# Juan Pablo Forero

### Frontier Tech Engineer - Software & Hardware

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I'm a passionate software-hardware engineer with 10+ years of experience inventing, designing, and developing human-centered products at the frontier of technology. Leveraging my C/C++ skills, embedded integration proficiency, and Unity expertise, I have engineered the hardware-software core of innovative extended reality connected experiences, haptic interfaces, and natural interaction technologies. I'm seeking a fast-paced, collaborative team where we can collectively innovate, stay ahead of trends, and maximize product impact.

## EXPERIENCE
*Based in Sunnyvale, California, USA. **Currently working under O-1 Extraordinary Talent Visa***

| Sr. Research Engineer | **Samsung Research America** | Jan .22 - Present |
|---|---|---|
| | Think Tank Team & Frontier Product Experience | Mountain View, USA |

- Conceived and developed enabling technologies for advancing edge device XR experiences and defined product vision around virtual humans and digital twins. Technical scope spans signal processing, machine learning & AI models on-device, computer vision, and motion capture. I delivered full solution integration using Unreal Engine & Unity 3D, Android JNI API, and backend AWS infrastructure.
- Drove product development and strategy by leading a cross-functional team of scientists, software engineers and UX/UI designers (7-11 people). Expanded team capacity through strategic outsourcing and timely contracts with external vendors (17 people). Conducted user-centric research, including longitudinal user studies for risk mitigation, early trend identification and data-driven decision making.
- Investigated and rapidly prototyped novel Augmented Reality (AR) and Virtual Reality (VR) experiences, exploring their potential for enhanced communication, adaptive information access, and productivity.

**Research Engineer**     Jan .17 - Jun .18

- Engineered *Nimbus*, a privacy-preserving, highly efficient, and low-cost natural interface specifically designed for infrared hand gesture and position tracking. It combines custom electronics, on-device signal processing & algorithms, and AI optimized for edge deployment. The Printed Circuit Board (PCB) design integrates SoC and a time-sensitive matrix of infrared sensor pairs and processing units. Optimized sensor drivers utilize DMA, SPI and I2C and enable efficient task scheduling (emulated RTOS) on Micro-controller's single thread. Inter-device integration leverages RF technology for ultra-low-latency data transmission. Nimbus's innovative approach redefines interactions across AR, VR and personal computing, overcoming some of the limitations inherent in camera-based and radar technologies.
- Showcased at Consumer Electronic Association (CES) 2018, Nimbus was integrated into a connected car of the future concept by Samsung.

| Lead Embedded Engineer R&D | **University of Auckland** | Oct .18 - Dec .22 |
|---|---|---|
| | *Augmented Human Lab* - Auckland Bioengineering Institute | Auckland, NZ |

- Led system integration and end-to-end processes for the *Kiwrious Science Experience*, deploying 10,200 sensor kits, an online ecosystem, and curriculum materials in 35 New Zealand (NZ) schools.
- Architected and engineered user-centered embedded systems and experiences, developed wearable sensory substitution systems (adopted by the Hearing House, NZ), haptic interfaces (VR), and edTech solutions. Expertise in STM32 (ARM Cortex-M), NRF9160 (LTE/GPS), and Microchip PIC MCUs.
- 7 peer-reviewed Human-Computer Interaction (HCI) publications; Awards, grants and recognitions by Google, the United Nations, and more.

| Embedded Research Engineer | **Singapore University of Technology and Design** | Jun .14 - Dec .16 |
|---|---|---|
| | *Augmented Human Lab* | Singapore, SG |

- Invented and produced an optical embedded firmware/hardware technology and sensor Bluetooth Low Energy & Wifi network for early detection of catastrophic bleeding at catheter extraction points, preventing patient mortality; published, patented, nationally recognized by media & government officials, and adopted by Changi General Hospital, SG.
- Devised and deployed a Music Sensory Substitution wearable to bring rhythm activities to hearing-impaired individuals at the Deaf School in Sri Lanka.
- Engineered & published new intent capturing technologies at the intersection of Internet of Things (IoT) and Context-Aware Pervasive Computing.

| Visiting Researcher | **Almende Organizing Networks** | Jun .13 - Jan .14 |
|---|---|---|
| | | Rotterdam, NL |

- Engineered a real-time Wifi control module and drivers for a budget-friendly drone, enhancing flight stability and path estimation through sensor fusion (i.e., high-latency internal sensor data & phone's camera input).

| Research Assistant | **La Salle University, URL** | Sep .11 - Jun .13 |
|---|---|---|
| | Robotics and Electronics Lab | Barcelona, SPN |

- Developed a robotic agent's Hardware kit & iOS app extensions for children's Traumatic Brain Injury rehab with Sant Joan de Déu Hospital, SPN
- Produced 150 custom smart-cube kits for real-world use and prospects to support neurodivergent conditions such as autism spectrum disorders.
- Simulation, Embedded Software & Hardware, Electronic System Design, Microcontroller optimizations, Interfaces (I2C, SPI, UART) & RF Networks

## EDUCATION

| Master of Engineering | **The University of Auckland** | Dec .18 - Dec .20 |
|---|---|---|
| Electronics - Computer Science | Full Scholarship - First Class Honors | Auckland, NZ |

- Hi-fi custom wearable vibrotactile display & Android app for enhanced human expression in collaboration with the Hearing House, NZ

| Innovation Fellowship Program | **Singapore-MIT Alliance for Research and Technology** | Sep .16 - Jan .17 |
|---|---|---|
| SMART | Full Sponsorship | Singapore, SG |

- Feasibility, integration, and productization of proprietary free-air gesture interaction technology.

| Bachelor of Science | **La Salle University, URL** | Sep .08 - Jun .13 |
|---|---|---|
| Electrical Eng. - Computer Science | Thesis First Class Honors | Barcelona, SPN |

- Robotic agent's Hardware kit & iOS app extensions for children's Traumatic Brain Injury rehab with Sant Joan de Déu Hospital, SPN

## SKILLS & INTERESTS

**Software Development:** C++ | C | C# - Unity 3D | Unreal Engine | Python | Java | Kotlin | Assembly | HDL | Embedded Linux
**Electronics Design:** Altium Designer | LTspice | Cadence OrCAD
**Design:** Adobe Illustrator | Adobe Photoshop | Adobe Premiere Pro | Figma
**Interests:** Game Development | Android Development | Prototyping | Climbing | Jiu-Jitsu | Board Games

## PUBLICATIONS

**Striving for Authentic and Sustained Technology Use in the Classroom** — 2023
International Journal of Human–Computer Interaction

**Primary school students programming with real-time environmental sensor data** — 2022
Proceedings of the 24th Australasian Computing Education Conference

**OM:** A Comprehensive Tool to Elicit Subjective Vibrotactile Expressions Associated with Contextualised Meaning — 2021
Conference on Mobile Human-Computer Interaction (Mobile HCI 2021)

**Touch me Gently:** Recreating the Perception of Touch using a Shape-Memory Alloy Matrix — 2020
Conference on Human Factors in Computing Systems Proceedings (CHI 2020)

**M-Hair:** Creating Novel Tactile Feedback by Augmenting the Body Hair to Respond to Magnetic Field — 2019
32nd Annual ACM Symposium on User Interface Software and Technology (UIST 2019)

**InSight:** A Systematic Approach to Create Dynamic Human-Controller-Interaction — 2017
8th Augmented Human International Conference

**Muss-bits:** Ad-Hoc Access to Musical Sound for Deaf Individuals — 2016
18th International SIGACCESS Conference on Computers and Accessibility

**postBits:** Using Contextual Locations for Embedding Cloud Information In the Home — 2015
Personal and Ubiquitous Computing Journal

**BWard:** Optical Approach for Reliable in-situ Early Blood Leakage Detection at Catheter Extraction Points — 2015
7th IEEE International Conference on Robotics, Automatics and Mechatronics

**footNote:** Designing a Cost Effective Plantar Pressure Monitoring System for Diabetic Foot Ulcer Prevention — 2015
6th Augmented Human International Conference

**Introduction to the Robotics with LEGO MINDSTORMS:** Social Use Of The LEGO MINDSTORMS Robots — 2012
Hispabrick Magazine

## PATENTS

**Object Detection and Motion Identification Using Electromagnetic Radiation** — 2020
US Patent 10,491,736

**On-site device for detecting presence of a liquid** — 2017
WO2017010942A1

## AWARDS

**Kiwrious**
Igniting students' scientific passion with affordable plug-and-play sensors, delivering a fun and interactive hands-on experience.
- **Good Design Awards - Winner** — 2021
- **Best Design Awards (Public Good: Silver; User Experience: Bronze; Value of Design: Bronze)** — 2021
- **100K Velocity Challenge - Social Category Award** — 2020

**OM - Finalist Public Good, User Experience Empowering & User Experience Innovating** — 2020
"Feel the world through frequency" - An inclusive wearable technology that can enrich the human experience

**Maia: Best Design Awards - User Experience Bronze Award** — 2020
A service using the latest in artificial intelligence to help mental health clinicians provide better care for their patients

**The Linked Horizons Foundation: 100K Velocity Challenge - LaunchPad Programme Finalists (Top 1%)** — 2019
Linked Horizons provides children with equal access to education and learning opportunities worldwide

**MussBits: Best Design Awards - Public Good Gold Award** — 2019
Wearable device designed to support music listening and music making for deaf individuals

## STARTUPS

**Korawai, providing comfort through connectivity** — 2021
Developing innovative solutions using leading-edge technologies in the New Zealand biotechnology space

**The Linked Horizons Foundation** — 2020
Providing equal access to a wide portfolio of opportunities beyond curriculum for a well-rounded education. Charity Registration: CC56814

**Kiwrious** — 2020
Igniting students' scientific passion with affordable plug-and-play sensors, delivering a fun and interactive hands-on experience.