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.