John McAlinden

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GitHub

EDUCATION

Vandegrift High School May 2024

- Class Rank: 11/697, Weighted GPA: 5.698/5, Unweighted GPA: 4/4, SAT 1540 (750R&W, 790M)
- Relevant Coursework: Computer Science 3, AP Physics C, AP Computer Science A, AP Calculus BC

WORK EXPERIENCE

Math Done Right

7/10/2023-Present 3 hr/week

- Created handouts and homework for 3 one hour lessons per week
- Covered AMC 8/10 and MathCounts topics such as combinatorics, number theory, and algebra for 2nd-5th graders
- Graded homework with provided feedback and office hours opportunities

PROJECTS

BrainLib

12th 20hr/week, 12 week/yr

- Fully functional pure pursuit trajectory and path follower for a differential drive
- Features built in kinematics based physics simulation for testing without a physical robot
- Allows live debugging using a UDP server
- Equipped with a fully functional React frontend created in TypeScript
- Generates a motion profile goal for each moment in trajectory
- Uses pure pursuit algorithm to allow for feedback based on path or trajectory following error
- Utilizes an interpolating treemap to store predicted robot poses to account for debugging capabilities being limited by hardware runtimes
- Includes a path and trajectory generator that turns a set of points into a quintic or cubic spline
- Uses linear algebra localizer to track robot's current location
- Features the ability to reverse paths or trajectories

Custom Interpreted Language

12th 5/week, 4 week/yr

- Has the functionality to create integers, do basic math (standard Java/c++ operators), print, handle conditionals, and run while loops
- Uses recursive-descent parsing to handle all operations
- Informs users if they've made a syntax error
- Syntax doesn't enforce whitespace just like Java or C++

VALORANT Automatic Video Editor

10th 10hr/week, 2 week/yr

- Uses AI to extract highlights where the user kills an enemy from a VALORANT video
- Written in Python with the use of OpenCV, YOLOv5, and moviePy
- Uses a neural network that was trained for 1000 epochs on a manually labeled 8000 image dataset

YouTube Shorts AskReddit Video Creator

10th-12th 10hr/week, 6 week/yr

- Automatically creates a video which reads out the comments in a popular AskReddit thread over background gameplay, just like popular YouTube Shorts and TikToks do.

- Uses the PRAW Reddit library to find posts and 45 seconds worth of comments
- Takes a screenshot of the post using a DOM based web scraper
- Uses Google Text to Speech (gTTS) to generate audio
- Uses PyTube to automatically download a background youtube video
- Splices everything together with moviePy
- Automatically uploads the resulting video to YouTube

Discord Wordle Bot

10th 5hr/week, 1 week/yr

- Discord.js based bot that automatically keeps track of the average attempts it took all users on a server to solve wordle
- Features a scoreboard and the ability for admins to remove suspected cheaters

Snake Neural Network

12th

- A neural network written completely from scratch in Java that is trained to play Snake
- The neural network is trained using a genetic algorithm on a population size of 5000.
- Anyone can download the program, run one file, and watch the snake slowly improve over the course of a few hours

mrjmac.github.io

10th-12th 7hr/week, 30 week/yr

- A website made completely from scratch and hosted on GitHub Pages
- Contains all sorts of information on my projects and competitive programming journey
- Contains several sorting algorithms with explanations and analysis of their efficiencies
- Lightweight and easy to read website made in HTML/JavaScript
- Contains an in browser music player with all my favorite songs

Liquipedia API

10th 2hr/week, 1 week/yr

- A from the ground up web scraper written 100% in Python that serves as an API for liquipedia VALORANT
- Returns all possible queryable information from the infobox on every player's page

FRC Betting Application

11th 3hr/week, 10 week/yr

- Java Swift application that allows users to look up, view, and bet on FRC teams, matches, or events
- Pulls matches and events from The Blue Alliance using their API
- Allowed users to search for events by name or find all the events a certain team is attending
- Lets users bet on specific aspects of matches, match results, or teams records
- Does not allow users to bet after a match had started
- Features a dynamic economy and currency system based on the probability of an alliance winning a match
- Features an in-depth user stats page to allow users to check how they are performing all time

Dasher

10th 2hr/week, 1 week/yr

- A simple, open source, 2D game written in GD Script

UIL Template Creator

11th 2hr/week, 1 week/yr

- A Java program that that automatically generates the user all the template files needed for a UIL competition
- Completely customizable, users can create their own templates

Door Manager

11th 2hr/week, 12 week/yr

- Java swift program that helps users understand at which times doors at my school will be unlocked
- Displays log files of when doors were opened and who opened them
- Allows users to import and export log data from CSV files
- Features the ability to create new bell schedules
- Gives users an alert if doors are opened at unexpected times

Binary Search Tree Visualizer

11th 2hr/week, 5 week/yr

- Java Swift application that displays a visual representation of a binary search tree based on values inputted by the user
- Displays several key pieces of information about the tree, such as
    - The completeness and fullness of the tree
    - Height
    - Width
    - The values in the tree in in-order, pre-order, and post-order traversal
    - Number of nodes
    - Number of Leaves
- Dynamically resizes the tree based on the number of nodes present

Minecraft Chat Log Extractor

12th 4hr/week, 2 week/yr

- A program that extracts Minecraft chat logs with 0 setup
- Gives users the option to save the logs to a file or to leave in standard output

Custom Music Website Creator

10th 4hr/week, 1 week/yr

- A Java program that that automatically generates the user an html webpage that contains a clean and sleek music player
- Completely customizable, users can add their own songs
- Final music player is completely styled with CSS with full Javascript functions that give the user the ability to skip songs, control volume, and loop upon completion

Four Function Calculator

11th 2/week, 2 week/yr

- Java Swift four function calculator that takes in an infix expression, transforms it into a postfix expression in O(n) using the shunting yard algorithm, and evaluates that expression

ACTIVITES

FIRST Robotics (2020, 2021, 2022)

9th-12th 35hr/week, 28 week/yr

Software Lead (10th, 11th, 12th)

- Member of the world renowned BrainSTEM and ViperBOTS robotics organizations
- Implemented motion profiling to follow a trajectory defined by quintic splines
- Researched a linear algebra solution for a differential drive localizer
- Integrated odometry localization for a differential drive to allow for correction during autonomous collisions
- Created a finite state machine to allow for extension of linear slide while driving
- Utilized physics to solve for rotational torque required to hold up a linear slide

- Applied pure pursuit algorithm for nonlinear path and trajectory following during autonomous period
- Modified PID control of drivetrain with feedback based gyroscopic correction
- Developed vision using bitmap and Vuforia to identify a vision target, increasing autonomous score by approximately 125%
- Trained software rookies using online slideshows, personalized lessons, and in person demonstrations
- Driver coach who was responsible for keeping track of time, point differentials, and general strategy during matches
- Gave a presentation about success in FTC to every team in Delaware

Competitive Programming

11th-12th 7hr/week, 45 week/yr

- Completed roughly 1 problem a day everyday for 3 months
- Included a writeup detailing how I solved the problem on my website
- Completed in various competitive programming competitions using techniques including
    - Prefix sums
    - Dynamic programming
    - Greedy algorithms
    - Breadth first search
    - Depth first Search
    - Two pointers
    - Bitmasks

UIL Academics

10th-12th 4hr/week, 30 week/yr

- Competed on the Computer Science team in 11th grade
- Responsible for going over Virtual Challenge Meet tests and teaching other members
- Attended invitational practice meets in 10th and 11th grade
- Practice competitive programming as a team once a week in a mock competition environment

CLUBS & ORGANIZATIONS

Mu Alpha Theta

10th-12th 1hr/week, 8 week/yr

- Participate in 2 hours of math a semester, 1 volunteer hour and 1 competition hour
- Attend monthly meetings that include a kahoot on a new math topic

Table Tennis Club

9th-10th 1hr/week, 15 week/yr

- Advertised club to student population to get required number of members
- Learned about the table tennis pro scene and local competitions
- Practiced once a week during club meetings

Math Club

11th-12th 3hr/week, 15 week/yr

Vice President(11th, 12th)

- Responsible for getting enough member sign ups to officially create the club
- Write and teach competitive math handouts written in LaTeX
- Planned, coordinated, wrote problems for, graded, and held a math competition for middle and elementary schoolers
- Participated in several math competitions as a club, achieving 1st place in the 2023 Penn math competition

- Achieved 7th in Texas in the Purple Comet High School division (8%)
- Host mathcounts style competitions during meetings
- Held a weekly problem of the week competition in club Discord

HONORS AND AWARDS

USACO Gold Division
- Perfect score on USACO Bronze January 2023 Competition

FIRST Robotics
- 2023 Texas State Championship Division Finalist
- 2022 State record high score
- 2021 Central Texas Inspire Award winner for excellency in the autonomous period
- 2022 KIPP X-Stream League Inspire Award with emphasis on software excellence
- 2021 Texas State Innovate Award winner for "creative, elegant, and unique" design
- 2022 Central Texas Design Award
- 2020 Austin Metro League Design Award

President's Volunteer Service Award
- Completed 50 hours of service in a calendar year

National Honor Society
- Accepted into my school's NHS chapter for academic performance, community service, character, and extracurricular involvement
- Complete 5 service tasks per semester, one being centered around a specific philanthropy

AP Scholar with Distinction
- Received highest level of AP distinction for achieving an average score of at least 3.5 on all AP Exams taken, and scores of 3 or higher on five exams
- Received a score of 5 on AP exams in
    - Calculus AP
    - Human Geography
    - World History
    - Computer Science A
    - Macroeconomics
    - Chemistry
    - Physics C: Mechanics

VOLUNTEER WORK AND EXPERIENCE

Young Men's Service League

9th-12th 2hr/week, 18 week/yr

Life Skill Committee(9th), Parliamentarian(10th), Philanthropy Chair(11th), Life Skills Chair(12th)
- Serve at 15+ Austin philanthropies including
    - Urban Roots
    - Mobile Loaves & Fishes: St Thomas More Ministry
    - Fig Leaf
    - UMLAUF Sculpture Garden & Museum
    - Partners in Hope
    - Side by Side Kids
    - Meals on Wheels
    - Brown Santa
    - Central Texas Food Bank
- Over 120 total hours

- Chapter had 3rd most hours of all chapters nationwide in 2021
- Philanthropy Chair: gave a speech at the start of each meeting about a philanthropy of interest, was responsible for dividing speeches among multiple other committee members
- Life Skills Chair: gave a speech at the start of each meeting about a life skill of choice, was responsible for dividing speeches among multiple other committee members
- Parliamentarian: was responsible for taking notes and minutes for each meeting and presenting them at the start of the next meeting