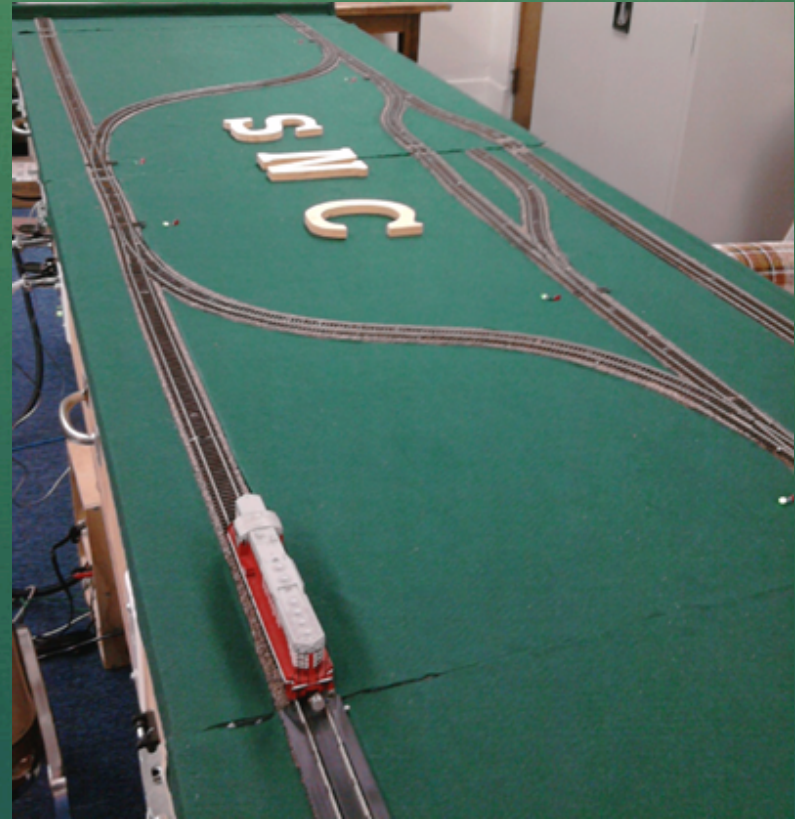


# Computer Controlled Railroad Simulator

Danielle Berchmans

# Project Description

- "Develop an application that simulates a CCR allowing applications to plug into the actual CCR without modifications."





# Project Requirements:

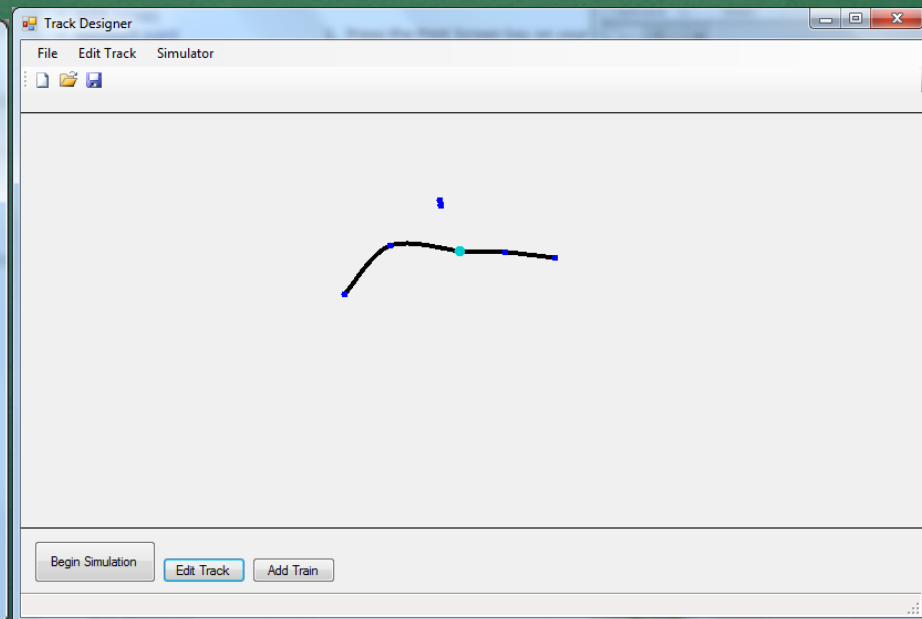
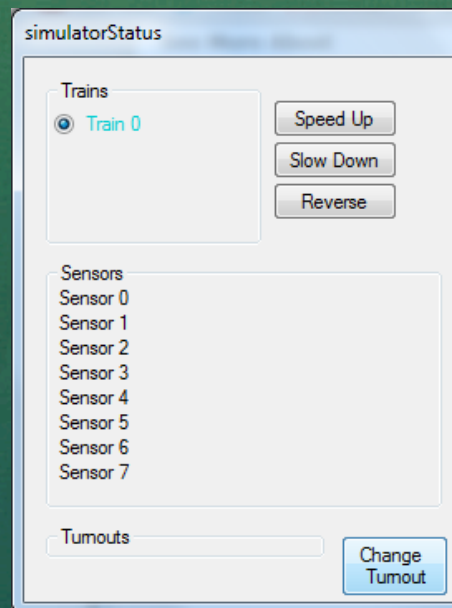
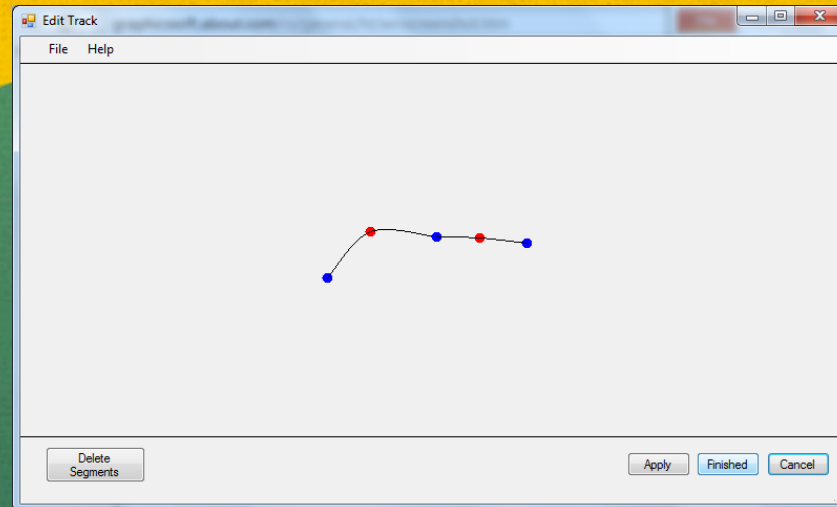
1. Design a track definition protocol so that users can define their own layouts.
2. Support the protocol for decoders (stationary and mobile) and Auxiliary Input Units (AIU) as specified by the National Model Railroad Association (NMRA).
3. Develop API functions that match the protocol for the existing CCR functions.
4. Develop a graphical interface that maintains the current state of the CCR.
5. Supports multiple trains.
6. Develop a simple user interface that can run the simulator.

# Previous project

- Strengths
  - Customizable track
  - Supported multiple trains
  - Had turnouts
- Weakness
  - Graphical interface could use some work
  - Train could get “stuck”
  - Did not simulate error conditions



# Kayla's Project



# What I Did

- Learned a new programming language
- Took Kayla's ideas and put my own spin on them
- Started project from scratch
  - Completely changed the simulator look and feel
  - Track design used pieces instead of free form drawing

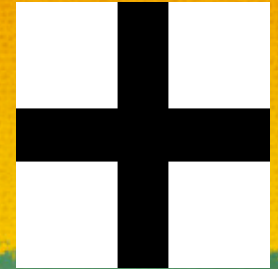


# Problems

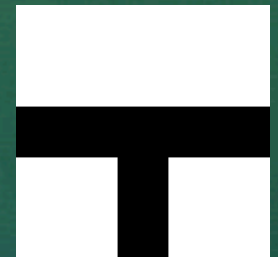
- Processes running in the background without my knowledge
- Trying to generate track pieces “on the fly”
- Using spacebar to rotate pieces
- Deleting pieces
- Trains running off the track
- Train’s colliding



# Methods



- Track design
  - Can drag and drop track pieces to desired location on work area
    - Auto-fit
  - Can rotate images using double-click
  - Can clear the work area
  - Can delete pieces
  - Can open old tracks and modify
  - Can save track for future use





# Methods

- Customize Trains
  - Can choose to run simulator with one – five trains
  - Each train can have its own:
    - Speed
    - Color
    - Direction
- Place Trains
  - Each train can be placed on a desired location on the track



# Methods

- Simulator
  - Can change the status of each train independently (speed and direction)
  - Can be paused
  - Can be restarted
  - Shows the movement of each train
  - Alerts user if train derails
  - Alerts user if trains hit



# Strategies

- A LOT of drawings
- Taking the project in small pieces
- Using online resources for guidance
  - *Stackoverflow.com* question and answers
  - MSDN C# Reference
- Talking to professors and other students
  - (even non-CS)
- Lots of testing

# CS Concepts

- Using different data structures to hold information about track and trains
  - Classes
  - Structs
  - Arrays
- C# language
- Reading/writing to files



# Extensions

- Get the simulator to work with the real train
- Allow the use of turnouts
- Make the simulator fun!

# Advice

- Start right away!
- Take the project in small pieces
  - (And take breaks!)
- Test, test, test!
- Talk with anyone who will listen
- Get help from others when necessary
- Don't doubt your capabilities
- Document as coding
- Keep website updated
- Enjoy yourself and have fun!





# Questions?



Thank You!