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# Justin Dugan

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## SKILLS

**Programming Languages:** Python, C#, Java, Assembly.

**Robotics:** Expertise in state-space control, model-based control systems, autonomous navigation, and embedded systems; awarded for Innovation in Control and Autonomous at FRC Worlds.

**Hardware & Low-Level Engineering:** Experienced in building custom computers, developing homemade electronics, and circuit design.

**Mathematics:** Advanced problem-solving, algorithm design, and application of mathematical principles in physics engines, game development, and robotics.

**Leadership & Collaboration:** Led programming teams in FRC robotics, organized game jams, and presided over multiple student organizations.

**Education & Mentoring:** Taught math as an instructor at Mathnasium, peer tutor, and TA, with additional experience refereeing elementary robotics competitions.

## EXPERIENCE

### **Mathnasium, West Chester PA - Instructor**

August 2023- PRESENT

- In a group setting of 5-25 students each with one on one instruction. Taught basic arithmetic to calculus.
- Greatly improved student math scores.

## EDUCATION

### **University Scholars Program, West Chester PA**

September 2018 - June 2025

1510 SAT

13 College level courses including Quantum Physics and Linear Algebra.

4.366 out of 4.5 Weighted GPA

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## AWARDS

### Online Encyclopedia of Integer Sequences - Sequence Accepted

#### Autonomous Award - *FRC World Championship*

- Given for outstanding autonomous performance and software.

#### Innovation In Control Award - *FRC Regional Competition*

#### Community Leadership Award - *University Scholars Program*

#### Distinguished Honor Roll - *University Scholars Program*

#### AP Scholar with Distinction

## ACTIVITIES

#### FRC Robotics - *Lead Programmer and Drive Team Member*

- Taught advanced programming concepts and advanced math, including linear algebra
- Created industry level and award winning software including object detection and odometry.
- Over 40 hours of participation weekly.

#### National Honors Society - *Member*

#### Quizbowl Team - *Varsity Member and Vice President*

#### Yearbook Club - *President*

#### Students For RARE - *President*

- NORD recognized rare disease advocacy club.

#### Spoke on School Panel About AI

#### Volunteer Tutoring

- Ran AP Physics C and Calculus tutoring every morning before school at University Scholars Program
- Tutored many students from University Scholars Program and Downingtown STEM.

#### Teacher's Assistant

- TA for STEM, AP Computer Science A, and AP Pre-Calculus.
- Set up labs, tutored students, and graded assignments.

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## School Ambassador

- Introduced students to school.
- Gave tours, met teachers.

## Purple Comet - *Participant*

### Volunteering Robotics

- Ran events at libraries, schools, and fundraisers to get students excited about STEM.
- Ran multiple FLL teams and helped run competitions.

## PROJECTS

### Breadboard Computer

- Built a homemade computer on breadboards using a 6502 microprocessor.

### Custom Speaker

- Created and refined a homemade audio speaker from scratch.

### Game Jams

- Participated in multiple 48, 72, and 96 hour game jams.
- A video game is created under extremely short time constraints.
- Placed in the top 10% on average.

### Physics Engine

- Custom physics engine created in Desmos graphing calculator.

### Godot Tools

- Created and published tools for Godot game engine.

### Complex Domain Coloring

- Created a domain coloring renderer in Desmos graphing calculator.

## Links

<https://justindugan.com/>

<https://github.com/jdugan0>

<https://github.com/FRC1640/2024-Code>

<https://jugan0.itch.io/>