

JOHN EMIL PETERSEN III, M.S., Ph.D.

Full Stack Dev | CAD | Materials Science | Physics | Engineering | Control Systems | Consulting
<http://n-dtech.com> | <http://www.linkedin.com/in/johnepetersen> | (361) 207-9346
jepetersen@utexas.edu | <https://github.com/tarbalReboot> | <https://orcid.org/0000-0001-7476-3690>

Professional Experience

Owner, Founder, and Sole Proprietor **N-Dimensional Engineering**

Jan 2018 –

- ∞ Engineered robotic alt-az positioning system for telescopes
- ∞ Achieved a level of accuracy appropriate for professional data acquisition
- ∞ Secured intellectual property with valuation in the millions of dollars.
- ∞ <https://www.youtube.com/embed/1IR116R1wuE>

Research Associate

Jan 2012 – Dec 2017

Texas State University, Department of Physics

- ∞ Calculated physical properties of novel materials via quantum mechanical first-principles
- ∞ Utilized Linux high-performance computing clusters to compile, run, and/or write various scientific programs using C/C++ and bash
- ∞ Characterized structural and electronic properties of materials via x-ray diffraction, atomic force microscopy, and Hall measurements, often using LabView
- ∞ Presented original results at professional society conferences and in peer-reviewed journals

Teaching Assistant

Aug 2011 – May 2015

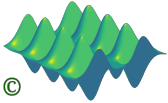
Texas State University, Department of Physics

- ∞ Introduced students to fundamental laws of electrodynamics and basic electrical engineering principles, through lecture and demonstration
- ∞ Became exceptionally familiar with circuits and their components

Various other previous positions, including Financial Adviser, Freelance Math Tutor, manual laborer, and sales associate.

Skills

- ∞ Demonstrated hard coding and mathematical modeling ability with C/C++
- ∞ Seasoned scripting skills with bash, awk, and C#
- ∞ Versed in Linux and Windows, whether in the terminal, Visual Studio, HPCC, or webserver
- ∞ Well-practiced in both relational (SQL) and key-pair (non-SQL) development and query
- ∞ Experienced in presenting, communicating, and educating to large crowds
- ∞ Skilled in materials characterization by XRD, AFM, and Hall measurements
- ∞ Learned and experienced with both CAD and shop tools, bringing design to prototype
- ∞ Skilled with electronics workbench, wet lab, mechanics, and power tools



JOHN EMIL PETERSEN III, M.S., Ph.D.

Full Stack Dev | CAD | Materials Science | Physics | Engineering | Control Systems | Consulting
<http://n-dtech.com> | <http://www.linkedin.com/in/johnepetersen> | (361) 207-9346
jepetersen@utexas.edu | <https://github.com/tarbalReboot> | <https://orcid.org/0000-0001-7476-3690>

Education

PhD, Materials Science and Engineering **Dec 2017**
Texas State University

“Impurities in Antiferromagnetic Transition-Metal Oxides – Symmetry and Optical Transitions”

GPA: 3.74

Master of Science, Physics **May 2013**
Texas State University

“First Principles Study of Structural, Electronic, and Mechanical Properties of Lead Selenide and Lead Telluride”

GPA: 3.13, Excellence in Graduate Research Award

Bachelor of Science, Physics **Dec 2010**
University of Texas at San Antonio

GPA: 3.34

- ∞ Co-founder and treasurer of local branch of Society of Physics Students
- ∞ Best Paper award at ABES Student Conference, 2010

Bachelor of Arts, Liberal Arts **Aug 2005**
University of Texas at Austin

- ∞ Minor in Business Foundations
- ∞ Studied abroad at ESADE, in Barcelona, Spain

Oral Presentations at National Conferences

APS March Meeting, New Orleans, LA **Mar 2017**

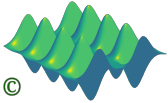
Ab Initio study on structural, electronic, magnetic and dielectric properties of LSNO within Density Functional Perturbation Theory, J. Petersen, et al.

<http://meetings.aps.org/link/BAPS.2017.MAR.A8.2>

APS March Meeting, Baltimore, MD **Mar 2016**

First Principles Study of Oxygen Vacancies and Iron Impurities on Electrical and Optical Properties of NiO, J. Petersen, et al.

<http://meetings.aps.org/link/BAPS.2016.MAR.Y30.9>

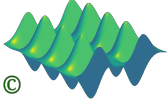


JOHN EMIL PETERSEN III, M.S., Ph.D.

Full Stack Dev | CAD | Materials Science | Physics | Engineering | Control Systems | Consulting
<http://n-dtech.com> | <http://www.linkedin.com/in/johnepetersen> | (361) 207-9346
jepetersen@utexas.edu | <https://github.com/tarbalReboot> | <https://orcid.org/0000-0001-7476-3690>

Publication List

11. Symmetry Considerations on Band Filling and First Optical Transition in NiO, J. Petersen, et al., **The European Physical Journal B** (2019) 92: 232.
<https://doi.org/10.1140/epjb/e2019-100363-5>
10. Spontaneous symmetry breaking and electronic and dielectric properties in commensurate $\text{La}_{7/4}\text{Sr}_{1/4}\text{CuO}_4$ and $\text{La}_{5/3}\text{Sr}_{1/3}\text{NiO}_4$, J. Petersen, et al., **Physical Review B** 97 (195129).
<https://doi.org/10.1103/PhysRevB.97.195129>
9. Carrier Lifetimes of Iodine-Doped CdMgTe/CdSeTe Double Heterostructures Grown by Molecular Beam Epitaxy, S. Sohal, et al., **Journal of Electronic Materials** 46 (9).
<https://doi.org/10.1007/s11664-017-5646-y>
8. Iodine Doping of CdTe and CdMgTe for Photovoltaic Applications, O.S. Ogedengbe, et al., **Journal of Electronic Materials** 46 (9).
<https://doi.org/10.1007/s11664-017-5588-4>
7. Electronic and Optical Properties of Antiferromagnetic Iron Doped NiO – A First Principles Study, J. Petersen, et al., **AIP Advances** 7 (5).
<https://doi.org/10.1063/1.4975493>
6. Effect of Free-Carrier Concentration and Optical Injection on Carrier Lifetimes in Undoped and Iodine Doped CdMgTe/ CdSeTe Double Heterostructures Grown by Molecular Beam Epitaxy, S. Sohal, et al., **Journal of Physics D Applied Physics** 49 (50).
<http://stacks.iop.org/0022-3727/49/i=50/a=505104>
5. Factors Influencing Photoluminescence and Photocarrier Lifetime in CdSeTe/CdMgTe Double heterostructures, C. Swartz, et al., **Journal of Applied Physics** 120 (16).
<https://doi.org/10.1063/1.4966574>
4. Ab Initio Study of Oxygen Vacancy Effects on Electronic and Optical Properties of NiO J. Petersen, et al., **MRS Advances** 1 (37).
<https://doi.org/10.1557/adv.2016.405>
3. The Effect of Anisotropic Valleys on Phonon Scattering and the Magnetotransport Properties of n-Type PbTe, C. Swartz, et al., **Journal of Electronic Materials** 45 (1).
<https://doi.org/10.1007/s11664-015-4184-8>
2. Thermoelectric Properties of IV-VI-Based Heterostructures and Superlattices, P. Borges, et al., **Journal of Solid State Chemistry** 227 (123).
<https://doi.org/10.1016/j.jssc.2015.03.027>
1. Elastic and Mechanical Properties of Intrinsic and Doped PbSe and PbTe Studied by First-Principles, J. Petersen, et al., **Materials Chemistry and Physics** 146 (3).
<https://doi.org/10.1016/j.matchemphys.2014.03.055>



JOHN EMIL PETERSEN III, M.S., Ph.D.

Full Stack Dev | CAD | Materials Science | Physics | Engineering | Control Systems | Consulting

<http://n-dtech.com> | <http://www.linkedin.com/in/johnepetersen> | (361) 207-9346

jepetersen@utexas.edu | <https://github.com/tarbalReboot> | <https://orcid.org/0000-0001-7476-3690>

Research Interests:

1. First Principles Calculations in Solid State Physics

I have theoretical expertise and publications in the applied quantum mechanics and electronic structure of band theory, and calculation of physical properties of bulk materials. **My current research involves** synchronistic or resonant orbital occupation in d orbitals of high-temperature superconductors and assessing the role of anharmonicity and symmetry of charge density waves on phase change into superconductance. Interpreting the one-half factor in BCS theory as an independent spin channel, rather than as cooper pairing, by simulating systems of particles with Fermionic statistics rather than Bosonic statistics and comparing to experiment yields fruitful results.

2. Materials Science and Engineering

I have theoretical and experimental expertise and publications in thermoelectric materials and their thermocouple heterostructures. **My current research involves** optimizing thermoelectric transduction under laminar flow conditions in a commercially viable manner. I developed some iterative simulation software in classless C++ in 2015, but I have lost access to the old github account as a result of losing access to an email account, so it has never been publicly updated, despite active development.

3. Automation and Robotics

I have engineering experience in automation and robotics which led to founding my current startup company and revolutionizing the field of automation in 2021 with my PID algorithm. **My current work in this area involves** writing a textbook on animamechatronics, which has been an active project for eight months and has a planned publication date of approximately February of 2028. Further, I am building a workshop for my engineering company, including an electronics bench and a custom CNC mill, for the many automated projects I have planned for my engineering company.

4. Mathematics, Computer Science, Quantum Mechanics, and Relativity

I have an extensive background in higher mathematics which I cultivated throughout my physics education and beyond. **My current work in this area involves** development of two independent linear algebra C++ header libraries, both under active development on my current github. The first, called “Euclidean,” is focused on Euclidean Space, i.e., \mathbf{R}^2 and \mathbf{R}^3 spaces or curved manifolds in \mathbf{R}^4 of the relativistic variety. Linear algebra and tensor operations in this space have applications in flight simulation, relativity research, geopositioning from satellite, fluid mechanics, and other related fields.

The second, called “nDLA,” focuses on similar mathematical operations but in n-dimensional systems, i.e., dynamic and unlimited dimensions. Memory requirements are much different, as are applications, so development is separate from Euclidean.

Wavefunctions are often truncated to be of finite dimension for computer simulation purposes, and the ultimate goal of nDLA will be to manage memory such that quantum mechanical simulations will be practical in C++, rather than having to use less actively developed compiled languages, such as FORTRAN or COBOL.