# Dhaval Parmar

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**Research Competencies**

Virtual Reality (VR), Augmented Reality (AR), Virtual Agents, Computer Graphics (CG), Human-Computer Interaction (HCI), Human Factors, Computer Science Education

**Education**

**Clemson University** — *Clemson, SC, USA*
Ph.D., Computer Science — *August 2011 – August 2017*

- Dissertation Topic:
  "Evaluating the Effects of Immersive Embodied Interaction on Cognition in Virtual Reality"
- Advisor: Dr. Sabarish V. Babu

**University of Mumbai** — *Mumbai, India*
Bachelor of Engineering, Computer Engineering — *July 2006 – June 2010*

**Major Projects**

**Smart and Connected Churches** — *2019 – 2021*
*Virtual Agents, Unity, C#, Java, Android, iOS, WebGL*

- Designed and developed Android, iOS, and WebGL Unity apps for COVID-19 vaccination and general health promotion within church communities.
- Tackled complex issues of account creation through chain-referral, peer-to-peer messaging, public and private forums, offline availability and access, multi-platform logins, and user data encryption.
- Studied the effects of culturally tailoring virtual agents, published results in the proceedings of the ACM International Conference on Intelligent Virtual Agents, *"Community-Based Cultural Tailoring of Virtual Agents"*, October 2020. `https://doi.org/10.1145/3383652.3423875`

**Atrial Fibrillation Health Literacy** — *2019 – 2021*
*Virtual Agents, Unity, C#, Java, iOS*

- Developed a Unity iOS mobile app for atrial fibrillation management and education via virtual agents.
- Implemented elements of health and medication tracking, agent dialogue for symptoms, side-effects, and barriers, and remote monitoring and health alerts to medical support team.
- Studied the effects of virtual agent interface compared with conventional mobile GUI, published results in the proceedings of the ACM CHI Conference on Human Factors in Computing Systems, *"Characterizing User Choice of Embodied Agents vs. Conventional GUIs on Smartphones"*, May 2021. `https://doi.org/10.1145/3411763.3451664`

**Real-time audience feedback using Microsoft HoloLens** — *2019 – 2020*
*AR, Unity, Microsoft HoloLens, C#, PHP, HTML/CSS*

- Developed an AR-enabled presentation display system to provide real-time feedback from the audience to the speaker during a presentation.
- Compared feedback display designs: overlaid over the head of the audience, displayed in the periphery of the presenter's view, and no feedback.
- Published results in the proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, *"Making It Personal: Addressing Individual Audience Members in Oral Presentations Using Augmented Reality"*, June 2020. `https://doi.org/10.1145/3397336`

**Virtual Environment Interactions** — *2014 – 2017*
*VR, Unity, C#, Microsoft Kinect, HTC Vive, Motion Capture*

- Developed an immersive VR game to teach programming to middle-school students.
- Students learned and used computer programming concepts to create dance choreography for virtual characters and used their virtual body within VR to perform with the characters.

- Compared embodied VR, non-embodied VR, and desktop-only implementations on their effects on learning programming concepts.
- Published results in the proceedings of the IEEE conference on Virtual Reality, *"Programming moves: Design and evaluation of applying embodied interaction in virtual environments to enhance computational thinking in middle school students"*, March 2016. `https://doi.org/10.1109/VR.2016.7504696`

**Technological Education Using Virtual E-School** *2013 – 2016*
*VR, Unity, C#, HTC Vive, Head-Tracking*

- Designed and developed precision metrology, industrial safety, and aviation training VR modules using the Unity game engine.
- Worked with various tracking systems, large screen stereo, Fish-tank, and head-mounted displays, and got experience with modeling and animation, and 3D unimanual and bimanual interface design.
- Performed an empirical comparative analysis between immersive HMD viewing and desktop-based viewing to study their effects on psychophysical skills education within an electrical circuitry training simulation.
- Published results in the Virtual Reality journal, *"A comparative evaluation of viewing metaphors on psychophysical skills education in an interactive virtual environment"*, September 2016. `https://doi.org/10.1007/s10055-016-0287-7`

## Professional Experience: Research and Teaching

**Khoury College of Computer Sciences, Northeastern University** *Boston, MA, USA*
Postdoctoral Research Associate *September 2017 – October 2021*

- Unity lead developer in NSF and NIH funded projects. Trained and managed colleagues in Unity development for research.
- Conducted human-factors research on topics of virtual agents, AR/VR, and machine learning. Mentored graduate students and published 12 peer-reviewed papers.

**School of Computing, Clemson University** *Clemson, SC, USA*
Graduate Research and Teaching Assistant *August 2011 – August 2017*

- Led the design and development of multiple VR projects using the Unity game engine, C# programming language, and various VR hardware and sensors.
- Conducted human-factors research on topics of VR/AR and CS education, resulting in 10 peer-reviewed publications.
- Performed TA and lab instructor duties for Human-Computer Interaction, Foundations of Software Development, Introduction to Computer Programming in C, and Introduction to Computer Organization courses.
- Developed assignments, scoring metrics and criteria, and grading rubrics. Mentored students via in-person meetings, discussion forums, and by creating guidelines and instructions.

## Professional Experience: Industry

**Accenture** *Mumbai, India*
Associate Software Engineer *July 2010 – July 2011*

- Worked on a support project for a major electric power holding company in the United States, delivering enhancements and fixes for multiple applications based on Microsoft's .Net technology.

## Publications

### Refereed Journal Papers

[1] Bickmore, T., Kimani, E., Shamekhi, A., Murali, P., **Parmar, D.**, Trinh, H. (2020). "Virtual agents as supporting media for scientific presentations", in *Journal on Multimodal User Interfaces **(JMUI)***, p. 1-16, November 2020. [Impact Factor: 1.511]

[2] **Parmar, D.**, Bickmore, T. (2020). "Making It Personal: Addressing Individual Audience Members in Oral Presentations Using Augmented Reality", in *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies **(IMWUT)***, 4(2), p. 1-22, June 2020.

[3] **Parmar, D.**, Bertrand, J., Babu, S. V., Madathil, K., Zelaya, M., Wang, T., Wagner, J., Gramopadhye, A. K., Frady, K. (2016). "A comparative evaluation of viewing metaphors on psychophysical skills education in an interactive virtual environment", in *Virtual Reality **(VR)***, 20(3), p. 141-157, September 2016. [Impact Factor: 3.634]

[4] Leonard, A. E., D'souza, N., Babu, S. V., Daily, S. B., Jörg, S., Waddell, C., **Parmar, D.**, Gundersen, K., Gestring, J., Boggs, K. (2015). "Embodying and Programming a Constellation of Multimodal Literacy Practices: Computational Thinking, Creative Movement, Biology, & Virtual Environment Interactions", in *Journal of Language and Literacy Education **(JoLLE)***, 11(2), p. 64-93, October 2015. [Impact Factor: 5.33]

[5] Daily, S. B., Leonard, A. E., Jörg, S., Babu, S. V., Gundersen, K., **Parmar, D.** (2015). "Embodying Computational Thinking: Initial Design of an Emerging Technological Learning Tool", in *Technology, Knowledge and Learning **(TKL)***, 20(1), p. 79-84, April 2015. [Impact Factor: 1.67]

**Peer-Reviewed Conference Proceedings**

[1] Bickmore, T., **Parmar, D.**, Kimani, E., Olafsson, S. (2021). "Diversity Informatics: Reducing Racial and Gender Bias with Virtual Agents", in *Proceedings of the 21st ACM International Conference on Intelligent Virtual Agents **(ACM IVA)***, p. 25-32, September 2021. [Acceptance Rate: 60%]

[2] Olafsson, S., **Parmar, D.**, Kimani, E., Oleary, T. K., Bickmore, T. (2021). "'More like a person than reading text in a machine': Characterizing User Choice of Embodied Agents vs. Conventional GUIs on Smartphones", in *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems **(CHI)***, p. 1-7, May 2021. [Acceptance Rate: 26.3%]

[3] Kimani, E., **Parmar, D.**, Murali, P., Bickmore, T. (2021). "Sharing the Load Online: Virtual Presentations with Virtual Co-Presenter Agents", in *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems **(CHI)***, p. 1-7, May 2021. [Acceptance Rate: 26.3%]

[4] Kimani, E., Murali, P., Shamekhi, A., **Parmar, D.**, Munikoti, S., Bickmore, T. (2020). "Multimodal Assessment of Oral Presentations using HMMs", in *Proceedings of the 2020 International Conference on Multimodal Interaction **(ACM ICMI)***, Utrecht, Netherlands, p. 650-654, October 2020. [Acceptance Rate: 37.7%]

[5] O'Leary, T. K., Stowell, E., Kimani, E., **Parmar, D.**, Olafsson, S., Hoffman, J., Parker, A. G., Paasche-Orlow, M. K. and Bickmore, T. (2020). "Community-Based Cultural Tailoring of Virtual Agents", in *Proceedings of the 20th ACM International Conference on Intelligent Virtual Agents **(ACM IVA)***, Glasgow, UK, p. 1-8, October 2020. [Acceptance Rate: 45.5%]

[6] **Parmar, D.**, Olafsson, S., Utami, D., Murali, P., Bickmore, T. (2020). "Navigating the Combinatorics of Virtual Agent Design Space to Maximize Persuasion", in *Proceedings of the 19th International Conference on Autonomous Agents and MultiAgent Systems **(ACM AAMAS)***, Auckland, New Zealand, p. 1010-1018, May 2020. [Acceptance Rate: 23%]

[7] Murali, P., Shamekhi, A., **Parmar, D.**, Bickmore, T. (2020). "Argumentation is More Important than Appearance for Designing Culturally Tailored Virtual Agents", in *Proceedings of the 19th International Conference on Autonomous Agents and MultiAgent Systems **(ACM AAMAS)***, Auckland, New Zealand, p. 1940-1942, May 2020. [Acceptance Rate: 23%]

[8] Kimani, E., Shamhekhi, A., Murali, P., **Parmar, D.**, Bickmore, T. (2019). "Stagecraft for Scientists: Exploring Novel Interaction Formats for Virtual Co-Presenter Agents", in *Proceedings of the 19th ACM International Conference on Intelligent Virtual Agents **(ACM IVA)***, Paris, France, p. 10-12, July 2019. [Acceptance Rate: 23.8%]

[9] **Parmar, D.**, Olafsson, S., Utami, D. and Bickmore, T. (2018). "Looking the Part: The Effect of Attire and Setting on Perceptions of a Virtual Health Counselor", in *Proceedings of the 18th ACM International Conference on Intelligent Virtual Agents **(ACM IVA)***, Sydney, NSW, Australia, p. 301-306, November 2018. [Acceptance Rate: 22.6%]

[10] Lin, L., **Parmar, D.**, Leonard, A. E., Daily, S. B., Babu, S. V., Jörg, S. (2017). "How Character Appearance Affects Learning in Computational Thinking", in *the ACM Symposium on Applied Perception 2017* ***(ACM SAP)***, Cottbus, Germany, p. 1-8, September 2017. [Acceptance Rate: 48.6%]

[11] **Parmar, D.**, Babu, S. V., Lin, L., Jörg, S., D'Souza, N., Leonard, A. E., Daily, S. B. (2016). "Can embodied interaction and virtual peer customization in a virtual programming environment enhance computational thinking?", in *Proceedings of the 2016 Research on Equity and Sustained Participation in Engineering, Computing, and Technology* ***(IEEE RESPECT)***, Atlanta, GA, USA, p. 1-2, August 2016. [Acceptance Rate: 50%]

[12] **Parmar, D.**, Isaac, J., Babu, S. V., D'Souza, N., Leonard, A. E., Jörg, S., Gundersen, K., Daily, S. B. (2016). "Programming moves: Design and evaluation of applying embodied interaction in virtual environments to enhance computational thinking in middle school students", in *Proceedings of the IEEE International Conference on Virtual Reality 2016* ***(IEEE VR)***, Greenville, SC, USA, p. 131-140, March 2016. [Acceptance Rate: 25.9%]

[13] Daily, S. B., Leonard, A. E., Jörg, S., Babu, S. V., D'Souza, N., **Parmar, D.**, Gundersen, K., Isaac, J., Acker, S. (2016). "Combating Perceptions of Computer Scientists: A Short-term Intervention", in *Proceedings of the 47th ACM Technical Symposium on Computing Science Education 2016* ***(ACM SIGCSE)***, Memphis, TN, USA, p. 686, February 2016. [Acceptance Rate: 35%]

[14] Jörg, S., Leonard, A. E., Babu, S. V., Gundersen, K., **Parmar, D.**, Boggs, K., Daily, S. B. (2014). "Character Animation and Embodiment in Teaching Computational Thinking", in *Proceedings of the* ***ACM SIGGRAPH*** *2014 Posters*, Vancouver, Canada, p. 4, July 2014. [Acceptance Rate: 21%]

[15] **Parmar, D.**, Bertrand, J., Shannon, B., Babu, S. V., Madathil, K., Zelaya, M., Wang, T., Wagner, J., Frady, K., Gramopadhye, A. K. (2014). "Interactive breadboard activity simulation (IBAS) for psychomotor skills education in electrical circuitry", in *Proceedings of the 2014 IEEE Symposium on 3D User Interfaces* ***(IEEE 3DUI)***, Minnesota, MN, USA, p. 181-182, March 2014. [Acceptance Rate: 24.3%]

[16] Bertrand, J., Dukes, L. C., Dukes, P. S., Ebrahimi, E., Hayes, A. L., Mack, N., McClendon, J., **Parmar, D.**, Pence, T. B., Shannon, B., Wachter, A., Wu, Y., Babu, S. V., Hodges, L. F. (2013). "Serious games for training, rehabilitation and workforce development", in *Proceedings of the IEEE International Conference on Virtual Reality 2013* ***(IEEE VR)***, Orlando, FL, USA, p. 195-196, March 2013. [Acceptance Rate: 21.6%]

## Invited Talks

**Human Centered XR Research Seminar**, Clemson University *October 2021*

*"Real Talk with Virtual Humans"*

**Computer Sciences Festival**, Northeastern University *April 2019*

*"AI Is My Co-Presenter"*

**School of Computing Seminar**, Clemson University *September 2016*

*"VEnvI: Using Dance and Virtual Reality to Get Middle School Children Interested in Computer Science"*

**School of Computing Seminar**, Clemson University *April 2016*

*"From Emotional Interactions to Educational Experiences with Virtual Humans in VR Simulations"*

## Services

**External**

ACM Symposium on Applied Perception (SAP) *September 2021*
Program Committee Member

IEEE Research on Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT) *March 2020*

Program Committee Member

IEEE Research on Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT) — *February 2019*
Program Committee Member

ACM Symposium on Applied Perception (SAP) — *August 2018*
Program Committee Member

IEEE International Conference on Virtual Reality (VR) — *March 2017*
Student Volunteers Chair

IEEE International Conference on Virtual Reality (VR) — *March 2016*
Local Organizations Chair

IEEE International Conference on Virtual Reality (VR) — *March 2015*
Student Volunteer

**Internal**

IT Student Advisory Board, Clemson University — *May 2015 – April 2016*
Board Member, Grant Reviewer

Graduate Student Government, Clemson University — *May 2015 – April 2016*
Webmaster, Steering Committee Member

Clemson Indian Students Association, Clemson University — *April 2014 – present*
Advisor

## Honors, Awards, and Memberships

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|---|---|
| Outstanding PhD Student in Computer Science — Clemson University | *April 2017* |
| Travel Grant recipient — Human Factors Institute, Clemson University | *July 2016* |
| Presenter's Choice Award — NSF 2016 Video Showcase: Advancing STEM for All | *May 2016* |
| Travel Grant recipient — Human Factors Institute, Clemson University | *February 2016* |
| Travel Grant recipient — Human Factors Institute, Clemson University | *February 2015* |
| Travel Grant recipient — Human Factors Institute, Clemson University | *February 2014* |
| Member, ACM | *2017 – present* |
| Alpha Epsilon Lambda (AEL) Honor Society — Eta Chapter, Clemson University | *2014 – present* |
| Upsilon Pi Epsilon (UPE) Honor Society — Alpha Chapter, Clemson University | *2012 – present* |
| Student Member, IEEE | *2012 – present* |
| Member, Clemson Indian Students Association, Clemson University | *2011 – present* |

## Technical Skills

- Languages: *C, C++, C#, Java, Python*
- Graphics Applications: *Unity, Maya, Blender, Photoshop, Premiere, After Effects, Nuke*
- Graphics APIs: *OpenGL, OpenSceneGraph, SDL, Vuforia*
- Web Development: *Django, Flask, REST, JSP, PHP, HTML/CSS, JavaScript, Bootstrap*
- Databases: *MySQL/MariaDB, SQLite, MS-SQL, Airtable*
- Developer Tools: *Git/SVN, Visual Studio, Slack, Trello, Jira, Linux, LaTeX*

## Languages

- English — *Full Professional Proficiency*
- Hindi — *Native Proficiency*
- Gujarati — *Limited Working Proficiency*
- Marathi — *Limited Working Proficiency*

## Mentoring Experience

**Graduate Student Mentoring**

Northeastern University — *Boston, MA, USA*

- Everlyne Kimani — *September 2017 – October 2021*
- Shuo Zhou — *September 2017 – October 2021*

- Teresa O'Leary — *September 2017 – October 2021*
- Prasanth Murali — *September 2018 – October 2021*
- Stefan Olafsson — *September 2017 – August 2021*
- Sumanth Munikoti — *September 2019 – December 2020*
- Ameneh Shamekhi — *September 2017 – May 2020*
- Zessie Zhang — *September 2017 – December 2019*

Clemson University — *Clemson, SC, USA*

- Lorraine Lin — *January 2015 – August 2017*
- Joseph Isaac — *January 2015 – May 2016*
- Xianshan Qu — *August 2014 – September 2015*

University of Florida — *Gainesville, FL, USA*

- Manjari Udeshi — *January 2016 – May 2016*

**Undergraduate Student Mentoring**

Calhoun Honors Program — *Clemson, SC, USA*

- Erica May Porter — *August 2013 – October 2013*
- Daniel Taylor — *August 2013 – December 2013*

## References Available to Contact

**Dr. Timothy W. Bickmore** — *Email:* bickmore@ccs.neu.edu, *Phone:* +1 (617) 373-5477
- Professor, Associate Dean for Research, Khoury College of Computer Sciences, Northeastern University.
- 360 Huntington Avenue, Boston, MA 02115
- *PostDoc advisor.*

**Dr. Sabarish V. Babu** — *Email:* sbabu@clemson.edu, *Phone:* +1 (864) 656-5089
- Associate Professor, School of Computing, Clemson University.
- 121 McAdams Hall, Clemson, SC 29634
- *Ph.D. advisor.*

**Dr. Shaundra B. Daily** — *Email:* shani.b@duke.edu, *Phone:* +1 (202) 922-7339
- Associate Professor of the Practice, Electrical and Computer Engineering, Duke University.
- 101 Science Dr, Fciemas 3577, Durham, NC 27705
- *Mentor, principal investigator on Ph.D. research project.*

## Prepared on

January 23, 2022