

# S. SOLOMON DARNELL

## RESEARCH SCIENTIST

in Biometrics, AI, Affect and Blockchain

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### ### EDUCATION

#### Doctor of Philosophy, Ph.D. in Computer Science, 2009 - 2015

- Clemson University, Advisor: Shaundra Bryant Daily
- Dissertation Title: **EngageME - The Design and Implementation of a Reflective Tool for Evaluating Student Engagement**

#### Masters of Software Engineering, MSWE 2003-2006

- Auburn University, Advisor: Gerry Dozier
- Project Title: **Evaluating Exits using Computational Intelligence and Pedestrian Escape Panic model**

#### Bachelor of Science, B.S. in Computer Engineering 1999-2003

### ### AWARDS, GRANTS & HONORS

- 2015 November - **Honor** Research Post-Doc with IBM Research Headquarters in Yorktown Heights, NY
- 2015 June - **Honor** Research Scientist Internship with IBM Research Africa
- 2015 May - **Award** PhD in Computer Science
- 2014 January - **Award** Scholarship for CHI Doctoral Consortium
- 2013 - **Award** Clemson University School of Computing Outstanding PhD Student
- 2013 August - **Award** Southern Region Education Board (SREB) Doctoral Dissertation Fellowship
- 2012 - **Honor** Induction into Alpha chapter of Upsilon Pi Epsilon Honor Society
- 2010 - **Award** Clemson University Alumni Doctoral Fellowship
- 2009-2015 - **Award** Clemson University Graduate School Fellowship
- 2009-2010 - **Award** PhD Fellowship to Purdue University Computer Technology and Information Department
- 2001-2002 - **Award** Undergrad Scholarship to Auburn University by Alabama Power Foundation
- 2001-2002 - **Award** Undergrad Scholarship to Auburn University by William F. and Brenda W. Hayes
- 2001 - **Honor** National Honor Society Induction - Tau Sigma at Auburn University

### ### FILED PATENTS

- 2016 Jan - **YOR920161714** - *System and method for improving classroom management by analyzing classroom artifacts using visual analysis*
- 2016 Jul - **YOR920161489** - *Managing lifelong learner events via blockchain systems and methods*
- 2016 Jul - **YOR920161490** - *A system and method for managing school systems on blockchain*
- 2017 May - **P201701835** - *System and Method for Single Use Biometric token with Limited Expiry Using Blockchain*
- 2018 Feb - **P201800988US01** - *A system and method for identification or verification by a consensus network using sparse parametric representations of biometric images*

### ### PUBLICATIONS

#### #### BOOKS & CHAPTERS

1. Daily, S., James, M. T., Cherry, D., Porter, J.J., **Darnell, S.S.**, Isaac, J., and Roy, T. **Chapter 9 - Affective Computing: Historical Foundations, Current Applications and Future Trends.** In T. Bennett (Eds.), *Emotions and Affect in Human Factors and Human-Computer Interaction*, pp 213-231. Academic Press, 2017.
2. **Darnell, S.S.**, Mack, N., Jackson, F., Alnizami, H., James, M., Ekandem, J., Alvarez, I., Andujar, M., Moon, D., and Gilbert, J.E. (2014). **Chapter 92: Human-Computer Interfaces for Speech Applications.** In T.F. Gonzalez, J. Diaz-Herrera & A. Tucker (Eds.), *Computing Handbook*, 3rd ed. (1), (3rd ed. pp.92:1-92:15) CRC Press.

### #### JOURNALS

1. M.T. James, S.B. Daily, T. Roy and **Shelby Solomon Darnell**. "EngageMe: designing a visualization tool utilizing physiological feedback to support instruction". In: *Technology, Instruction, Cognition and Learning* 10 (2 2015).
  2. Darnell, Shelby Solomon, "EngageMe: The Design and Implementation of a Reflective Tool for Evaluating Student Engagement" (2015). All Dissertations. 1790.
  3. K. P. Hollingsworth, **S. S. Darnell**, P. E. Miller, D. L. Woodard, K. W. Bowyer and P. J. Flynn, "Human and Machine Performance on Periocular Biometrics Under Near-Infrared Light and Visible Light," in *IEEE Transactions on Information Forensics and Security*, vol. 7, no. 2, pp. 588-601, April 2012.
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## #### CONFERENCES

1. Nandakumar, K., Ratha, N., Pankanti, S., & **Darnell, S.** (2017, December). Secure one-time biometric tokens for non-repudiable multi-party transactions. In *Information Forensics and Security (WIFS), 2017 IEEE Workshop on* (pp. 1-6). IEEE.
  2. Bore, N., Karumba, S., Mutahi, J., **Darnell, S. S.**, Wayua, C., & Weldemariam, K. (2017, November). Towards Blockchain-enabled School Information Hub. In *Proceedings of the Ninth International Conference on Information and Communication Technologies and Development* (pp. 19:1-19-4). ACM. 19:1-19:4
  3. **Shelby Solomon Darnell**. 2014. EngageME: a tool to simplify the conveyance of complicated data. In *CHI '14 Extended Abstracts on Human Factors in Computing Systems (CHI EA '14)*. ACM, New York, NY, USA, 359-362. DOI: <https://doi.org/10.1145/2559206.2574765>
  4. Daily, S. B., Meyers, D., **Darnell, S.**, Roy, T., & James, M. T. (2013, July). Understanding privacy and trust issues in a classroom affective computing system deployment. In *International Conference on Distributed, Ambient, and Pervasive Interactions* (pp. 414-423). Springer, Berlin, Heidelberg.
  5. Roy, Tania; James, Melva T.; Gupta, Arindam; **Darnell, Shelby S.**; and Daily, Shaundra, "A Participatory Design Process for Developing a Tool to Visualize Classroom Engagement" (2013). *Graduate Research and Discovery Symposium (GRADS)*. 68.
  6. Chattaraman V., Kwon WS., Gilbert J., **Darnell S.** (2012) Locus of Control in Conversational Agent Design: Effects on Older Users' Interactivity and Social Presence. In: Nakano Y., Neff M., Paiva A., Walker M. (eds) *Intelligent Virtual Agents. IVA 2012. Lecture Notes in Computer Science*, vol 7502. Springer, Berlin, Heidelberg
  7. J.E. Gilbert and J.I. Ekandem and **S.S. Darnell** et.al., "Accessible Voting: One Machine, One Vote for Everyone". In: *CHI'11 Extended Abstracts on Human Factors in Computing Systems, CHI Video Presentation*. Vancouver, Canada, May 2011.
  8. **Darnell, S.S.** et.al. "MyDASH: The Biometric Digital Dashboard". in *Proceedings of the 3rd Workshop on Multimodal Interfaces for Automotive Applications (MIAA'11) at the 2011 International Conference on Intelligent User Interfaces (IUI'11)* Palo Alto, CA, Feb. 2011, pp.53-56.
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## #### TECHNICAL AND WHITE PAPERS

1. **Shelby Solomon Darnell**. "Alleviating Escape Panic Using Evolutionary Intelligence". in *Auburn University Theses and Dissertations*. May 2006.
  2. Carnahan, B., Muhdi, R., Fu, S.G., **Darnell, S.**, Davis, J., Doziera, G., & Smith, A. "GENEVAC: Evolving Exits for Evacuation Models via Steady-State Genetic Search". in *Technical Report: Auburn University CSSE 05-06*.
  3. Bazahnau, A., Ondula, E. and **Darnell, S.S.** "Blockchain and IOT - Using Raspberry Pi's to test DApp feasibility". in *IBM Research Africa Technical reports* 2017.
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## ### INVITED TALKS, PANELS & NEWS ARTICLES

1. **2018 August 31** Panel: Research and Setting Research Priorities, Venue: *Pan Africa Christian University's (PACUs) Inaugural Research Week*, Moderator: *Professor Dionysius (Dan)*
2. **2018 March 1** Article: Five major ways blockchain can help telecom, published by: CIO East Africa
3. **2018 February 23** Talk: **"Blockchain: What, Why and Good to know"**, invited by Moringa school Nairobi, Kenya
4. **2018 February 14** Article: Three things consumer brands should consider in adopting blockchain, published by Standard Digital Media
5. **2017 October 11** Guest Lecture (Talk): **"Blockchain: What, Why & Good to Know"**, Venue: Senior Financial Economics at Strathmore University, invited by: Professor Godfrey Madigu
6. **2017 June 09** Panel (Blockchain Expert): "Blockchain, what can it do, how does it work", Venue: Metta Nairobi, 14 Riverside Drive
7. **2016 May** Guest Lecture (Talk): **"An Intro to Computer Vision"**, Venue: Computer Programming class at Strathmore University, Host: Samuel Karumba (computer science lecturer)

## ### SKILLS

### Full Stack Development

- Biometrics on Blockchain (Securing the Signal): Explore new and novel techniques to maintain secrecy of pure biometric information to login to blockchains

### Web Design

- Assertively exploit wireless initiatives rather than synergistic core competencies.

### Interface Design

- Credibly streamline mission-critical value with multifunctional functionalities.

### Project Direction

- Proven ability to lead and manage a wide variety of design and development projects in team and independent situations.

## ### TECHNICAL

Skills	and	Languages		
XHTML	C	C++	C#	Typescript
Java	Javascript	JQuery	PHP	Perl
Python	Docker	CVS	Subversion	Git
Windows XP-10	Linux	OS X	Lisp	Quick Basic
Golang	Kubernetes	Basic	Ruby	LaTeX
Visual Basic	Visual C++	Visual C#		

## Research Experience

IBM Research

*Research Scientist*

**March 2016-current**

Investigate identity and security on blockchain using biometrics. Researching and implementing state-of-the-art cancelable biometric techniques to create a pastoral identity solution to help developing and war torn countries better identify and aide their populations.

*Intern*

**Jun-Aug 2015**

Implemented and demoed a real-time computer vision application to track dark-skinned children in a classroom under hardware and network resource constraints.

*Research Post-doc*

**Dec 2015-Feb 2016**

Further explored computer vision techniques for tracking and uniquely identifying dark-skinned children in a classroom under hardware and network resource constraints. Wrote first patent.

## Work Experience

*Project Engineer*

**Jan 2009 - Apr 2009**

Performed a subset of the duties of a Project Engineer (overall engineering lead, management of incoming product and warehouse personnel, overseeing project shipping and receiving, while interacting and working with sub-contractors to build solutions for our clients).

**2006 - 2008**

As a developer I designed and implemented client-server enterprise software to control aircraft hardware, built development management scripts, and added to an existing internal web platform

*System Integration Lab Manager*

**Apr 2009 - June 2009**

Acted as a systems integration lab manager by organizing and building, from the ground up, a SIL with the help of warehouse personnel and test engineers to simulate the internals of an aircraft system to be deployed for the U.S. Airforce.

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## More Work Experience

Auburn University

*IT Lead Assistant & Developer, College of Science and Math (COSAM)*

**Aug 2004 - Dec 2004**

- provided windows and mac system administration, trouble shooting and support - co-developed software for genetic sequence experimentation

***IT support, Department of Computer Science and Software Engineering (CSSE)***

**Jan 2002 - May 2003**

- Managed multiple computer labs and equipment - provided windows, mac, and linux system administration, trouble-shooting and support

***Mentor, College of Engineering***

**Jan 2001**

*Information Technology (IT) Lead and Manager, Student Athlete Support Services (SASS)*

**Sep 2004 - December 2005**

- Chief architect for in-house student check-in software - managed multiple computer labs - hired & groomed a 4 person staff, each of whom had the dual role of lab manager and developer - managed over 100 computer, interfacing and meeting the needs of Athletic counselors and student-athletes alike

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## Teaching Experience

Auburn/Clemson University

*Computer Science - Applications, Department of Computer Science*

**2003, 2004, 2012**

- Oversee computer science lab assignments - Teach basic MS office application usage - Teach lab and grade assignments