

Balasarayanan Thoravi Kumaravel

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EDUCATION

PhD Candidate in Computer Science - University of California, Berkeley, CA

2017-ongoing

Advisor: Björn Hartmann

TA experience: Three times Lead GSI of CS294-137 - Theory & Applications of Virtual Reality, Immersive Computing

B. Tech, Indian Institute of Technology Madras, India

2012-2016

SKILLS

Programming Languages: C, C++, Python, JavaScript, C#, HTML, CSS, MATLAB, G-Code programming

Development: Arduino, Atmel & TI MCUs, HoloLens, Android, iOS, RaspberryPi, BeagleBone Black (and related)

Software: Unity, Eagle PCB Design, Solidworks, AutoCAD, CREO,

Others: CNC Machining, PCB Milling, 3D Printing, Laser cutting, Photoshop & Illustrator, LaTeX

SELECTED COURSEWORK

- Interactive Device Design
- User Interface Design
- Computer Vision
- Algorithmic Human-robot Interact
- Intro to Machine Learning
- Instrumentation and control
- HCI Research
- Data structures and algorithms
- Foundations- Operations Research

SELECTED RECENT PROJECTS

• **DreamStream: Immersive and Interactive Spectating in VR**

At Microsoft Research | Mentor: Andy Wilson

May'20 – Sep'21

Developed scalable 3D streaming systems for live streaming of Virtual Reality experiences. Researched interaction techniques to facilitate remote multi-user interactions over streamed 3D environments. Will be presented at CHI 2022.

• **TranceiVR : Bridging Asymmetrical Communication Between Colocated External and VR Users**

At UC Berkeley | Mentors: Cuong Nguyen, Stephen DiVerdi, Bjoern Hartmann

May'19 – Sep'19

Researched asymmetrical VR interactions – Interactions between a VR user and a colocated external user. Developed a communication system that allows users in asymmetrical VR interactions to be more effective and successful in terms of speed, error rate and perceived task load while collaborating using existing VR apps. **Presented at UIST 2020**

• **Loki: Facilitating Remote Instruction of Physical Tasks Using Bi-Directional Mixed-Reality Telepresence**

At Autodesk | Mentors: Fraser Anderson, George Fitzmaurice, Tovi Grossman, Bjoern Hartmann

Dec'18 – Apr'19

Contributed a design space that explores real-time bi-directional mixed-reality based remote training of physical tasks. Developed a real-time bi-directional depth-capture based mixed-reality telepresence system and associated set of interaction techniques that help users navigate across the contributed design space. **Presented at UIST 2019**

• **TutoriVR: A video-based tutorial system for design applications in VR**

May'18 – Sep'18

At Adobe Research and UC Berkeley | Mentors: Cuong Nguyen, Stephen DiVerdi, Bjoern Hartmann

Researched VR-embedded tutorial system that supplements video tutorials with 3D and contextual aids directly in the user's VR environment to help with learning design applications in VR. **Presented at CHI 2019**

• **AdaptiveAR: Adapting Layout of Augmented Reality Content to Unknown Physical spaces**

At Adobe Research | Mentors: Cuong Nguyen, Paul Asente, Bjoern Hartmann

Jan'21 – Apr'21

• **AR Mediated Human Drone Interaction** at UC Berkeley

Sep'17 – Dec'17

Solving the problem of navigation with drones in a shared human-drone environment using Microsoft HoloLens

• **IoT enabled CNC machine** at IIT Madras (India), Massachusetts Institute of Technology (US)

Jul'15 – May'16

Developed an Internet enabled CNC milling machine capable of real-time control and data acquisition

• **Energy Harvesting Powered Wireless Sensor Networks** at UC Berkeley

Fall'16 & Spring '17

Built low power wireless sensor motes capable of being powered by energy harvesters & having dual power reservoir

• **Machine Field data analysis and Prediction** at Advanced Research, Caterpillar India, EDC-I

Winter '15

Optimized the performance of caterpillar excavators through data driven analytics of the various machine operations

SCHOLASTIC ACHIEVEMENTS

- Won the 50,000\$ Vive Center Seed grant for AR/VR Research
- Received the Graduate Division Block Grant Award for Summer 2017
- Won the best interdisciplinary bachelors thesis project across all engineering departments; best thesis project in Mechanical engineering; Gold medal in Aditya Birla Regional Manufacturing summit

- **All India Rank 297** (out of 1 million students), **State Rank 11** in All India Engineering Entrance Exam (AIEEE)
- Among **top 10** students in IIT Madras to qualify for the prestigious DAAD ("German Academic Exchange Program")
- **Top 10%** of the branch to get a Branch Change in the first semester at IIT Madras
- **National Top 1%** and Qualified in National Standard Examination in Physics (NSEP 2011)
- **Top 20 in the country** to qualify Indian National Astronomy Olympiad 2010, attended Indian team selection camp

POSITIONS OF RESPONSIBILITY

- **Webmaster, Asha For Education, Berkeley** 2017-2019
Led the website operations team of the Berkeley chapter of the Asha For Education, NGO
- **Core, Events, Shaastra 2016** (*Annual Technical Festival of IIT Madras, ISO9001:2000 Certified*) 2015-2016
Spearheaded a team of about 200 members towards carrying out 55 top quality events and tech workshops
- **Core and Head of Electronics Club, Centre For Innovation** (*Student run Makerspace of IITM*) 2014-2015
Mentored & Facilitated training of over 300 students in Electronics, Robotics through various student projects

PEER-REVIEWED PUBLICATIONS

- **Balasaravanan Thoravi Kumaravel**, Bjoern Hartmann. 2022. Interactive Mixed-Dimensional Media for Cross-Dimensional Collaboration in Mixed Reality Environments. In Proceedings of Frontiers in Virtual Reality Technologies for VR.
DOI: <https://doi.org/10.3389/frvir.2022.766336>
- **Balasaravanan Thoravi Kumaravel**, Andrew D. Wilson. 2022. DreamStream: Immersive and Interactive Spectating in VR. In Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems (CHI '22)
DOI: <https://doi.org/10.1145/3491102.3517508>
- Haohua Lyu*, Cyrus Vachha*, Qianyi Chen*, Odysseus Pyrinis, Avery Liou, **Balasaravanan Thoravi Kumaravel**, Bjoern Hartmann. 2022. WebTransceiVR: Asymmetrical Communication Between Multiple VR and Non-VR Users Online. In Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems (CHI '22).
DOI: <https://doi.org/10.1145/3491101.3519816>
- **Balasaravanan Thoravi Kumaravel**, Cuong Nguyen, Stephen DiVerdi, and Björn Hartmann. 2020. TransceiVR: Bridging Asymmetrical Communication Between VR Users and External Collaborators. In Proceedings of the 33rd ACM Symposium on User Interface Software and Technology (UIST '20)
DOI: <https://doi.org/10.1145/3379337.3415827>
- Stephanie Claudino Daffara, Anna Brewer, **Balasaravanan Thoravi Kumaravel**, Bjoern Hartmann. 2020. Living Paper: Authoring AR Narratives Across Digital and Tangible Media. In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI '20).
DOI: <https://doi.org/10.1145/3334480.3383091>
- **Balasaravanan Thoravi Kumaravel**, Fraser Anderson, George Fitzmaurice, Björn Hartmann and Tovi Grossman. 2019. Loki: Facilitating Remote Instruction of Physical Tasks Using Bi-Directional Mixed-Reality Telepresence In Proceedings of the 32st Annual ACM Symposium on User Interface Software and Technology (UIST '19).
DOI: <https://doi.org/10.1145/3332165.3347872>
- **Balasaravanan Thoravi Kumaravel**, Cuong Nguyen, Stephen DiVerdi, and Björn Hartmann. 2019. TutoriVR: A Video-Based Tutorial System for Design Applications in Virtual Reality. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19).
DOI: <https://doi.org/10.1145/3290605.3300514>
- **Balasaravanan T. Kumaravel**, B. T. Kumaravel, R. Bhattacharyya, J. Siegel, S. E. Sarma and N. Arunachalam, "Development of an Internet of Things enabled manufacturing system for tool wear characterization," 2017 IEEE 3rd International Symposium in Robotics and Manufacturing Automation (ROMA), Kuala Lumpur, 2017, pp. 1-6.
DOI: <https://doi.org/10.1109/ROMA.2017.8231733>
- M. E. Kiziroglou, M. Cowell, **B. T. Kumaravel**, D. E. Boyle, J. W. Evans, P. K. Wright, and E. M. Yeatman - "Speed vs efficiency and storage type in portable energy systems" - International Conference on Micro and Nanotechnology for Power Generation and Energy Conversion Applications (Power MEMS 2017)

PATENTS

- "Interfaces and techniques to retarget 2d screencast videos into 3d tutorials in virtual reality", Status: Filed, US Patent filing number 16/163428
- "3d simulation of a 3d drawing in virtual reality", Status: Filed, US Patent filing number 17/321726
- "Remote interaction via bi-directional mixed-reality telepresence", Status: Filed, US Patent filing number 16/903303