Dr. STEPHEN A. RACUNAS

NIH-style BioSketch

CONTACT

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POSITION

CTO, Advisory

EDUCATION

INSTITUTION AND LOCATION	DEGREE	annotation	FIELD OF STUDY
Carnegie Mellon, Pittsburgh, PA	B.S. *(x3)*	Full University Honors (x3)	Mathematics and Physics and Electrical Engineering (as three separate but simultaneous degrees)
Princeton University, Princeton, NJ	M.S.	ISS Fellow	Electrical and Computer Engineering and Information Sciences and Systems
PSU, University Park, PA	Ph.D.	Life Sciences Institute Invitee	Electrical and Computer Engineering and Bioinformatics
Stanford University, Stanford, CA	Postdoc	Research Scientist	Bioinformatics + Gerontology

Dr. Racunas was elected to the American Academy of Achievement for computational support of research that won the Nobel Prize.

Variously, Dr. Racunas consults for Stanford University's School of Medicine, Stanford University Hospitals, Stanford's "d-School" Incubator programs and "Seed Lab" invitees, the University of Michigan, C.S. Mott Children's Hospital, The Orlando Health Foundation, MedStar, and other nonprofit health organizations.

Stephen Racunas has been an Engineering Fellow-At-Large of the Santa Fe Institute, a Research Science Institute Scholar, and a National Foundation of America Scholar. He was named an Exploratory and Foundational Research Fellow for pioneering work in Bioinformatics.

Stephen's personal strengths include a talent for working independently on complex challenges and an ability to assemble and lead agile teams to innovate, research, and develop effective solutions to "hard" problems. Accordingly, Dr. Stephen Racunas founded his own "Grass-Roots Science" organization in 2007.

Since then, Dr. Stephen Racunas has:
* Invented and deployed cutting-edge database, knowledge base, query, and analytics systems
* Developed mobile-ready integrations for healthcare
* Served as Principal Investigator on research contracts, federal grants, and other awards

In that time, Dr. Racunas has been offered grants and research contracts from:
* The National Science Foundation
* Stanford University School of Medicine (and also various depts. at Stanford Hospitals)
* The University of Colorado Health Sciences Center
* The University of Michigan Medical Center
* The Orlando Health Foundation
* Sanofi - Aventis
* The Knight Foundation / WPI
* The Office of Naval Research
* C.S. Mott Children's Hospital
* The National Aeronautics and Space Administration

Research Statement:

Dr. Racunas pursues exploratory research and development. He builds upon his work designing mobile-ready services for medicine, his successful hypothesis testing frameworks, and his expertise with scalable biomedical and distributed computing environments to design and create systems that inform patients, caregivers, health providers and researchers throughout the entire "network of care."

Honors:

Recent Competition-Based Research & Development Recognition:
2009 Google Innovation Prize for "Hypothesis-Based Organization of Scientific Information"
2011 Top-Five placement in the Sanofi - Aventis Innovation Challenge for "A Hope Unwounded"
2012 Finalist at the Stanford 'BASES' Engineering-Design Competition
2012 'Startup Idol' Finalist (Top-Five placement)
2012 Completed 'Design Garage' with a project that was profiled on the TV show '60 Minutes'
2013 Perfect Ranking (@100% fta) on all MDB Qualifiers, leading to nomination to the Global Instructor Pool
2014 Tech Advisor to '*Hack for Good*' Winner: "Feeding-Forward"
2014 Tech Advisor to *Y Combinator* #8- NP: "Noora Health" (India + USA education for best medical outcomes)

Research Presentation Honors:
Invited Lecturer, Harvard Medical School (Systems Biology)
Invited Lecturer, MITRE corp.
Invited Speaker, Aging 2.0
Invited Speaker & Honorarium Talk, MedStar Innovation Summit ("Compassion Technology")
Invited Speaker & Honorarium Talk, NoSQL:Now 2013 ("Solving Complex Data Problems in Healthcare")
Keynote Speaker, ROCKY Bioinformatics

Outstanding Ph.D. Dissertation Research Honors:
Dr. Stephen Racunas' combined Bioinformatics Dissertation and Electrical and Computer Engineering Ph.D. Thesis Defense were awarded the highest possible scores in all evaluation categories

Honor Societies:
Mortar Board, Tau Beta Pi, Eta Kappa Nu, Lambda Sigma, Phi Eta Sigma, RSI, Century III Leader Foundation; PA Governors' School for the Sciences

University Honors and Awards:
Dean's List
Honors Thesis
Highest University Honors in each of three simultaneous degrees

Samples of Various Other Awards:
The National (formerly Westinghouse, *now Intel*) Science Talent Search Scholarship winner (#6)
USA Today newspaper Academic All-American
All - USA Academic First Team
First - Tier "CTY". . . 740 Math & 740 Verbal SAT (by age 12)
Multiple SMPY Scholarship awards
Physics Olympiad
Bauch & Lomb Science Award
Bronze Medal (Judo), American-Canadian Games, 73kg -*Sankyu*

Recent Funded Research: Recent Research Contracts and Grant Awards:

C.S. Mott Children's Hospital
Funded by: The University of Michigan
Software Design for Mobile Engagement
Currently serving as "Advisory CTO" to guide design and implementation of software to facilitate increased adherence and increased patient, family, and caregiver involvement in healthcare. Current emphasis is on diabetes and nutrition.
Role: Advisory CTO

Noora Health
Funded by: Y Combinator, "Fast-Forward"

Advised 'Top-8' Y Combinator startup-NP re: research, software architecture, and health ecosystem business development.
Role: Principal Advisor, Tech Advisor

Inward, Inc. Consulting
Funded by: Inward Inc.
App System Architecture and Business Development
Conceived, prototyped, and architected app extensions and AI / analytics for Inward's mobile behavior-change platform.
Role: Advisory CTO

Knight Foundation WPI Grant Award #20120264
Funded by: Knight Foundation, WPI, GroundSource
System for SMS-based Community Outreach
Architected a platform in support of public health, service, outreach, and social entrepreneurship.
Role: Advisory CTO

Server-Monitoring Architecture Lead WWID #11450183
Employed by: Intel Corporation
High-Throughput System for Monitoring Server Reliability and Performance
Designed, architected and promulgated a very-high-throughput system for realtime server-health reliability assessment.
My resulting invention was chosen for patenting by Intel Corp. (Intel Invention Disclosure ID #108555)
Role: Software Architect and Business Development Lead ("Blue Badge" - 'Top Security' Clearance)

Medic Mobile Research Consulting Contract
Funded by: Medic Mobile
System for Glucose Management among Adolescent Type I Diabetics
Conceived, designed and implemented an AI texting 'bot for childhood Type I diabetes management and care.
Role: Served as Prime Contractor for this contract

Orlando Health Foundation Research Consulting Contract
Funded by: Orlando Health
Technology and Data Integrations for Congestive Heart Failure Patients
Found process and technology improvements to improve outcomes and reduce readmissions for CHF and diabetes patients.
Role: Served as Principal Investigator for this award

AETNA Research Consulting Contract
Funded by: Aetna Life Ins. Co.
Technologies for Caregiver Support
Designed SCS's data-analysis pipeline and tech integrations (including ext. db's and biometric devices).
Role: Served as Prime Contractor for this contract

Data-Design Diabetes Innovation Grant-Award
Funded by: Sanofi - Aventis
"A Hope Unwounded": Virtualized Clinical Trials and Care Support
Designed datastore and phone app prototypes to help patients and physicians uncover diabetes complications in seniors.
Role: Served as Principal Investigator for this award

Stanford University Contract
Funded by: Stanford University Medical School
Data Driven Medicine and Socially Conscious Informatics
Taught scalable distributed analytics for pattern detection, hypothesis discovery, querying, and text-mining to the first team to analyze 10 years' worth of *all* medical records for all 17 million Stanford Hospital patients.
Role: Served as Principal Investigator for this contract

NSF *Award # III/SGER*-0849207
Funded by: National Science Foundation
Hypothesis Based Query in Biological Systems
Developed a distributed web-enabled biomedical hypothesis discovery and evidence tracking application. Combined hypotheses and hypothesis fragments with data and data source provenance to support biomedical inferences.
Role: Served as Principal Investigator of the NSF sub-award

ONR Award # N00014-08-1-0485
Funded by: Office of Naval Research
Contradiction-Based Logic for Information Fusion
Deployed a high-performance EC2 environment for storing and accessing high-throughput data in real time. Aspects included distributed databasing, custom high-speed data processing pipelines, and query-support tools.
Role: Served as Principal Investigator for this award

Stanford University Contract
Funded by: Stanford University
Hypothesis-Based Data Indexing and Data Fusion in Medicine
Invented optimization algorithms for maximizing agreement among medical hypothesis fragments and data.
Role: Served as Principal Investigator for this contract

CollabRx Contract
Funded by: CollabRx, Inc.
Investigation of High-Performance Data Storage Technologies for Medicine
Investigated all suitable RDF stores for their ability to quickly and efficiently store and retrieve medical data and data relationships relevant to the treatment of melanomas.
Role: Served as Principal Investigator for this contract

UCHSC Contract
Funded by: UCHSC
Mathematical Foundations and Software Infrastructure for an Online Medical Hypothesis Repository
Invented algorithms and software for rapidly and automatically generating perturbations of a given biomedical hypothesis, including the design of an "online lab notebook" for hypothesis and data source tracking.
Role: Served as Principal Investigator for this contract

NASA Award # N064803
Funded by: NASA
Data and Background Constraints in Hypothesis Testing
Formulated hypothesis-testing algorithms for integration of data and background constraints via Markov Logic Networks.
Role: Consulting Engineer

A Sample of Resulting Publications:

Racunas, S., N. Shah, I. Albert, N.V. Fedoroff (2004) HyBrow: A prototype system for computer-aided hypothesis testing. Bioinformatics 2004-20: i257-i264.

Racunas, S., Griffin, C., N. Shah (2004) A Finite Model Theory for Biological Hypotheses. IEEE Computer Society Bioinformatics Conference - CSB, pp. 616-620, 2004, but for framing and required background see also:

Racunas, S., Griffin, C., N. Shah A Contradiction-Based Framework for Testing Gene Regulation Hypotheses
IEEE Computer Society Bioinformatics Conference - CSB pp. 634-638, from the prior year

Fedoroff, N., S. Racunas, J. Shrager (2005) Tools for thought in the age of biological knowledge. The Scientist 19(11):20.

Racunas, S., and C. Griffin (2005) Logical data fusion for biological hypothesis evaluation. International Conference on Information Fusion

Racunas, S., N. Shah, N.V. Fedoroff (2006) A case study in pathway knowledge base verification. BMC Bioinformatics 2006, 7:196.

Bridewell, W., Langley, P., Racunas, S., S. R. Borrett (2006) Learning Process Models with Missing Data. The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases - ECML, pp. 557-565.

Brooks, R., B. Pillai, S. Racunas, S. Rai (2007) Network analysis using probabilistic connectivity matrices. IEEE Trans. SMC, 37:694-702.

Racunas, S., Griffin, C., A. Pohorille (2007) Chemical Process Modeling for Minimal Metabolic Systems -- Evaluating Hypotheses for Chemical Processes Enabling Life IPM 2007.

Pohorille, A., Shrager., J., Racunas, S., K. Schweighofer (2007) An Integrated System for Synthesis and Evaluation of Biological Models. NASA Internal Technical Report, NSTC 2007 Conference A1P5_NSTC-07-0025

Racunas, S., C. Griffin, A. Pohorille (2008) Chemical Process Modeling for Minimal Metabolic Systems. Proceedings of the 24th International Conference on Machine Learning, Corvallis, OR.

Griffin, C., K. Testa, S. Racunas (2010) An Algorithm for Constructing and Searching Spaces of Alternative Hypotheses. IEEE Trans. SMC, 99:1-11.

LePendu, P., S. Racunas, S. Iyer, Y. Liu, C. Fairon, N. Shah (2011) Annotation Analysis for Testing Drug Safety Signals. ISMB Bio-Ontologies.

Racunas, S., and N. Mahmud (2013) Help for Type I Diabetes Patients via a Relation-Centered Adaptive SMS Robot. [Advance Copies Available upon Request]