Juan Pablo Forero

Research Engineer & Prototyper – Software & Hardware

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Software-hardware engineer specializing in Human-Computer Interaction with over 10 years of experience inventing, engineering, and developing human-centered products at the frontier of technology. Leveraging my C/C#/C++ skills, embedded integration proficiency, and AR/VR expertise, I have engineered the software-hardware core of innovative extended reality connected experiences, haptic interfaces, and natural interaction technologies. I'm seeking a fast-paced, collaborative team where we can maximize product impact.

EXPERIENCE

Product Design Prototyper — **Meta** — *Reality Labs* — Aug .24 - Present — Redmond, USA

- Developed experience-driven prototypes in Unity (C#) to explore and validate user interactions within short time frames. Delivered demos to internal stakeholders, shaping product direction and informing strategic decisions.
- Built the Unity infrastructure and unified pipeline to seamlessly integrate proprietary backend services, tools, and both commercial and proprietary edge devices into a cohesive system. Worked closely with design, engineering, and project management teams to refine interactions and ensure system reliability. This integration enabled advanced user experiences incorporating egocentric computing, proactive agents, and personalized AI.

Sr. Research Engineer — **Samsung Research America** — *Think Tank Team* — Jan .22 - Apr .24 — Mountain View, USA

- Conceived and developed enabling technologies for advancing edge device Augmented Reality (AR) and Virtual Reality (VR) 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. Delivered full solution integration using Unreal Engine & Unity 3D, Android JNI API, and backend AWS infrastructure.
- Led concept-to-MVP XR healthcare project adopted by Samsung's New Business Task Force, poised for commercialization. Scaled a cross-functional team from 3 to 11 individuals, strategically outsourced for additional capacity (9 experts), and drove user-centric research for early trend identification and data-driven decision-making.

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 Electronics Show (CES) 2018, Nimbus was integrated into a connected car of the future concept by Samsung.

Lead Embedded Engineer R&D — **University of Auckland** — *Augmented Human Lab* - Auckland Bioengineering Institute — Oct .18 - Jan .22 — 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.

Embedded Research Engineer — **Singapore University of Technology and Design** — *Augmented Human Lab* — Jun .14 - Jan .17 — 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** — Robotics and Electronics Lab — Sep .11 - Jun .13 — 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
Electronics Design: Altium Designer | LTspice | Cadence OrCAD
Interests: Game Development | Android Development | Prototyping | Climbing | Jiu-Jitsu | Board Games

PUBLICATIONS

CoTacs: A Haptic Toolkit to Explore Effective On-Body Haptic Feedback by Ideating, Designing, Evaluating and Refining Haptic Designs Using Group Collaboration 2024
International Journal of Human–Computer Interaction

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)

PhantomTouch: Creating an extended reality by the illusion of touch using a shape-memory alloy matrix 2019
SIGGRAPH Asia

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)

M-Hair: Extended Reality by Stimulating the Body Hair 2019
SIGGRAPH Asia

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
- **Fast Company's Innovation by Design Awards - Honorable Mention** 2020
- **100K Velocity Challenge - Social Category Award**

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:
Wearable device designed to support music listening and music making for deaf individuals

- **Best Design Awards - Public Good Gold Award** 2019
- **Fast Company's Innovation by Design Awards - Honorable Mention** 2019

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.