area

The text area displays notification to the transit operator. It can be scrolled, but cannot be edited.

#### Vehicle Panel

This panel contains controls and statuses unrelated to the motion of the vehicle. It includes the Train ID box, Advertise button, Lights radio button group, Left Doors radio button group, Right Doors radio button group, and train mode button.

##### Train ID

Train identification is displayed in the box labeled “Train ID”, and uniquely names the train with an integer. This box can be edited to control a different train

##### Advertise

Advertise allows the transit operator to make announcements

##### Lights

The train lights can be turned off and on by clicking the radio button group labeled “Lights”. Clicking “fail” injects a light failure fault into the system

##### Left Doors

The train’s left doors can be controlled by clicking off and on by clicking the radio button group labeled “Left Doors”. Clicking “fail” injects a left door failure fault into the system

##### Right Doors

The train’s right doors can be controlled by clicking off and on by clicking the radio button group labeled “Right Doors”. Clicking “fail” injects a left door failure fault into the system

##### Train Mode

Train mode can be toggle between manual and automatic. By default, the train is in manual mode. To engage the automatic state, press the button labeled “Automatic”.

##### Vehicle Parameters

Clicking this button brings up a list of vehicle parameters in a separate window.

#### Motion Panel

This panel contains controls and statuses related to the motion of the vehicle. It includes the Speed Request box. Speed Request slider, Emergency Stop Button, Block Speed Limit box, Current Speed box, Current Power Box, and Set Point Box.

##### Speed Request

The speed request box displays the speed currently called for by the transit operator. This speed can be adjusted by moving the slider located directly below the “Speed Request” label.

##### Emergency Stop

The emergency stop button will bring the train to zero speed if pressed. This button should only be used in case of emergencies.

##### Block Speed Limit

The bock speed limit is display in the text box label “Block Speed Limit”

##### Current Speed

The current speed is displayed in the text box labeled “Current Speed”.

##### Current Power

The current power is displayed in the “Current Power” box and can be indirectly controlled by adjusting the “Speed Request” slider.

##### Set Point

Each set point is uniquely described by an integer. The set point can be adjusted in the “Set Point” box by the transit operator.