

# Terek ARCE

## PhD Student | 3D Audio/VR Researcher

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I am a Ph.D. student in the Computer & Information Science & Engineering Department at the University of Florida. The picture above is a textured mesh of my head created through photogrammetry and used in my research work. My research is largely focused on 3D Audio in virtual and mixed reality systems. I am currently working on a novel pipeline for the creation of individualized head-related transfer functions (HRTFs), as well as developing standardized psychoacoustic experiments in virtual reality. My primary interest is in understanding the precise correlations of an individual's HRTFs and their corresponding pinna.

## EDUCATION

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Present August 2012	<b>University of Florida   COMPUTER &amp; INFORMATION SCIENCE &amp; ENGINEERING   Gainesville, FL</b> <ul style="list-style-type: none"><li>&gt; Ph.D. Computer Engineering</li><li>&gt; Dissertation: Analysis of human localization - correlations between individualized HRTFs and pinna.</li><li>&gt; Advisor: Dr. Kyla McMullen</li><li>&gt; GPA: 3.72</li></ul>
May 2012 August 2010	<b>University of Florida   COMPUTER &amp; INFORMATION SCIENCE &amp; ENGINEERING   Gainesville, FL</b> <ul style="list-style-type: none"><li>&gt; Post-Baccalaureate Status</li><li>&gt; GPA: 3.88</li></ul>
October 2008 August 2008	<b>Uniformed Services University   F. EDWARD HÉBERT SCHOOL OF MEDICINE   Bethesda, MD</b> <ul style="list-style-type: none"><li>&gt; M.D. Program</li></ul>
August 2008 May 2008	<b>AMEDD Center &amp; School   BASIC OFFICER LEADER COURSE (BOLC)   Fort Sam Houston, TX</b> <ul style="list-style-type: none"><li>&gt; Basic training for Army and Army Medical Department (AMEDD) officers</li><li>&gt; Skills developed: discipline, teamwork, soldier skills, tactical/medical doctrine, leadership</li></ul>
May 2008 May 2006	<b>University of Florida   COLLEGE OF LIBERAL ARTS AND SCIENCES   Gainesville, FL</b> <ul style="list-style-type: none"><li>&gt; Awarded B.S. in Interdisciplinary Studies</li><li>&gt; Concentration: Integrative Biology</li><li>&gt; Minor: Anthropology</li><li>&gt; GPA: 3.82, Cum Laude</li></ul>
May 2006 August 2004	<b>Florida State University   COLLEGE OF ARTS &amp; SCIENCES   Tallahassee, FL</b> <ul style="list-style-type: none"><li>&gt; Major: Biology</li><li>&gt; Track: Pre-Medicine</li><li>&gt; GPA: 4.00</li></ul>

## TEACHING & WORK EXPERIENCE

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Present May 2013	<b>University of Florida   HERBERT WERTHEIM COLLEGE OF ENGINEERING   Gainesville, FL</b> <i>Graduate Student Instructor</i> for INTRODUCTION TO ENGINEERING <ul style="list-style-type: none"><li>&gt; Created lesson plans and PowerPoint slides</li><li>&gt; Developed interactive programs for new engineers to implement</li><li>&gt; Exposed students to opportunities in CS &amp; CE related fields</li></ul>
May 2013 August 2012	<b>University of Florida   COMPUTER &amp; INFORMATION SCIENCE &amp; ENGINEERING   Gainesville, FL</b> <i>Teaching Assistant</i> for PROGRAMMING FUNDAMENTALS I & II FOR MAJORS <ul style="list-style-type: none"><li>&gt; Created lab lesson plans and PowerPoint slides to reinforce programming concepts</li><li>&gt; Taught two to three lab sessions each week (4-6 hours)</li><li>&gt; Assisted students in office hours each week (2+ hours)</li></ul>
January 2010 October 2008	<b>United States Army   UNIFORMED SERVICES UNIVERSITY   Bethesda, MD</b> <i>Second Lieutenant, MS</i> for CONTINUING HEALTH EDUCATION <ul style="list-style-type: none"><li>&gt; Worked with a team of DoD &amp; GS service members to create and deploy a database for CE credits</li><li>&gt; Helped plan CHE DoD Conferences</li><li>&gt; Assisted Army, Navy and Air Force medical personnel with CE credits</li></ul>

## RESEARCH EXPERIENCE

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Present May 2016	<b>University of Florida   COMPUTER &amp; INFORMATION SCIENCE &amp; ENGINEERING   Gainesville, FL</b> <i>Ph.D. Student</i> in the SOUNDPAD LAB <ul style="list-style-type: none"><li>&gt; Advisor: Dr. Kyla McMullen</li><li>&gt; Designed VR and AR experiments to assess individual localization ability</li><li>&gt; Developed a pipeline for individualized HRTF creation using photogrammetry</li><li>&gt; Created a VR program for 'visualization' of 3D molecules utilizing spatialized audio</li><li>&gt; Built a 3D audio plugin for Unity</li></ul>
May 2016 August 2012	<b>University of Florida   COMPUTER &amp; INFORMATION SCIENCE &amp; ENGINEERING   Gainesville, FL</b> <i>Ph.D. Student</i> in the EMBEDDED SYSTEMS LAB <ul style="list-style-type: none"><li>&gt; Advisor: Dr. Prabhat Mishra</li><li>&gt; Examined security issues in implantable medical devices</li><li>&gt; Improved speed of network-based classifiers for cancer detection using parallelized code</li><li>&gt; Designed and developed a network-based heuristic for gene expression forecasting</li></ul>
January 2010 October 2008	<b>University of Florida   MOLECULAR GENETICS &amp; MICROBIOLOGY   Gainesville, FL</b> <i>Undergraduate Researcher</i> in the EVOLUTIONARY DEVELOPMENT (EVODEVO) LAB <ul style="list-style-type: none"><li>&gt; Advisor: Dr. Martin Cohn</li><li>&gt; Cloned and analyzed limulus CoIA and SoxE genes</li><li>&gt; Learned lab techniques such as polymerase chain reaction (PCR)</li><li>&gt; Examined the evolution of cartilage in invertebrate lineages</li></ul>

## PUBLICATIONS

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- 1 Arce, T., Fuchs, H., & McMullen, K. (2017). The effects of 3d audio on hologram localization in augmented reality environments. In *Proceedings of the human factors and ergonomics society annual meeting* (Vol. 61, 1, pp. 2115–2119). SAGE Publications Sage CA: Los Angeles, CA.
- 2 Arce, T. & McMullen, K. (2017). Hearing biochemical structures: molecular visualization with spatial audio. *ACM SIGACCESS Accessibility and Computing*, (117), 9–13.

## PROGRAMMING SKILLS

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Languages	C, C#, C++, CSS, HTML, Java, JavaScript, MATLAB, Objective-C, Python, PL/SQL, R, Ruby, SQL, TeX/LaTeX, Visual Basic, XML
Libraries/Frameworks	BLAS, CUDA, Google Chart, Intel MKL, jQuery, LAPACK, Microsoft .Net, OpenAL, OpenGL, OpenVR, PowerShell, Rails, SteamVR, VRTK
Databases	Microsoft Access, MySQL, PostgreSQL
Development Utilities	Bash, Blender, Eclipse, FMOD, Git, IntelliJ Idea, Intel Parallel Studio XE, Make, MATLAB, Meshlab, Simulink, Unity, Unreal Engine, Visual Studio, 3DF Zephyr
Operating Systems	Android, iOS, Mac OS X, Ubuntu (Linux), Windows Mixed Reality, Windows 7, Windows 10

## SELECT PROJECTS

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Present January 2018	<b>Hololens Medical Simulation   DISSERTATION RESEARCH PROJECT, UF SoundPad Lab</b> <ul style="list-style-type: none"><li>&gt; Worked with UNC CS/Medical teams to develop a tool for prostate biopsy training</li><li>&gt; Incorporated 3D audio into medical simulation</li><li>&gt; Developed experiments to determine how best to use 3D sounds in AR environments</li></ul> <p><span>Blender</span> <span>C#</span> <span>C++</span> <span>Git</span> <span>MATLAB</span> <span>Unity</span> <span>Visual Studio</span> <span>Windows Mixed Reality</span></p>
Present August 2017	<b>Individualized HRTFs from Photogrammetry   DISSERTATION RESEARCH PROJECT, UF SoundPad Lab</b> <ul style="list-style-type: none"><li>&gt; Designed a pipeline for individualized HRTF creation</li><li>&gt; Utilized photogrammetry techniques to create head and body meshes</li><li>&gt; Developed mesh processing procedures</li><li>&gt; Integrated a GPU-based boundary element method</li></ul> <p><span>Blender</span> <span>C</span> <span>CUDA</span> <span>C++</span> <span>Intel Parallel Studio XE</span> <span>Git</span> <span>MATLAB</span> <span>Meshlab</span> <span>Visual Studio</span> <span>Windows 10</span> <span>3DF Zephyr</span></p>

- Present January 2017** | **Custom 3D Audio Plugin | DISSERTATION RESEARCH PROJECT, UF SoundPad Lab**
- > Designed and developed a custom 3D-Audio plugin for Unity
  - > Integrated CIPIC, KEMAR and personalized HRTFs into an audio spatializer
  - > Ported for both VR and AR environments/projects
- C# C++ Git MATLAB OpenVR Unity Visual Studio Windows Mixed Reality Windows 10
- Present January 2017** | **VR/AR Localization Experiment | DISSERTATION RESEARCH PROJECT, UF SoundPad Lab**
- > Developed both a VR and AR program to test user localization ability
  - > Incorporated psychoacoustic experiment implementations into VR experiment designs
  - > Conducted subject experiments to determine individual localization ability
- C# C++ OpenVR Python Git SteamVR Unity Visual Studio VRTK Windows Mixed Reality Windows 10
- August 2017 January 2016** | **Web-based IDE User Interface Study | GRADUATE RESEARCH PROJECT, UF SoundPad Lab**
- > Conducted multiple user studies comparing commercial web-based IDEs
  - > Determined a set of best practices for developers of web-based IDEs
- MATLAB Python R Windows 10
- January 2017 May 2016** | **Sonification of Proteins | GRADUATE RESEARCH PROJECT, UF SoundPad Lab**
- > Designed and developed a MATLAB and VR program for sonifying proteins
  - > Utilized spatial sound to allow users to 'visualize' protein primary & secondary structure
  - > Created both visual (VR) and non-visual interfaces for users
- C# C++ MATLAB OpenVR Git SteamVR Unity Visual Studio VRTK Windows 10
- May 2016 August 2016** | **Network-based Forecasting (NBF) | GRADUATE RESEARCH PROJECT, UF Embedded Systems Lab**
- > Developed the NBF method used to forecast gene expression changes over time
  - > Trained and tested the NBF on large gene expression data
  - > Compared random selection and Chi2 feature selection methods
  - > Analyzed the numerical stability of genetic classifiers (kNN, linear SVM and NBC)
- BLAS C++ LAPACK Python Git Visual Studio Windows 10

## AWARDS & HONORS

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UF Informatics Institute Fellowship . . . . .	2016
UF Graduate School Fellowship . . . . .	2010
Army Service Medal . . . . .	2009
Global War on Terrorism Service Medal . . . . .	2009
National Defense Service Medal . . . . .	2009
Phi Beta Kappa . . . . .	2008
UF Howard Hughes GATOR Fellowship . . . . .	2007-2008
Golden Key Honor Society . . . . .	2007
Florida Academic Scholars Award . . . . .	2004-2008
Phi Eta Sigma . . . . .	2004-2008
FSU Incentive Freshmen Scholarship . . . . .	2004-2006
National Society of Collegiate Scholars . . . . .	2004-2006
Superior Piano Concerto . . . . .	2004

## + UNIVERSITY/COMMUNITY SERVICE & CLUBS

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UF Campus Crusade for Christ (Cru) - Member . . . . .	2010-2011
Noah's Endeavor - Volunteer . . . . .	2007-2008
UF Fellowship of Christian Athletes - Member . . . . .	2006-2008
Alpha Epsilon Delta - Vice President . . . . .	2005-2006
Caribbean American Medical Education Organization - Volunteer . . . . .	2005
UF Swim Club - Founder . . . . .	2006-2008
FSU Swim Club - Member . . . . .	2004-2006
FSU Surf Team - Member . . . . .	2004-2005
National Federation of Music Clubs - Member . . . . .	2004