Derek Qin

dqin@caltech.edu

Education

- **California Institute of Technology**, Pasadena, California   *Sept 2020 - Present*
  - Bachelor of Science: Computer Science (Machine Learning & Robotics)

Projects

- **Traffic Signal Control Simulation for Optimization of Vehicle Flow**   Plano, Texas
  Computer Science & Applied Mathematics   *August 2017 - March 2018*
  - Developed a novel signal management algorithm that operates using car volume statistics
  - Implemented with Python and Google Maps API to identify an optimally efficient light configuration without extra cost for car-detection systems
  - Verified feasibility by testing configurations on both non-actuated and semi-actuated intersections (18% decrease in wait times)
  - Awards:
    - **1st Prize** in Engineering Mechanics, Dallas Regional Science and Engineering Fair
    - Texas State Science Fair Finalist
    - 3rd Prize Terracon Consultants Excellence in Engineering
    - Office of Naval Research Special Award
    - Air Force Research Laboratory Special Award

- **Phantom Traffic Jam Alleviation Using Networked Autonomous Cars**   Plano, Texas
  Computer Science & Applied Mathematics   *August 2018 - April 2019*
  - Created a novel microscopic traffic model and derived a first-order differential equation to model flow rate and jam dissipation
  - Implemented bilateral control scheme and a vehicle unit structure with Python for vehicle control
  - Awards:
    - **1st Prize** in Mathematics, Dallas Regional Science and Engineering Fair
    - Texas State Science Fair Finalist
    - Mu Alpha Theta Special Award

- **Surface Stress Development During Nanopatterning**   Boston University, MA
  Materials Science, Computer Science, & Physics   *June 2019 - Present*
  - Selected for Research in Science & Engineering (RISE) Program
  - Analyzed self-organizing patterns on Silicon in ultra-high vacuum bombarded by Argon plasma at various incidence angles
  - Added dimensionality to multi-beam optical stress sensor (MOSS) measurements using a dual etalon configuration probing both parallel and perpendicular to ion beam incidence
  - Developed computer vision analysis software using Scikit-learn to speed up analysis and improve precision. Analyzed sample patterns using atomic force microscopy
  - *Mentors: Prof. Karl Ludwig, Peco Myint*
  - Awards
    - **1st Prize** in Physics, Dallas Regional Science and Engineering Fair
    - Texas State Science Fair Finalist
    - Office of Naval Research Naval Science Award
    - US Air Force Certificate of Achievement Award

Experience and Activities

- **QuizBowl**, Plano West Senior High — Plano, Texas
  Co-Captain, Co-President — *Aug 2018 - May 2020*
    - Qualified for NAQT HSNCT in first year of pyramidal QuizBowl
    - Led team to National Academic Championship Finals Tournament
    - Increased membership from 10 to 30 and helped establish clubs at feeder schools
    - Organized weekly practices and team communication
    - Coordinated with PISD to secure support for district-wide QuizBowl tournaments

- **Association for Young Scientists and Innovators** — Plano, Texas
  Vice President, Co-founder — *May 2019 - September 2020*
    - Helped middle and high school students develop research skills
    - Managed membership information and communication with over 200 science fair students
    - Organized meetings and created message board for announcements, discussions, and questions
    - Organized AYSI Summer Coding Institute, which taught over 300 middle and high school students essential skills in MIT App Inventor and Artificial Intelligence

- **AwesomeMath Summer Program** — University of Texas at Dallas
  Student — *2015, 2016*
    - Studied Advanced Graph Theory, Combinatorial Geometry, Posets, Analysis

Awards and Achievements

- **Special Awards**
    - USA Physics Olympiad, Honorable Mention (National Top 200 Individuals) (2019)
    - National Academic QuizBowl Tournaments (NAQT) Championship Tournament (2019)
    - Chinese Institute of Engineers (CIE) Young Achiever Award (2019)
    - Duke TIP William and Dorothy C. Bevan Scholarship (2014)
    - National AP Scholar, AP Scholar with Distinction (2019)
- **Mathematics Awards**
    - Harvard-MIT Mathematics Tournament, Team Round, 10$^{\text{th}}$ Place (2018)
    - 5x American Invitational Mathematics Exam (AIME) Qualifier (2015, 2016, 2017, 2018, 2019)
    - 8x American Mathematics Competition (AMC 10) Distinguished Honor Roll (2014-2018)
- **Research Awards**
    - Multiple Awards, See Projects Section

Selected Coursework

- **Passed Placements:**
    - CS 1 (Intro to Programming), Ma 1c (Multivariable Calculus), Ma 2 (Differential Equations), Ph 1a (Classical Mechanics)

- **CS:**
    - CS 21 (Complexity Theory), CS 38 (Algorithms)

- **Math:**
    - Ma 6a (Discrete Math), Ma 2 (Differential Equations)

Skills

- **Languages**
    - Fluent in English and Mandarin Chinese
- **Programming Languages**
    - C/C++ , Java, Python, HTML, CSS, Matlab, Octave
    - Tensorflow, Keras, Scikit-learn, NumPy
- **Software**
    - Proficient with Microsoft Office, Adobe Premiere, LightWorks, and Google Docs
- **Miscellaneous**
    - This resume was created with LaTeX