



Nicolas Caytairo

*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 Caytairo 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 Caytairo Silva, Jose David Esquicha Tejada, Karina Rosas Paredes, Jose Alfredo Sullá Torres.
Registration No. 003663.
Filed: 01 Oct 2024. Registered: 20 Nov 2024.
- 2024 **Copyright: ASYS Attendance Registration and Control Application**, *INDECOPI*, Peru.
Nicolás Esleyder Caytairo Silva, Denilson Carlos Ala Samayani, Jackeline Melady Peña Alejandro, Jose Alfredo Sullá Torres, Manuel Mariano Zuñiga Carnero.
Registration No. 003668.
Filed: 02 Oct 2024. Registered: 13 Nov 2024.

Publications

Preprints

- 2025 **Caytairo, N.**, Sipiran, I. *Symmetrization of 3D Generative Models*. arXiv preprint, Dec. 2025. Available at: <https://arxiv.org/abs/2512.18953>
- 2025 **Caytairo, 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., **Caytairo-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 **Caytairo-Silva, N. E.**, Maraza-Quispe, B., Castro-Gutierrez, E. G., Rosas-Paredes, K., Sullá-Torres, J. A., Alcázar-Holguin, M. A., Choquehuanca-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>

- Caytairo-Silva, N. E.**, Maraza-Quispe, B., Mamani-Nina, L. A., Mamani-Sucasaca, E. M., Aguilar-Gonzales, J. L., Urdy-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 **Caytairo-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., **Caytairo-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., **Caytairo-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., **Caytairo-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>
- 2018 Maraza-Quispe, B., Alfaro-Casas, L., Alejandro-Oviedo, O. M., Vivanco-Chávez, C., Jiménez-Villegas, Y., Choquehuayta-Palomino, S., Herrera-Quispe, J., **Caytairo-Silva, N. E.** *Biofeedback of States of Anxiety through Automated Detection Processes Using Different Technologies*. International Journal of Engineering & Technology, 7(3), Jul. 2018. <https://doi.org/10.14419/ijet.v7i3.15041>
- Conference Proceedings**
- 2023 Maraza-Quispe, B., **Caytairo-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>
- Caytairo-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>
- Caytairo-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>

- Caytuario-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., **Caytuario-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 **Caytuario-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., **Caytuario-Silva, N. E.**, Choquehuayta-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., **Caytuario-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., **Caytuario-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., **Caytuario-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.

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- 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.
- 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.”

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- First Place – Capstone Projects Fair**, *Faculty of Physical and Formal Sciences and Engineering, Catholic University of Santa Maria.*
Awarded first place for outstanding final-year project.
- 2022 **Semifinalist – IDEATON William Morris**, *Equipu Santa María & INNICIA Business Incubator, Catholic University of Santa Maria.*
Young Entrepreneurs and Innovators Santamarianos competition.
- First Place – UCSM Projects Fair**, *Vice Presidency of Research, Catholic University of Santa Maria.*
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 Maria.*
Awarded first place in collaboration with UCSM.
- First Place – Local Hult Prize Final**, *Catholic University of Santa Maria.*
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.
- 2020 **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 Maria.*
Awarded first place for entrepreneurial project.
- First Place – Innovation Day**, *Catholic University of Santa Maria.*
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 Maria.*
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 (IJJET)*.
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.

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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 Maria.
- 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 Equipu Santa María and the INNICIA Business Incubator.
- Junior Innovation and Entrepreneurship Manager**, *INNICIA 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.