

# ROBERT J. PARUCH, Ph.D.

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## SUMMARY

Computer Programmer passionate about developing complex back-end algorithms to support functional and intuitive web applications. With a doctoral degree in computational physics, qualified to use analytical and creative thinking to find solutions for highly technical problems. Equipped with the ability to work independently and collaboratively on multiple complex projects. Able to prioritize competing tasks under pressure after a five-year postdoctoral research project focusing on computer modeling of physical phenomena in materials science. Interested in pursuing career opportunities in web development related areas, especially in the research setting involving data manipulation and the development of data-driven web applications.

## TECHNICAL SKILLS

- Full Stack Web Development programming skills: HTML, CSS, JavaScript, JQuery, Bootstrap, Google Firebase, Node.js, MySQL, MongoDB, ORM, API routing, Express, Handlebars.js, React, writing tests
- Scientific programming and code optimization (Python, Java, C/C++, Fortran, Tcl), including automation scripting required for efficient processing and graphical visualization of very large research datasets
- Numerical methods (linear algebra, ODE's, PDE's), statistical analysis, graphing and analytic packages (matplotlib, PyLab, Gnuplot, Origin Pro, Mathematica), molecular modeling and visualization programs (Visual Molecular Dynamics, Materials Studio), algorithms to support research in modeling of solids
- Computer simulation techniques (Molecular Dynamics, Monte Carlo), including parallel and distributed computing practices using remote High Performance Clusters (Bash, SSH, PBS)
- Software development practices (IDE's, debuggers) and team collaboration (Git, GitHub, Agile, Kanban)
- Operating systems (Windows, Linux), networking (TCP/IP) and computer architecture (PC assembly)
- Scientific writing (document formatting, preparation of figures), peer reviewing, publishing, and presenting the results of research at conferences (MS Office, Google Docs, LaTeX, Adobe Photoshop)

## PROJECTS

### **Prudent Pantry | <https://github.com/robjpar/prudent-pantry> | <https://prudent-pantry.herokuapp.com>**

- A MERN Stack web application tracking the inventory of household food items and provide the user with meal recipes prioritizing the need of using the foods with short remaining shelf life. Intended for reduction of household food waste with positive impact on the personal budget and natural environment
- Managed the GitHub repository and the project board (Kanban). Created, assigned and watched over timely completion of tasks to all team members. Implemented API routing and API requests (Edamam.com)
- React, JavaScript/Axios, API requests/routing, Express, MongoDB/Mongoose, Passport.js, Heroku Platform

### **D.R.I.V. | <https://github.com/robjpar/driv> | <https://referral-information-viewer.herokuapp.com>**

- The Donor Referral Information Viewer (D.R.I.V.) full stack web application developed to address the needs of efficient and convenient access to and processing of information in a tissue donor referral organization
- Implemented the structure of database (ORM), a CSV file data importer, and RESTful API routing
- HTML, CSS/Bootstrap, JavaScript/JQuery/Ajax, API requests/routing, Express, Handlebars.js, MySQL/Sequelize, CVS, Passport.js, Heroku Platform

### **GifVia | <https://github.com/robjpar/gif-via> | <https://robjpar.github.io/gif-via>**

- An interactive GIF animated trivia game built as a front-end web application. Utilizes the Open Trivia Database and GIPHY API to deliver enjoyable and engaging family entertainment for all ages
- Implemented JS scripts to support dynamic content generation of the login page, the login logic, scoreboard rendering and permanent storage of the users' login credentials in a real-time database (Google Firebase)
- HTML, CSS/Bootstrap, JavaScript/JQuery, Ajax/API requests, Google Firebase, Chart.js, GitHub Pages

## EXPERIENCE

### Postdoctoral Researcher

2011, 2012 – 2017

### The Pennsylvania State University

University Park, PA

- Conducted research on sputtering and depth profiling of molecular solids. The protocol included performing molecular dynamics simulations of multiple-cluster irradiation of molecular solids and interpretation of the results with previously developed, and then improved, the Steady-State Statistical Sputtering Model (SS-SSM). The obtained results allowed for improvement of accuracy and specificity of the Secondary-Ion Mass Spectrometry (SIMS) analytical technique, which was of important experimental interest
- Demonstrated that the universal concept in sputtering yields has a physical basis based on similarities in ejection mechanisms between molecular and atomic solids. The obtained results explained and provided new understanding of the experimental findings reported in the literature before
- Coded the macroscopic transport model based on the advection-diffusion-reaction equation. Demonstrated that this approach is applicable to modeling of depth profiling for larger time and length scales that are directly comparable with the experimental quantities, which laid the groundwork for further model approaches to interpret the results of depth profiling simulations under experimentally applicable conditions
- Coauthored 10 research papers published in peer-review journals and international conferences, including six papers as the first author. Presented the research results at four international conferences

### Graduate Research Assistant/Teaching Assistant

2008 – 2012

### Jagiellonian University

Krakow, Poland

- Conducted research on depth profiling of atomic solids. Developed a novel method, the Steady-State Statistical Sputtering Model (SS-SSM), which application provided insight into the dynamics of the irradiation-induced processes in atomic solids, which was of important experimental interest
- Coauthored nine research papers published in peer-review journals and international conferences, including three papers as the first author. Presented the results of research at three international conferences
- Taught the Undergraduate Computer Modeling of Materials Course and supervised the Undergraduate Electronic and General Physics Labs classes. Prepared and graded over 50 theoretical assignments and programming exercises on topics including classical mechanics, statistical physics and condensed matter
- Served on the Festival of Science in Krakow as a physics lab demonstrator, and on the Sciences Promotion Program “FENIKS” for lower secondary and secondary school students as a physics lab instructor
- Served on the local organizing committee of the COSIRES 2010 International Conference in Krakow

## EDUCATION

### Bootcamp Certificate: University of Oregon, Portland, Oregon

A 24-week intensive program focused on gaining technical programming skills in full stack web development with emphasis on complying with best coding practices and effective team collaboration.

### Doctor of Philosophy in Physics: Jagiellonian University, Krakow, Poland

Dissertation: “Computer modeling of depth profiling of crystals with  $C_{60}$  and  $Au_3$  cluster projectile beams.”

### Master of Science in Physics, majoring in Computational Physics: Jagiellonian University, Krakow, Poland

Thesis: “Computer modeling of sputtering of arachidic acid films by  $C_{60}$  cluster projectiles.”