# LUIS QUINTERO

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## SUMMARY

Researcher in virtual reality technologies and behavioral analysis with machine learning. Experience developing bioinspired interactive systems that combine real-time analysis of time-series (physiology, motion, gameplay), computer vision, and human-computer interaction. Interested in designing and developing systems that merge wearable health monitoring sensors with immersive technologies on health, training, and education applications.

*Programming:*       C#, C++, Python.
*Platforms/Libraries:*  Unity, OpenCV, Qt, Scikit-learn.
*Hardware:*          Oculus, HTC Vive, Polar, Zephyr, Myo, Emotiv.

## EXPERIENCE

### RESEARCHER – PhD SCHOLAR
June 2019 – Present
*Stockholm, Sweden*
- Research area in the intersection of machine learning and immersive technologies. The aim of the project is to gain understanding on how behavioral data (physiology, motion, interactions) from users can be analyzed with machine learning methods to infer subjective human cognitive factors (skill level, emotional states, mental workload) and inform the design of better adaptive virtual reality applications.

### CONSULTANCY SERVICES ON VIRTUAL REALITY
September 2017 – Present
- Design and development of VR solutions. The developed projects include systems for professional training of military personnel (USA), architecture visualization using immersive systems (Colombia) and healthcare solutions (Sweden). See the section "Projects and Portfolio" of the CV for more details.

### VIRTUAL REALITY DEVELOPER
February 2017 – August 2017
*Madeira Interactive Technology Institute, Portugal*
- Design, and development of a research VR application for mental health wellbeing. Using wearable physiological sensors, HTC Vive, and developed in Unity game engine.
- Contribution in the implementation of calibration tool for low-cost CAVE systems using the Kinect sensor.
- Contribution in a framework for physiologically-adapted interactive systems for health promotion in the elderly population. Implementing a real-time visual scripting in Unity.

### BIOENGINEERING PROFESSIONAL
April 2015 – January 2017
*Colombia's Center for Bioinformatics and Computational Biology (BIOS), Colombia*
- Support in the formulation of project proposals to build customized hardware-software systems for industry, mainly working on computer vision and signal processing.
- Implementation of user interfaces to control a system that ensures quality control of products at the end of an assembly line.
- Development and evaluation of computer vision algorithms in real-life settings.

# EDUCATION

**2019 – 2024      Ph.D. Computer and Systems Sciences (_ongoing_)**
*Stockholm University, Stockholm, Sweden.*

**2017 – 2019      MSc. Health Informatics**
*Karolinska Institutet, Stockholm, Sweden.*
- Design, development and evaluation of mobile-based VR application to empower self-care in mental health processes, in includes real-time HRV analysis from smartwatches.
- **Thesis' title**: "*Facilitating Technology-based Mental Health Interventions with Mobile Virtual Reality and Wearable Smartwatches*"

**2010 – 2015      BSc. Electronics Engineering**
*National University of Colombia, Manizales, Colombia.*
- *GPA: 4.4/5.0* **-** Best 10% GPA among graduated students.
- **Award:** Top-best results in national-wide undergraduate examination.
- **Main topics:** Digital and signal processing, hardware programming, control systems.

# PUBLICATIONS

**Complete list of publications:** https://scholar.google.com/citations?user=RYg_PGQAAAAJ

**(2021)  Quintero L**, Papapetrou P, Hollmén J, and Fors U. Effective Classification of Head Motion Trajectories in Virtual Reality using Time-Series Methods. *IEEE International Conference on Artificial Intelligence and Virtual Reality (AIVR)*, Taichung, Taiwan (virtual). DOI

**(2021)  Quintero L**, Muñoz JE, De Mooij J, and Gaebler M. Excite-O-Meter: Software Framework to Integrate Heart Activity in Virtual Reality. *2021 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, Bari, Italy (virtual). DOI

**(2021)** Muñoz JE, **Quintero L**, Stephens C, and Pope AT. Taxonomy of Physiologically Adaptive Systems and Design Framework. *International Conference on Human-Computer Interaction (HCII), Adaptive Instructional Systems*, (virtual). DOI

**(2020)  Quintero L**. Research Methodologies when Combining Virtual Reality with Machine Learning: A Brief Scoping Review. *PErvasive Technologies Related to Assistive Environments Conference (PETRA)*, Corfu, Greece. DOI

**(2020)** Muñoz JE, **Quintero L**, Stephens C, and Pope AT. A Psychophysiological Model of Firearms Training in Police Officers: A Virtual Reality Experiment for Biocybernetic Adaptation. *Frontiers in Psychology (Journal)*. DOI

**(2019)  Quintero L**, Muñoz JE, Papapetrou P. Open-Source Physiological Computing Framework using Heart Rate Variability in Mobile Virtual Reality Applications. IEEE International Conference on Artificial Intelligence and Virtual Reality (AIVR), San Diego, USA. DOI

**(2019)  Quintero L.**, Papapetrou P., Muñoz JE, Fors U. Implementation of Mobile-based Real-time Heart Rate Variability Detection for Personalized Healthcare. *Workshop TMDM in IEEE International Conference on Data Mining (ICDM)*, Beijing, China. DOI

**(2018)** Badia, S. B. i, **Quintero, L. V.**, Cameirao, M. S., Chirico, A., Triberti, S., Cipresso, P., & Gaggioli, A. (2018). *Towards Emotionally-Adaptive Virtual Reality for Mental Health Applications*. IEEE Journal of Biomedical and Health Informatics. DOI

# PROJECTS AND PORTFOLIO

**(2020)         Excite-O-Meter[**Website**]**
Tool created in Unity that allows integrating human-body signals into interactive applications to quantify and visualize our inner responses during and after immersive experience. The tool uses scientifically validated principles of cardiovascular reactivity to illustrate how the measured levels of excitement are affected during XR experiences.

**(2018)         EasyBlood [**Video**]**
Mobile Virtual Reality application deployed in Unity. The solution is meant to be used in hospital settings to aid health practitioners to handle children anxiety during blood samples, it uses game-based mechanics to distract the users.

**(2018)         ArmRehabVR [**Website**]**
Mobile-VR environment with virtual limbs controlled remotely via VRPN protocol. Part of a system to aid rehabilitation of spinal cord injury through EEG monitoring and virtual reality.

**(2018)         PortalSense [**Website**]**
Founder and product manager of a company that deploys interactive and immersive systems using high-end virtual reality for industry and education.

**(2018)         BioPhyS [**Website**]**
System to enhance cognitive skills in virtual military training, using sophisticated biofeedback technologies that deliver highly adaptive scenarios aiming at boosting skills in military personnel based on recognition of physiological signals.
- Development of first demo of the adaptive shooting application in Unity.
- Integration of physiological signals with communication protocols (UDP) in Unity.

**(2017)         3Dream [**Video**]**
VR tool used to train emotional regulation in psychology. It uses HTC-Vive and wearable devices to estimate user's emotion and create content procedurally accordingly.
- Development of the virtual environment in Unity3D, communication protocols and signal processing of physiological data.

**(2017)         BL-Engine & VR CAVE System [**Video**]**
Support in the development of a software tool designed for an easy creation of physiologically modulated videogames by means of wearable sensors. And one for interaction with Kinect sensor in CAVE systems.
- Design and coding of visual scripting module using Unity3D.
- Implementation of a 3D calibration tool for low-cost VR CAVE systems.

**(2015)         ViLimbs [**Video**]**
Bio-signal-based interaction with virtual limbs to improve rehabilitation for amputees with phantom limb pain phenomenon.
- Coding the migration from wired EMG device to wireless Myo device. GUI design and coding for ViLimbs application using Qt and C++ libraries.

**(2015)         Large-size video walls**
Video wall with resolution of 66.3MP for information and science visualization, one of the most advanced tools for scientific research in Latin America.
- **Human-Computer Interface for Large Scale Interaction [**Video**]**
  Develop of human-computer interfaces to facilitate video wall usage, were implemented server-client applications using communication protocols like TUIO and VRPN to allow the control of the video wall using devices including smartphones, joystick, Myo gyroscope.
- **Augmented Reality Immersion in Large Displays [**Video**]**
  Application to be displayed in video wall to generate immersive scenarios with Unity using perspective adjustment from a webcam streaming placed in the top of the videowall room.