

Dr Soumya C. Barathi

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| Employment | Founder and CEO | Exergaming Ltd December, 2020 - Present |
| | I founded a start-up called Exergaming Ltd. Under my leadership as the CEO of Exergaming Ltd, my team built an innovative prototype of an exercise controlled game that tracks movements by just using a camera in devices such as laptops and PCs. I also developed experience in pitching business ideas, market analysis, and business planning. Our webpage is here: https://www.exergaming.net . | |
| | LD15 Cohort Member | Entrepreneur First, London September, 2020 - January, 2021 |
| | I was accepted into the highly competitive Entrepreneur First (EF) programme which has an acceptance rate of less than 3%. EF is an international talent investor and they provide an effective environment to build a technology start-up. I developed a valuable network of a wide range of industry experts and business leaders. The EF webpage is here: https://www.joinef.com/the-programme . | |
| Previous Employment Experience | Marie Curie FIRE and CAMERA Researcher | University of Bath October, 2016 - September, 2020 |
| | I was a Marie Curie FIRE (Fellow with Industrial Research Enhancement) researcher in the Department of Computer Science at the University of Bath. I was awarded the FIRE Fellowship via a competitive international process. As part of my Fellowship I have been trained in public engagement, handling the media, and other professional skills including project management. My research has focused on improving performance, user experience, and measuring and analysing affect in high intensity VR exergaming. The FIRE webpage is here: https://www.csct.ac.uk/msca-fire . | |
| | I was also a member of CAMERA (Centre for the Analysis of Motion, Entertainment Research & Applications), a multi-disciplinary research centre bringing together visual computing, machine learning, human-computer interaction, health, human performance and engineering researchers. The CAMERA webpage is here: https://www.camera.ac.uk . | |
| | Business Analyst | Unisys June 2015 - June 2016 |
| | I was involved in the design, development, business analysis, and testing of USFN (Unisys Secure Family Net). As a member of the user experience team, I worked on enhancing the usability of the application by logically grouping the data fields and creating digital mockups of the screens. | |
| | ADM Intern | Unisys January 2015 - June 2015 |
| | I worked on the project USFN which stands for Unisys Secure Family Net. It is a robust and flexible system designed to address the unique needs of child welfare agencies. I was involved in business analysis in which the business rules were documented based on the client's requirements and communicated to the development team. | |
| Education | PhD in Human Computer Interaction (HCI) | |
| | October 2016 to May 2020 <i>University of Bath, UK</i> <i>Title: Interactive Feedforward in High Intensity VR Exergaming</i> <i>Advisors: Dr Christof Lutteroth, Prof Eamonn O'Neill, and Dr Michael Proulx</i> <i>Examiners: Prof Stephen Payne and Prof Kirsten Cater</i> | |
| | Bachelor of Technology in Computer Science and Engineering, First Class, | |
| | July 2011 to May 2015, SRM University, India | |

Award/ Grant**EU Marie Skłodowska-Curie Actions (MSCA FIRE) Fellowship 2016-2020**

My PhD research was funded by the EPSRC Centre for Doctoral Training in Digital Entertainment (CDE), EP/L016540/1, and the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 665992.

London Hopper Research Spotlight Finalist Prize, 2018

I presented my exergaming research at the Research Spotlight Competition and won the Finalist Prize. My presentation was on using a motivational psychophysical training method called interactive feedforward in high intensity VR exergaming.

**Publications
(Peer reviewed)**

A note on publication venue: the ACM Conference on Human Factors in Computing Systems (CHI) is consistently ranked as one of the leading forums for dissemination of research results and covers the broad spectrum of research in Human Computer Interaction. Papers in CHI are refereed as full papers, and have an acceptance rate of around 15-25% each year.

ACM CHI Conference → *Top tier conference in Computer Science*
(Acceptance < 25%)

**Affect Recognition using Psychophysiological Correlates
in High Intensity VR Exergaming**

*Proceedings of the 2020 CHI Conference on
Human Factors in Computing Systems;*

Recognising the affective state of VR exergame players could enable us to personalise and optimise their experience. However, affect recognition based on psychophysiological measurements for high intensity VR exergames presents challenges as the effects of exercise and VR headsets interfere with typical measurements. This paper presents novel predictors of affect based on gaze fixations, eye blinks, pupil diameter, and skin conductivity for affect recognition in high intensity VR exergaming.

<https://dl.acm.org/doi/abs/10.1145/3313831.3376596>

**Guidelines for Affect Elicitation and Tracking
in High Intensity VR Exergaming**

Momentary Emotion Elicitation and Capture Workshop at CHI 2020 Conference

This position paper on VR exergaming provides an overview of advances made in affect elicitation and tracking. It outlines guidelines for evoking underwhelming, overwhelming, and optimal affective states and tracking the affective state using psychophysiological measurements in high intensity VR exergaming. It discusses the research challenges that need to be addressed to implement affectively adaptive high intensity VR exergaming. https://meec-ws.com/papers/MEEC_2020_paper_10.pdf

**Interactive Feedforward for Improving Performance
and Maintaining Intrinsic Motivation in VR Exergaming**

*Proceedings of the 2018 CHI Conference on
Human Factors in Computing Systems;*

This paper presents a novel method called interactive feedforward, which is an interactive adaptation of the psychophysical feedforward training method where rapid improvements in performance are achieved by creating self-models showing previously unachieved performance levels. Interactive feedforward was evaluated in a cycling-based VR exergame where players interacted and competed with their self-model at real-time in a VR experience. Interactive feedforward led to improved exercise performance while maintaining intrinsic motivation. <http://dx.doi.org/10.1145/3173574.3173982>

**Datasets and
Analyses****Datasets and Analyses for Affect Recognition using
Psychophysiological Correlates in High Intensity VR Exergaming**

University of Bath

This repository contains the datasets of two experiments that investigate the use of a range

of sensors for affect recognition in a VR exergame. The first experiment compares the impact of physical exertion and gamification on psychophysiological measurements during rest, conventional exercise, VR exergaming, and sedentary VR gaming. The second experiment compares underwhelming, overwhelming, and optimal VR exergaming scenarios. <https://doi.org/10.15125/BATH-00758>

Skills

Experimental Design

I have done a number of literature reviews, and proposed and implemented the experiment design, and programmed the exergame design for the various experiment conditions. I have conducted user studies involving over 100 participants, giving me a strong grasp of experimental design and running user studies in HCI.

Software Development and Game Design

I have developed VR exergaming applications for my various research experiments by using the Unity game engine and a variety of VR headsets such as HTC Vive and FOVE. I have implemented a novel psychophysical training technique called social interactive feedforward in VR exergaming. It allows players to train and compete with virtual enhanced models of their friends thus giving them an interactive, social VR exergaming experience. I have simulated underwhelming, overwhelming, and optimal exergaming scenarios by using game play and aesthetics. I built a novel multi-sensory affect tracking system and recorded the data at run-time of the exergaming experiments. I implemented a ray casting system in the VR exergame using the FOVE VR headset to track gaze fixations. I used ray casting to detect the gameplay-related components corresponding to the point of gaze, such as a timer and speed indicator.

Hardware and Systems Integration

I have reverse engineered bespoke hardware to make it inter-operable with my game. I created a VR exergaming application by integrating the Lode Excalibur Sport exercise bike with the game developed in Unity using the serial port interface. I created a multi-sensory affect tracking system using a set of psychophysiological monitors. I measured the tonic skin conductance using the Shimmer3 Consensys GSR development kit and I monitored the pupillometry measures such as blink rate and pupil dilation using a FOVE VR headset which has eye tracking capabilities.

Quantitative analysis

I have experience of quantitative analysis such as ANOVA and regression models using R and JASP.

Resource Allocation and Project Management

As the CEO of my start up, Exergaming Ltd, I have gained experience in judicious resource and project management. I used a lean product development approach to optimise our time and financial resources while developing a prototype exergame. I led a team of game developers and designed a novel exercise controlled game by partnering with a game studio.

Industrial Research Training

I have attended several workshops as part of my FIRE industrial research fellowship training, for example; real world translation of research ideas; delivering projects while winning over stakeholders; and knowing your audience and communicating confidently.

Public Engagement, Guest Lecture, and Talks

I have given talks on my research to interdisciplinary audiences, non-specialists, the general public, and different age groups including primary and secondary school children. I modulate my presentation based on the background of my audience. I communicate my research accessibly and inclusively, avoiding confusing jargon and my talks have always been well received. I have presented my research at several events such as Bath Taps into Science, and CDE Research Showcase – BU Festival of Learning.