Austin J. Baird, Ph

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、 (801) 792-2582 | ☑ ajbaird86@gmail.com | 🌴 homepage | 🖸 ajbaird | in bairdaustin | 🕿 Austin Baird

About

I am driven by innovations in computational biology that will have an impact in quality of healthcare and believe that these solutions must bridge multiple disciplines in order to optimize the outcomes that are possible. I am looking for a role that will enable me to have the greatest reach achieving my goal of bettering patient care while also giving me the opportunity to foster, grow and lead a team towards that central purpose.

Education

University of North Carolina, Chapel Hill

Chapel Hill, NC

PhD in Applied Mathematics

August 2014

- Thesis: Modeling Valveless Pumping Mechanisms, link
- · Advisor: Dr. Laura Miller, Committee: Forest, M. Gregory, Adalsteinsson, David, White, Brian, Mucha, Peter, Kier, William M.

University of California, Santa Cruz

Santa Cruz, CA

June 2008

BA IN MATHEMATICS

• Honors Thesis: Modeling Native California Grassland Populations

Experience _____

Applied Research Associates, Inc.

Raleigh, NC

BIOMEDICAL MODELING GROUP LEADER (SENIOR ENGINEER, DISTINGUISHED MEMBER OF THE TECHNICAL STAFF)

December 2018 - PRESENT

- Lead a multidisciplinary team across 4 different projects
- · In charge of agile development processes, product roadmap, delivery scheduling, and direct communication with government customers
- · Led and won multiple research and development funds through Defense Health Agency and Army Research Lab grants
- · Principal investigator of the BioGears, BurnCare training application, and the traumatic brain injury angiogensis projects
- Organized teaming across three research hospitals and multiple small businesses
- Communicate research progress through multiple conferences and peer reviewed publications, including the BioGears 2020 conference
- Oversaw implementation of all models associated with BioGears releases 7.0-7.3

STAFF ENGINEER 2 January 2017 - December 2018

- Expanded the BioGears physiology model by adding gastro-intestinal digestion/absorption, diuretic drug, and pain stimulus models
- · Nominated and won federal innovation award in collaboration with Telemedicine & Advanced Technology Research Center (TATRC) government lab
- Updated the BioGears build library to be hosted on Github, modernized development timeline
- · Won two government contracts totaling 4 million dollars in additional research and development funding
- Oversaw implementation of all models associated with BioGears releases 6.1-6.3

February 2016 - January. 2017

- Implemented a new renal system model in the BioGears engine with local autoregulation
- Contributed to updated blood/gas model and matrix circuit solver implementation
- Led validation and unit testing of C++ code base
- · Oversaw Jenkins cloud build testing environment including daily reporting and system validation

Webassign

CONTENT DEVELOPER

Raleigh, NC

August 2015 - February 2016

· Created detailed solutions for the differential equation teaching application including step-by-step instructions

• Coordinated content outlines with leadership teams to detail requirements

Durke University Durham, NC

VISITING ASSISTANT PROFESSOR

Analyzed how pressure changes induced by heart failure affect the hemodynamic and reabsorptive function of the kidney

- Taught two semesters of introduction to partial and ordinary differential equations, developed all course materials
- Coordinated validation and experimental data with University of Ontario research hospital clinicians
- Presented results at experimental biology, Boston MA
- · Investigated blood clotting in the renal veins using the immersed boundary method

University of North Carolina, Chapel Hill

Chapel Hill, NC

GRADUATE RESEARCH FELLOW

September 2010 - August 2014

August 2014 - August 2015

- Developed a fully coupled fluid-structure interaction code in C++ and Python to test the performance of valveless pumping
- · Created a new computational valveless pumping mechanism using muscle cells to provide neuro-mechanical forcing in the system
- Presented and work at 12 conferences, domestic and abroad and published results
- · Led wet lab organism maintenance and worked with lab-mates to collect particle image velocity data from
- · Collaborated with colleagues from the Biology department to collect experimental results to validate computational models

Publications _____

JOURNAL ARTICLES

Open Source Pharmacokinetic/Pharmacodynamic Framework: Tutorial on the BioGears Engine

M. McDaniel, J. Carter, J. M. Keller, S. A. White, A. Baird

CPT: pharmacometrics & systems pharmacology 8.1 (2019) pp. 12–25. Wiley Online Library, 2019

A Whole-Body Mathematical Model of Sepsis Progression and Treatment Designed in the BioGears Physiology Engine

M. McDaniel, J. Keller, S. White, A. Baird

Frontiers in physiology 10 (2019) p. 1321. Frontiers, 2019

Neuromechanical Pumping: Boundary Flexibility and Traveling Depolarization Waves Drive Flow Within Valveless, Tubular Hearts

A. BAIRD, L. WALDROP, L. MILLER

Japan Journal of Industrial and Applied Mathematics 32.3 (2015) pp. 829–846. Springer, 2015

A Mathematical Model and MATLAB Code for Muscle-Fluid-Structure Simulations

N. A. BATTISTA, A. J. BAIRD, L. A. MILLER

Integrative and comparative biology 55.5 (2015) pp. 901–911. Oxford University Press, 2015

Numerical Study of Scaling Effects in Peristalsis and Dynamic Suction Pumping

A. BAIRD, T. KING, L. MILLER

Contemp. Math 628 (2014) pp. 129-148. 2014

Modeling Valveless Pumping Mechanisms

A. BAIRD

College of Arts and Sciences, Department of Mathematics (2014). 2014

CONFERENCE PROCEEDINGS

A Full-Body Model of Burn Pathophysiology and Treatment Using the BioGears Engine

M. McDaniel, A. Baird

2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), 2019

Electro-Dynamic Suction Pumping at Small Scales

A. BAIRD, L. MILLER

APS Division of Fluid Dynamics Meeting Abstracts, 2013

Funding

Defense Health Agency Fredrick, MD

SUSTAIN: PROLONGED FIELD CARE TRAINING FRAMEWORK

March 2018

- Role: Lead Physiology Modeler and Proposal Manager
- · Amount: \$2,200,000
- Contract(s): W81XWH-18-C-0169

Defense Health Agency

Orlando, FL

BURNCARE: VIRTUAL PATIENT APPLICATION TO TRAIN THERMAL INJURY

January 2017

- · Role: Principal Investigator
- Amount: \$2,100,000
- Contract(s): W911NF-18-C-0037

Army Research Labs

Raleigh, NC January 2017

- FAST COMPUTATIONAL SIMULATIONS OF TRAUMATIC BRAIN INJURY
- Role: Principal Investigator
- Amount: \$353,000
- Contract(s): W911NF-17-1-0572

Defense Health Agency

Fredrick, MD

August 2016

BIOGEARS FOLLOW-ON RESEARCH AWARD

- · Role: Principal Investigator
- Amount: \$1,900,000
- Contract(s): W81XWH-13-2-0068, W81XWH-17-C-0172

Projects

BioGears Physiology Engine

Raleigh, NC

ARM, C++, GITHUB, JAVA, PYTHON, XML

Feb 2016 - PRESENT

- · TATRC and DHA funded project to lower the barrier for whole-body physiology simulation in healthcare training and research
- · Lumped parameter physics based cardio-pulmonary model with compartment overlays for complete systems biology modeling support
- Models include: circulation, drug pharmacokinetics-pharmacodynamics, traumatic brain injury, pnuemothorax, urine concentration, blood coagulation, pain stimulus, infection, digestion absorption, and others
- Multi-platform build support and agile process development

BurnCARE Medical Training Application

Raleigh, NC

Jan 2018 - PRESENT

- Android, C++, Unreal Engine 4,
- DHA and ARL funded project to improve burn care training and patient care in the military
- Burn care application developed in Unreal Engine 4 for the Android tablet platform
- Modular concept designed to teach individual, unique burn treatment requirements
- · Collaborative effort with the U.S. Army Institute of Surgical Research

Sustain: Prolong Field Care Training Framework

Raleigh, NC

C++, JAVASCRIPT, PYTHON

Jan 2018 - PRESENT

- DHA funded project to create a computational framework for prolonged field care training in the military
- · Modular framework to connect different software critical for training
- Scenario builder, Unreal Engine 4 training game, networking code, DDS virtual patient management code, and learning record database portal

Traumatic Brain Injury Angiogenesis

Raleigh, NC

C++, Python, Paraview, 3DSLICER

Jan 2017 - PRESENT

- · Army Research Labs funded basic research project on angiogensis after a traumaic brain injury
- Visual studio c++ managed code base
- 3D fractal model of the vasculature with dynamical system model of the VEGF protein interaction and role in the angiogensis process

| Selected Presentations | (of 23) | |
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| Selected Presentations (of 23) | |
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| Military Health System Research Symposium | Orlando, FL |
| "BurnCare: Virtual Tablet Training to Enhance Burn Injury Care and Treatment" | August 2019 |
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| Society for Simulation in Health | Raleigh, NC |
| BIOGEARS MODEL TO SIMULATE PATIENT RESPONSES TO SEPSIS | March 2019 |
| American College of Surgeons Simulation Summit | Chicago II |
| BioGears: A Framework for Multiscale Physiology Modeling | Chicago, IL March 2019 |
| BIOGLANS. AT NAMEWORK FOR INCELESCALE I TITSIOLOGY MODELING | March 2013 |
| Department of Defense Working Group on Computational Modeling of Human Lethality, | Arlington, VA |
| Injury, and Impairment from Blast-Related Threats | Anington, va |
| BIOGEARS HUMAN PHYSIOLOGY ENGINE | February 2019 |
| Virtual Physiological Human Conference | Zaragoza, Spain |
| AN IN-SILICO WHOLE-BODY FRAMEWORK TO SIMULATE KINETICS AND DYNAMICS OF PHARMACEUTICALS AND ASSOCIATED REVERSAL | |
| Agents | September 2018 |
| | |
| International Meeting on Simulation in Healthcare | Los Angeles, CA |
| AN IN-SILICO WHOLE-BODY FRAMEWORK TO SIMULATE KINETICS AND DYNAMICS OF PHARMACEUTICALS AND ASSOCIATED REVERSAL AGENTS | January 2018 |
| ACENTS | |
| Chemical and Biological Defense Science and Technology Conference | Long Beach, CA |
| BIOGEARS: SIMULATING WHOLE-BODY RESPONSE TO CHEMICAL EXPOSURE | November 2017 |
| Experimental Biology | Dooton MA |
| Experimental Biology Implications of Increase Renal Venous Pressure for Renal Hemodynamic and Reabsorptive Function Studied by a | Boston, MA |
| MATHEMATICAL MODEL OF THE KIDNEY | March 2015 |
| | |
| Duke Interdisciplinary Discussion Course | Durham, NC |
| Moving Fluid in Tubes | October, 2014 |
| Society of Mathematical Biology | Osaka, Japan |
| ELECTRO-DYNAMIC SUCTION PUMPING AT SMALL SCALES | August 2014 |
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| Teaching Experience | |
| Duke University, Math 353 | Durham, NC |
| Introduction to Ordinary and Partial Differential Equations for Engineers | Spring 2015 |
| Duke University, Math 353 | Durham, NC |
| Introduction to Ordinary and Partial Differential Equations for Engineers | Fall 2014 |
| | . 3., 2017 |
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Applied Mathematical Methods (Computational Lab)

• Course Materials: link

Chapel Hill, NC

Spring 2013

Chaos and Population Dynamics Fall 2012

Skills _

Technical Python, C++, Buildbot, Paraview, VTK, CMAKE, XML, AWS, Docker, Matlab, R

Modeling Systems Biology, Fluid-Structure Interaction, Pharmacology (PKPD), Injury Physiology, Dynamical Systems, Protein Interaction,

Angiogensis, Circulation, Lumped Parameter

Management Agile Development, Scrum, Personnel Management, Hiring, Public Speaking, Financial Coverage, Grant Writing, Teaming,

Sub-Contractor Management

Affiliations _____

Society for Simulation in Healthcare

LEADERSHIP GROUP ON SIMULATION AND MODELING 2016 - PRESENT

IEEE

ENGINEERING IN MEDICINE AND BIOLOGY 2018 - PRESENT

NIH

Inter-agency Modeling and Analysis Group 2019 - PRESENT

Recommendations _

Laura Miller

PROFESSOR OF BIOLOGY AND MATHEMATICS UNC, CHAPEL HILL, UNIVERSITY OF ARIZONA

- · Address: Department of Biology CB 3280 Coker Hall University of North Carolina Chapel Hill, NC 27599
- Phone: 919-943-2434
- Email: fairyflies9@gmail.com
- Website: https://sites.google.com/site/swimflypump/

Professor M. Gregory Forest

GRANT DAHLSTROM DISTINGUISHED PROFESSOR OF MATHEMATICS AT UNC, CHAPEL HILL

- Address: CB 3250, UNC Chapel Hill, Chapel Hill, NC 27599-3250
- Email: forest@unc.edu
- Website: https://aps.unc.edu/faculty-member/forest-greg/