



Nicolas Caytuiro

*Ph.D. candidate in Computer Science at the University of Chile, with a background in Systems Engineering from the Catholic University of Santa Maria (Arequipa, Peru). My research focuses on **deep learning** and **3D computer vision**, particularly **generative models** and their applications. Currently, I am working on preserving structural priors in 3D generative models, specifically symmetry.*

I am the co-founder of the Shape Vision Lab at the University of Chile and an affiliated Ph.D. student at the National Center for Artificial Intelligence CENIA, Santiago, Chile.

Research Interests: Deep Learning, 3D Computer Vision, Geometry Processing.

Education

- 2024–Present **Ph.D. in Computer Science**, Department of Computer Science, University of Chile, Santiago, Chile.
- **CENIA Scholarship (ANID Basal Funding FB210017)**, Mar. 2025 – Feb. 2026.
Support and recognition granted to Ph.D. students conducting research in Artificial Intelligence.
 - **NIC Chile Scholarship**, Aug. 2024 – Feb. 2025.
Financial support awarded by NIC Chile to initiate doctoral studies.
- 2024 **Systems Engineer**, Department of Systems Engineering, Catholic University of Santa Maria, Arequipa, Peru.
Thesis: Development of an ergonomic and low-cost assistive device for banknote recognition based on computer vision and IoT for people with visual impairments in the city of Arequipa.
- 2019–2023 **Bachelor of Systems Engineering**, Department of Systems Engineering, Catholic University of Santa Maria, Arequipa, Peru.
- **PRONABEC Scholarship – Continuity of Studies**, May 2022 – Dec. 2022.
Awardee of the national scholarship program granted by the National Program of Scholarships and Educational Credit (PRONABEC), Call 2022-I.
 - **PRONABEC Scholarship – Continuity of Studies**, Mar. 2021 – Dec. 2021.
Awardee of the national scholarship program granted by PRONABEC, Call 2020-II.
- 2020–2021 **Intermediate English B2**, Language Center, Catholic University of Santa Maria, Arequipa, Peru.
- 2016–2018 **International Baccalaureate – High School**, High-Performance School of Arequipa, Arequipa, Peru.

Teaching Experience

- Spring 2025 **Teaching Assistant**, University of Chile, Santiago, Chile.
- Neural Networks and Deep Learning (CC66U-1).
 - Neural Networks and Deep Learning (CC66U-2).
 - Computer Vision (CC5209-1).
 - Research in Computer Science: Methods, Techniques, and Perspectives (CC7910-1).

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Spring 2025 **Tutor**, *University of Chile*, Santiago, Chile.

- Software Project (CC5402-1).

Working Experience

Feb 2024 – **Programmer Analyst & Head of the Artificial Intelligence Department**,

Jul 2024 *Bantotal*, Arequipa, Peru.

- Development, maintenance, testing, and documentation of banking software applications.
- Support in the implementation and validation of core financial systems.
- Leadership of the Artificial Intelligence Department:
 - Development and testing of FastAPI applications based on large language models (LLMs) for software documentation and automatic pseudocode generation.
 - Design of LLM-based tools for requirement interpretation and analysis, improving efficiency and accuracy in software development project management.

May 2023 – **Renacyt Researcher (Level VI)**, CONCYTEC, Peru.

Present Affiliation: Catholic University of Santa Maria.

Oct 2022 – **IBM Consulting Intern**, IBM del Peru S.A.C., Lima, Peru.

- Oct 2023
- Business process modeling support.
 - Interface micro-design documentation.
 - Design and implementation documentation for microservices.

Apr 2022 – **Pre-Professional Intern – AI & Analytics**, NEO Consulting, Lima, Peru.

- Sep 2023
- Implementation of Digital Analytics tools (GA4, GTM, Looker Studio, Adobe Analytics).
 - Monitoring, testing, and validation of analytics implementations.
 - Definition of digital analytics project work plans.

Jun 2022 – **Junior Manager**, UCSM Business Incubator Starts Up, Arequipa, Peru.

Mar 2023 Support in educational innovation and entrepreneurship projects.

Jun 2022 – **Backend Developer**, Microdata, Arequipa, Peru, .

- Oct 2022
- Backend development using Django.
 - Maintenance of MVC-based web systems.

Aug 2021 – **Full Stack Web Developer**, Digixonic Studios, Arequipa, Peru, .

- Sep 2021
- Design and development of websites using HTML, CSS, PHP, and JavaScript.

Jan 2018 – **CEO & Founder**, MERKODI, Arequipa, Peru.

Present Design and development of custom websites and mobile applications.

Research Projects

2023 – 2024 **Lead Researcher**, Resolution No. 038-2023-VRINV, Catholic University of Santa Maria, Peru.

Development of an ergonomic and low-cost assistive device based on IoT and computer vision to assist visually impaired individuals in the city of Arequipa.

Grant: USD 1,818

2022 – 2023 **Lead Researcher**, Resolution No. 038-2023-VRINV, Catholic University of Santa Maria, Peru.

Discovery and analysis of teaching behavior in the university teaching process through the use of process mining techniques.

Grant: USD 1,854

- 2022 – 2023 **Research Assistant**, *Resolution No. 7995-CU-2022*, Catholic University of Santa Maria, Peru.
Development of a quantitative tool for the assessment of motor competence using wearable technology in schoolchildren in the province of Arequipa.

Intellectual Property

- 2025 **Utility Model: Assistive Device for Banknote Recognition for Visually Impaired Individuals**, *INDECOPI*, Peru.
Nicolás Esleyder Caytuiro Silva, Eveling Gloria Castro Gutierrez, Jackeline Melady Peña Alejandro.
Registration No. 2117.
Filed: 01 Oct 2024. Granted: 13 Jan 2025.
- 2024 **Copyright: KONNECT Networking Application**, *INDECOPI*, Peru.
Nicolás Esleyder Caytuiro Silva, Jose David Esquicha Tejada, Karina Rosas Paredes, Jose Alfredo Sulla Torres.
Registration No. 003663.
Filed: 01 Oct 2024. Registered: 20 Nov 2024.
- 2024 **Copyright: ASYS Attendance Registration and Control Application**, *INDECOPI*, Peru.
Nicolás Esleyder Caytuiro Silva, Denilson Carlos Ala Samayani, Jackeline Melady Peña Alejandro, Jose Alfredo Sulla Torres, Manuel Mariano Zuñiga Carnero.
Registration No. 003668.
Filed: 02 Oct 2024. Registered: 13 Nov 2024.

Publications

Preprints

- 2025 **Caytuiro, N.**, Sipiran, I. *Symmetrization of 3D Generative Models*. arXiv preprint, Dec. 2025. Available at: <https://arxiv.org/abs/2512.18953>
- 2025 **Caytuiro, N.**, Sipiran, I. *3D Shape Generation: A Survey*. arXiv preprint, Jun. 2025. Available at: <https://arxiv.org/abs/2506.22678>

Journals

- 2025 Maraza-Quispe, B., Rosas-Iman, V. H., Solorzano-Bernuy, R. M., Casa-Zeballos, L., Ttito-Suaña, M. A., Feliciano-Yucra, G., Martinez-Lopez, A. C., Quispe-Flores, L. M., **Caytuiro-Silva, N. E.** *Strengthening Digital Security through a Hybrid Encryption Algorithm for Messages on WhatsApp*. SN Computer Science, 6(5), May 2025. <https://doi.org/10.1007/s42979-025-04007-z>
- 2024 **Caytuiro-Silva, N. E.**, Maraza-Quispe, B., Castro-Gutierrez, E. G., Rosas-Paredes, K., Sulla-Torres, J. A., Alcázar-Holguin, M. A., Choquehuana-Quispe, W. *Optimizing Attendance Management in Educational Institutions Through Mobile Technologies: A Machine Learning and Cloud Computing Approach*. International Journal of Interactive Mobile Technologies, 18(12), May 2024. <https://doi.org/10.3991/ijim.v18i12.46917>

- Caytuiro-Silva, N. E.**, Maraza-Quispe, B., Mamani-Nina, L. A., Mamani-Sucasaca, E. M., Aguilar-Gonzales, J. L., Urday-Cuadros, J. *The Impact of Minecraft on the Development of Prosocial Behaviors in Regular Basic Education Students*. IEEE Revista Iberoamericana de Tecnologías del Aprendizaje, 19, 90–99, Feb. 2024. <https://doi.org/10.1109/RITA.2024.3368375>
- 2023 **Caytuiro-Silva, N. E.**, Peña-Alejandro, J. M., Castro-Gutierrez, E. G., Sulla-Torres, J., Maraza-Quispe, B. *Annotated Peruvian Banknote Dataset for currency recognition and classification*. Data in Brief, 51, 109715, Dec. 2023. <https://doi.org/10.1016/j.dib.2023.109715>
- Maraza-Quispe, B., Alejandro-Oviedo, O. M., Llanos-Talavera, K. S., Choquehuanca-Quispe, W., Choquehuayta-Palomino, S. A., **Caytuiro-Silva, N. E.** *Towards the Development of Emotions through the Use of Augmented Reality for the Improvement of Teaching-Learning Processes*. International Journal of Information and Education Technology, 13(1), 56–63, Jan. 2023. <https://doi.org/10.18178/ijiet.2023.13.1.1780>
- 2020 Maraza-Quispe, B., Alejandro-Oviedo, O. M., Choquehuanca-Quispe, W., **Caytuiro-Silva, N. E.**, Herrera-Quispe, J. *Towards a standardization of learning behavior indicators in virtual environments*. International Journal of Advanced Computer Science and Applications, 11(11), 2020. <https://doi.org/10.14569/ijacsa.2020.0111119>
- 2019 Maraza-Quispe, B., **Caytuiro-Silva, N. E.**, Castro-Gutierrez, E., Alejandro-Oviedo, M., Choquehuanca-Quispe, W., Fernandez-Gambarini, W., Cuadros-Paz, L., Cisneros-Chavez, B. *Towards the development of collaborative learning in virtual environments*. International Journal of Advanced Computer Science and Applications, 10(12), 2019. <https://doi.org/10.14569/ijacsa.2019.0101237>
- Conference Proceedings**
- 2023 Maraza-Quispe, B., **Caytuiro-Silva, N. E.**, Arizaca-Machaca, E. A., Torres-Loayza, J. L., Ccama-Marron, G. A., Fernandez-Gambarini, W. C. *Promoting Scientific Inquiry in Physics Students through the Use of Simulators*. Proceedings of the 15th International Conference on Education Technology and Computers (ICETC 2023), Sept. 2023. <https://doi.org/10.1145/3629296.3629312>
- Caytuiro-Silva, N. E.**, Castro-Gutierrez, E. G., Peña-Alejandro, J. M., Rosas-Paredes, K., Sulla-Torres, J. *Mobile Application for the Registration and Control of Student Attendance at the Universidad Católica de Santa María Based on Google Technologies and Machine Learning*. CEUR Workshop Proceedings, Vol. 3693, 2023. <https://ceur-ws.org/Vol-3693/paper16.pdf>
- Caytuiro-Silva, N. E.**, Castro-Gutierrez, E. G., Peña-Alejandro, J. M. *A Systematic Review of Assistive Tools for Individuals with Visual Impairments*. CEUR Workshop Proceedings, Vol. 3693, 2023. <https://ceur-ws.org/Vol-3693/paper14.pdf>
- Caytuiro-Silva, N. E.**, Castro-Gutierrez, E. G., Peña-Alejandro, J. M. *Proposal Based on Computer Vision and IoT for the Development of an Ergonomic and Low-Cost Assistance Device for People with Visual Disabilities*. CEUR Workshop Proceedings, Vol. 3693, 2023. <https://ceur-ws.org/Vol-3693/paper15.pdf>

- Calderón-Ruiz, G., **Caytuiro-Silva, N. E.**, Lazarte-Díaz, C., Urrutia-Quequezana, G. *Discovery and Analysis of the Teaching/Learning Processes Using Process Mining Techniques*. CEUR Workshop Proceedings, Vol. 3353, 2023. <https://ceur-ws.org/Vol-3353/paper5.pdf>
- 2022 **Caytuiro-Silva, N.**, Ala-Samayani, D., Peña-Alejandro, J., Zuñiga-Carnero, M., Sulla-Torres, J. A. *Development of a Mobile Application for the Registration and Control of Attendance of University Students Based on Machine Learning*. Proceedings of the LACCEI International Multiconference, Dec. 2022. <https://doi.org/10.18687/LEIRD2022.1.1.8>
- Maraza-Quispe, B., Alejandro-Oviedo, O. M., Choquehuanca-Quispe, W., Quispe-Flores, L. M., **Caytuiro-Silva, N. E.**, Choquehuaya-Palomino, S. A. *Towards the Development of Computational Thinking in Students through Games*. Proceedings of the 14th International Conference on Education Technology and Computers (ICETC 2022), Oct. 2022. <https://doi.org/10.1145/3572549.3572552>
- 2021 Maraza-Quispe, B., Alejandro-Oviedo, O. M., **Caytuiro-Silva, N. E.**, Barrios-Concha, W. A., Quispe-Flores, L. M., Jordan-Franco, M. M. *The Development of Student Spatial Orientation through the Use of 3D Graphics*. Proceedings of the 13th International Conference on Education Technology and Computers (ICETC 2021), 2021. <https://doi.org/10.1145/3498765.3498841>
- 2019 Maraza-Quispe, B., Alejandro-Oviedo, O. M., Cisneros-Chavez, B., Cuentas-Toledo, M., Cuadros-Paz, L., Fernandez-Gambarini, W., Quispe-Flores, L., **Caytuiro-Silva, N. E.** *Model to Personalize the Teaching-Learning Process in Virtual Environments Using Case-Based Reasoning*. Proceedings of the 11th International Conference on Education Technology and Computers (ICETC 2019), Oct. 2019. <https://doi.org/10.1145/3369255.3369264>
- Maraza-Quispe, B., Alfaro-Casas, L., Alejandro-Oviedo, O. M., **Caytuiro-Silva, N. E.**, Vivanco-Chavez, C., Choquehuanca-Quispe, W., Alay-Palomino, Y. E., Quispe-Chambi, K. *YouTube Assessment as a Means of Documentary Research Students*. Proceedings of the 11th International Conference on Education Technology and Computers (ICETC 2019), Oct. 2019. <https://doi.org/10.1145/3369255.3369299>

Honors / Awards

Honors

- 2025 **Youngest Ph.D. Student**, Department of Computer Science, University of Chile. Recognized as the youngest Ph.D. student in the department.
- 2023 **Qualified Researcher – RENACYT Level VII**, National Registry of Scientific, Technological, and Technological Innovation (RENACYT). Official recognition as a qualified researcher at Level VII.
- 2018 **International Recognition**, United States Agency for International Development (USAID). Awarded for the project "Biofeedback for the States of Anxiety and Stress through Automated Detection Processes" at the International Science and Engineering Fair (INTEL ISEF 2018), Pittsburgh, PA, USA.

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- 2018 **International Recognition**, *Wolfram Research*.
 Recognition awarded at the International Science and Engineering Fair (INTEL ISEF 2018), Pittsburgh, PA, USA.
- 2017 **Official Recognition**, *Mariano Melgar District Municipality*.
 Awarded for achieving first place at the National School Science and Technology Fair FENCYT-EUREKA 2017 (National Stage).
- 2016–2017 **Official Recognition**, *Regional Government of Arequipa*.
 Awarded for achieving first place during the years 2016–2017 at the National Science and Technology Fair EUREKA.
- 2017 **Official Recognition**, *Paucarpata District Municipality*.
 Awarded for achieving first place at the School Science and Technology Fair FENCYT-EUREKA 2017.
- 2017 **Official Recognition**, *Regional Government of Arequipa*.
 Awarded for achieving first place in the School Mining Competition organized by the Peruvian Institute of Mining Engineers (IIMP), with the project “*Towards Responsible Mining with the Help of Technology*.”
- 2017 **Official Recognition**, *Regional Government of Arequipa*.
 Awarded for achieving first place in the Floral Games organized by UGEL Sur, with the project “*Robotic Prototype Toxic Gas Detector – Lifesaver*.”
- 2017 **Official Recognition**, *Regional Education Management of Arequipa*.
 Awarded for achieving first place at the National School Science and Technology Fair EUREKA 2017, with the project “*Biofeedback of Anxiety States through the Use of Wireless Technologies*.”
- 2017 **Official Recognition**, *National Network of High-Performance Schools*.
 Awarded for achieving first place at the National Science and Technology Fair FENCYT-EUREKA 2017.
- 2017 **Official Recognition – BASIC SCIENCES Category**, *Regional Government of Arequipa*.
 Awarded for achieving first place nationally and regionally in the Basic Sciences category at the XXVII National Science and Technology Fair EUREKA 2017.
- 2016 **Official Recognition**, *Regional Government of Arequipa*.
 Awarded for achieving first place at the XXVI National School Science and Technology Fair EUREKA 2016.
- 2016 **Regional Executive Resolution No. 176-2016-GRA/GR**, *Regional Government of Arequipa*.
 Official congratulations for outstanding participation in regional, national, and international competitions.

Awards

- 2023 **First Place – LEIRD 2023**, *3rd LACCEI International Multiconference on Entrepreneurship, Innovation, and Regional Development*.
 Awarded first place with the project “*Ergonomic and Low-Cost Assistance Device for Visually Impaired People*.”
- First Place – Capstone Projects Fair**, *Faculty of Physical and Formal Sciences and Engineering, Catholic University of Santa María*.
 Awarded first place for outstanding final-year project.

- 2022 **Semifinalist – IDEATON William Morris, Equipo Santa María & INNICIA Business Incubator, Catholic University of Santa María.**
 Young Entrepreneurs and Innovators Santamarianos competition.
First Place – UCSM Projects Fair, Vice Presidency of Research, Catholic University of Santa María.
 Awarded first place for innovation and research impact.
Participant – Impact StartUp Competition (ISC) Bootcamp, KOICA Peru Office.
 Participation in entrepreneurship and startup acceleration bootcamp.
First Place – Impact StartUp Competition (ISC), Catholic University of Santa María.
 Awarded first place in collaboration with UCSM.
First Place – Local Hult Prize Final, Catholic University of Santa María.
 Winner of the local final stage of the Hult Prize competition.
- 2021 **Participant – Lima Impact Summit, Hult Prize Peru.**
 Participation in international entrepreneurship and social impact summit.
First Place – Solveathon for Economic Reactivation, Presidency of the Council of Ministers (PCM) & Partners.
 Supported by IPAE, UPAL, National Council of Competitiveness and Productivity, and MIT Solve.
First Place – K'UMARA Hackathon, Pontifical Catholic University of Peru (PUCP), IEEE EMBS Student Chapter.
 Winner of the 1st Edition of the K'UMARA Hackathon.
- 2019 **First Place – StartUp Competition, INNICIA Business Incubator, Catholic University of Santa María.**
 Awarded first place for entrepreneurial project.
First Place – Innovation Day, Catholic University of Santa María.
 Awarded first place during Innovation Day.
First Place – Project Competition (Second Semester), Faculty of Physical and Formal Sciences and Engineering, UCSM.
 Awarded first place for academic project excellence.
First Place – Project Competition (First Semester), Faculty of Physical and Formal Sciences and Engineering, UCSM.
 Awarded first place for academic project excellence.
- 2018 **First Place – “My First Research” Competition, Catholic University of Santa María.**
 Project titled “Improving the Air We Breathe.” Held in Arequipa, Peru.
First Place – Regional Stage, Samsung “Solutions for the Future” Competition.
 Represented the Arequipa region at the regional stage.
Finalist – International Science and Engineering Fair (INTEL-ISEF), Pittsburgh, Pennsylvania, USA.
 Project titled “Biofeedback for the States of Anxiety and Stress through Automated Detection Processes.”

- 2017 **First Place – National School Science and Technology Fair (EUREKA), XXVII Edition, Lima, Peru.**
 Project titled “*Biofeedback of Anxiety and Stress States through Automated Detection Procedures.*”
- Second Place – National School Science and Technology Fair (EUREKA), XXVII Edition, Arequipa, Peru.**
 Awarded second place at I.E.P. Santa Clara.
- First Place – IIMP School Mining Award, Institute of Mining Engineers of Peru (IIMP).**
 Monograph titled “*Towards Mining and Environmental Care, Responsible with the Help of Technology.*”
- 2016 **First Place – National School Science and Technology Fair (EUREKA), XXVI Edition, Lima, Peru.**
 Winner of the national stage.
- First Place – BASIC SCIENCES Category, XXVI National School Science and Technology Fair (EUREKA).**
 Awarded first place nationally in the Basic Sciences category.

Scientific Community Service

Peer Reviewing

- 2025 **Reviewer, International Journal of Information and Education Technology (IJIET).**
Reviewer, International Conference on Research in Computational Science and Technology.
- Manuscript: *Comparación de modelos generativos compactos para respuesta automática en español mediante RAG.*
 - Manuscript: *Revisión Sistemática del Uso de Técnicas de Paralelización y Computación Distribuida para la Optimización de XGBoost.*
- Reviewer, Educational Initiative in Artificial Intelligence (PhawAI+TaReCDa).**
- 2024 **Reviewer, IEEE Revista Iberoamericana de Tecnologías del Aprendizaje (RITA).**
- Manuscript: *Evaluation of the Impact of an Online Educational Platform on the Development of Mathematical Competencies in Elementary School Students.*

Presentations

- 2023 **Invited Speaker, International Postgraduate Seminar “Quality Management in Research and Accreditation Model for Postgraduate Schools”, Cusco, Peru.**
 Organized by the Postgraduate Unit, Faculty of Education, National University of San Antonio Abad del Cusco.
- 2022 **Invited Speaker, International Conference “Update on Healthcare for People with Hearing and Visual Impairment”, Lima, Peru.**
 Organized by the National University of San Marcos.

Academic and Organizational Service

- 2023 **Organizing Committee Collaborator, XXX International Symposium on Systems Engineering (JINIS), Arequipa, Peru.**
 Organized by the Vice Presidency of Research and the Faculty of Physical and Formal Sciences and Engineering, Catholic University of Santa María.

- 2022 **Organizing Committee Collaborator**, *V International Congress of Trends in Innovation (CITIE) & XXIX International Symposium on Systems Engineering (JINIS)*, Arequipa, Peru.
Organized by the Vice Presidency of Research and the Faculty of Physical and Formal Sciences and Engineering, Catholic University of Santa Maria.
- Innovation and Entrepreneurship Manager**, *IDEATON William Morris: Young Entrepreneurs and Innovators Santamarianos*, Arequipa, Peru.
Organized by Equipo Santa María and the INNICA Business Incubator.
- Junior Innovation and Entrepreneurship Manager**, *INNICA Business Incubator*, Arequipa, Peru.
Catholic University of Santa Maria.
- 2019 **Mentor**, “*La Cato Te Refuerza*” Program, Arequipa, Peru.
Organized by the Academic Vice Presidency, Catholic University of Santa Maria.