

S. SOLOMON DARNELL

RESEARCH SCIENTIST

in Biometrics, AI, Affect and Blockchain

shelby@shelbydarnell.com

Shelby Solomon Darnell website

Twitter @ShelbySDarnell

LinkedIn: ShelbySolomonDarnell

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.

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

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