# Daniel Smolyak | Curriculum Vitae

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## Education

**University of Maryland, College Park** — **College Park, MD**
*B.S. in Computer Science and Economics, 3.99 GPA* — *Expected Graduation: May 2020*
Gemstone Honors Program, Full Merit Scholarship

**Atholton High School** — **Columbia, MD**
*Graduated in Top 5% of Class, 4.00 GPA* — *September 2012 – May 2016*

## Research Experience

**Applied Research Lab for Intelligence and Security** — **University of Maryland, College Park**
*Advisor: Dr. Anton C Rytting* — *October 2019 – Present*

- Identifying personality metrics through analysis of Russian social media posts, using natural language processing techniques, such as BERT, and my knowledge of Russian.
- Anonymizing data through the use of named-entity recognition recognition models.

**Data Science REU** — **Indiana University - Purdue University Indianapolis**
*Advisor: Dr. George Mohler* — *June 2018 – September 2018*

- Developed generative adversarial networks (GANs) to generate synthetic GPS trajectory data and to find anomalies within real GPS trajectory data.
- Improved upon current benchmarks in GAN-based anomaly detection by using Gaussian Mixture Models.
- Worked in a team with one undergraduate and one graduate student, presented progress updates to all other members of the REU each week.
- Presented at the *5th National Symposium for NSF REU Research in Data Science, Systems, and Security*.

**Gemstone Honors Program** — **University of Maryland, College Park**
*Advisors: Dr. Sean Barnes and Dr. Margaret Bjarnadottir* — *May 2017 – Present*

- Member of a 7-person team of undergraduates conducting a 3-year research project on predictors of success in the NBA, and how a team's place in the success cycle should affect its front-office decisions, such as signing a free agent, selecting players via the draft, trading draft selections, signing a new coach, or adopting a new style of play.
- Wrote a literature review, methodology, and project proposal, which the team presented to an expert panel.
- Conducting various types of data analytics, including clustering, regression, and decision trees, to answer research questions, including descriptive, predictive, and prescriptive analytics.
- Presented at annual *Do-Good Showcase* and *Undergraduate Research Day* at the University of Maryland.
- Will complete and present a Gemstone thesis, to be defended in May 2020.

**Human Computer Interaction Laboratory** **University of Maryland, College Park**
*Advisors: Dr. Eun Kyoung Choe and Dr. Bongshin Lee* *September 2017 – May 2018*

- Read and annotated scholarly papers in the fields of human computer interaction and psychology.
- Designed a study to leverage goal-setting and streaks in mobile applications to provide support for lapse-management in order to promote healthy behavior change.
- Designed a study to examine individuals' interactions with voice/audio devices in an exercise context.
- Developed an Android mobile application and an Amazon Alexa skill for the above study.
- Published an extended abstract to the *2018 ACM CHI Conference on Human Factors in Computer Systems*.

**Computer Science Department: Independent Study** **University of Maryland, College Park**
*Advisor: Dr. William Gasarch* *September 2017 – February 2019*

- Conducted research in the field of combinatorics on *The Muffin Problem*, which is concerned with the fair and optimal allocation of resources under certain constraints.
- Coded in Python mixed-integer programs and multiple algorithms and procedures to find and verify solutions to the muffin problem.
- Wrote and proofread mathematical theorems and proofs for various sub-problems and their solutions.
- Co-author on a full length book on the topic, *Mathematical Muffin Morsels*, as well as a paper presenting our research in the *2018 FUN with Algorithms Conference*.

**REU: Combinatorial Algorithms Applied Research** **University of Maryland, College Park**
*Advisor: Dr. William Gasarch* *June 2015 – August 2015*

- Conducted research and developed algorithms for exploring topics in Ramsey Theory by using Satisfiability (SAT) solvers.
- Collaborated with a small group of undergraduates to code SAT solvers using C++.
- Resulting research was presented at an unrefereed math conference, and submitted to the Siemens competition, where the paper was chosen as a semi-finalist.

## Work Experience

**Microsoft, Research and AI Group** **Bellevue, WA**
*Software Engineering Intern* *June 2019 – August 2019*

- Member of the Bing Conversational Search Team, which generates options for query reformulation.
- Extended the scope of the feature by allowing for faceted search. Finding facets through data science experimentation in C#, Scope, and Cosmos DB with word ontologies and classifiers.

**Johns Hopkins University, Applied Physics Laboratory** **Laurel, MD**
*Software Development Intern* *September 2014 – August 2017*

- Interned for two years, during the school year, as a high school intern (2014-2016), and interned for two summers as a college intern (2016-2017).
- Implemented an interface for conducting depth perception with two stereo-cameras using the OpenCV library in C++, including wiring the electronic synchronization of the cameras and calibrating the cameras.
- Earned first place in the Intern Challenge, where interns were placed in teams to design an innovative office space for implementation in renovations, and presented their design to staff and management.
- Added and enhanced functionality of an image annotator, written in Python's PyQt library, which was used for identifying boats in images as training data for a boat-recognizing computer vision model. The annotator was integrated with a MySQL database containing data on approximately 30,000 images of boats in various settings.

## Publications

- Smolyak, D., Lee, B., & Choe, E. K. "TandemTrack: Promoting Consistent Exercise Leveraging Multimodal Training and Tracking". *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems*, 2018.
- Gray, K., Smolyak, D., Badirli, S., & Mohler, G. "Coupled IGMM-GANs for deep multimodal anomaly detection in human mobility data". *IEEE International Conference on Big Data (Big Data)*, 2018.
- Gasarch, W., Metz, E., Prinz, J., Smolyak, D.. *Mathematical Muffin Morsels*. World Scientific, 2019.
- Cui, G., Dickerson, J., Durvasula, N., Gasarch, W., Metz, E., Prinz, J., Raman, N., Smolyak, D. & Yoo, S. H. "A Muffin-Theorem Generator". *International Conference on Fun with Algorithms (FUN)*, 2018.
- Canakci, B., Christenson, H., Fleischman, R., McNabb, N., & Smolyak, D. "On SAT Solvers and Ramsey-type Numbers". Presented at *American Mathematical Society Fall Eastern Sectional Meeting*, 2015.

## Skills

- **Programming Languages:**
  Proficient in: Java, Python, C, C++, MySQL, R, Javascript, Kotlin, OCaml, Ruby, Prolog, LaTeX
  Experience with: Matlab, Typescript, Assembly
- **Version Control:** Git, SVN
- **Environments:** IntelliJ, PyCharm, Eclipse, Emacs, Atom, Android Studio, Visual Studio
- **Languages:** Russian (heritage), French (elementary)

## Teaching Experience

**CMSC 434: Introduction to Human-Computer Interaction**
*Teaching Assistant* *Fall 2018 & Spring 2019*

- Managing multiple class teams for the semester-long project to prototype and develop a software application.
- Grading and proofreading projects, homeworks, and exams throughout the course.

**GEMS 100: Introduction to Gemstone**
*Section Leader* *Fall 2017 & Fall 2018*

- Co-taught a 10-person class of first-semester freshman in Gemstone.
- Presented information and guided activities on topics including: Introduction to the University and the Gemstone Program, Team Dynamics, How to do Research, and Social Innovation.

**GEMS 104: Introduction to Gemstone**
*Section Leader* *Spring 2019*

- Individually taught a 13-person class of second-semester freshman in Gemstone.
- Presented information and guided activities on topics including: Ethics in Research, Finding Research Sources, and Writing a Literature Review.

## Leadership and Service

**Gemstone Leadership Council**
*Co-President* *May 2018 – Present*

- Leading the coalition of student leaders from the Gemstone student body, whose goal is to support Gemstone students through the four-year undergraduate research experience and beyond through academic, professional, and community engagement events and initiatives.
- Communicating and discussing the organization's agenda with Gemstone staff and the Executive Board.
- Facilitating the smooth operation of and collaboration between the various organizations within Gemstone.
- Overseeing and delegating the various tasks within event/initiative planning, organization, and execution.

**Technica Hackathon**
*Organizer, Technology Team* *May 2019 – November 2019*

- Member of the student-lead group organizing UMD's all-women and non-binary hackathon.
- As part of the tech team, helped implement the Technica website (gotechnica.org) and mobile app.

**Girls Who Code**
*Tutor* *September 2018 – April 2019*

- Instructed middle and high school students in programming fundamentals in Javascript.

## Honors and Awards

- **Omicron Delta Kappa National Leadership Honors Society** - In recognition of campus involvement
- **BSOS Undergraduate Experience Funds Recipient** - Funding for IEEE BigData conference attendance
- **Banneker/Key Scholar** - Full scholarship for attendance at University of Maryland, College Park
- **National Merit Scholar** - Annual scholarship earned by high performance on the NMSQT

## Selected Coursework

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| CMSC 828R: Adv. Topics in Info. Processing; Applied Mechanism Design for Social Good | Spring 2020 |
| CMSC 454: Algorithms for Data Science | Spring 2020 |
| ECON 416: Analysis of Economics Development | Spring 2020 |
| ECON 415: Market Design | Fall 2019 |
| ECON 406: Advanced Microeconomics | Fall 2019 |
| CMSC 433: Programming Language Technologies and Paradigms | Fall 2019 |
| CMSC 451: Design and Analysis of Computer Algorithms | Spring 2019 |
| CMSC 420: Data Structures | Spring 2019 |
| ECON 423: Econometrics II | Spring 2019 |
| CMSC 422: Introduction to Machine Learning | Fall 2018 |
| ECON 422: Econometrics I | Fall 2018 |
| ECON 414: Game Theory | Fall 2018 |
| CMSC 320: Introduction to Data Science (R) | Spring 2018 |
| CMSC 434: Introduction to Human-Computer Interaction | Spring 2018 |
| CMSC 858R: Advanced Topics in Theory of Computing: Ramsey Theory | Spring 2018 |
| CMSC 330: Organization of Programming Languages (Ruby, OCaml, and Prolog) | Fall 2017 |
| STAT 400: Applied Probability and Statistics I | Fall 2017 |
| CMSC 216: Introduction to Computer Systems (C and Assembly) | Spring 2017 |
| CMSC 250: Discrete Structures | Spring 2017 |
| MATH 341: Multivariable Calculus, Linear Algebra and Differential Equations II (Honors) | Spring 2017 |
| MATH 340: Multivariable Calculus, Linear Algebra and Differential Equations I (Honors) | Fall 2016 |
| CMSC 132H: Object-Oriented Programming II (Java) | Fall 2016 |