# João Victor Palhares Barbosa

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## Summary

Scientist researcher member of the Artificial Intelligence Laboratory (recod.ai), and master's student at the Institute of Computer at The State University of Campinas (UNICAMP). His emphasis is on the use of models of Deep Learning such as Artificial Neural Networks (ANN) and Generative Adversarial Networks (GAN) in the medical field to estimate blood pressure and detect brain anomalies. Experienced Computer Vision Team Leader with a demonstrated history of working in the information technology and services industry. Skilled with Machine Learning and Deep Learning models, Convolutional Networks, Fourier Transform, Object Recognition, 3D Reconstruction, Simultaneous Localization and Mapping (SLAM), Data Analysis, and Data Visualization. Also has experience as a Natural Language Processing Engineer, Data Scientist, RASA Chatbot Developer, IIoT & IoT Developer, DevOps Developer, and experience working in Cognitive Computing Innovation Studio. Particularly interested in Artificial Intelligence for Medicine, Robotics, Mobile Robotics, Autonomous Guided Vehicles, Robotics in Biomechanics, and Robotic Prostheses. For the superior quality of the Neural Network model, the field of study is based on: supervised learning, unsupervised learning, linear regression, logistic regression, and Neural Networks (Biological basis: Functional and organizational aspects; Knowledge of linear algebra and optimization; Non-recurrent neural networks; Recurrent neural networks; Self-organizing maps and unsupervised learning; Regularization and other learning machines), PCA and LDA, Clustering, Deep Learning (Nonlinear optimization and cost functions, Dropout, Long Short Term Memory (LSTM) Block, Representation Learning, Manifolds, Autoencoders, Restricted Boltzmann Machines, Models of Attention, Generative Adversary Networks, Trained Neural Network Interpretation, Reinforcement Learning), SVM, Random Forest, and Ensemble Learning.

## Education

- **Computer Institute - The State University of Campinas - IC UNICAMP** — Campinas, Brazil
  *M.Sc. student in Computer Science - Information Engineering* — *August 2022 - Present*
  ***Courses:*** *Scientific Methodology for Computing, Introduction to Digital Image Processing, Machine Learning and Pattern Recognition, Seminar on Computing, Scientific Writing, Neural Networks, Data Science and Visualization in Health, Topics in Machine Learning.*
  ***Laboratories:*** *Laboratory of Image Data Science (LIDS) and Reasoning for Complex Data (Recod.ai)*

- **Arthur de Azevedo Technological Faculty - FATEC Mogi Mirim** — Mogi Mirim, Brazil
  *Major of Industrial Mechatronics Technology* — *Jan 2020 - July 2022*
  ***Courses:*** *Principles of Mechatronics, Applied Electroelectronic Systems I and II, Laboratory Techniques and Computer Programming I and II, Classical Mechanics, Linear Algebra and Analytical Geometry, Calculus I and II, Academic Communication, English I, II, III, IV, V, Technical Drawing, Introduction to Dimensional Systems, Electromagnetism, Descriptive Statistics, Industrial Electronics, Digital Electronics, Electrical Installations, Resistance of Materials, Thermometry, Calorimetry and Thermodynamics, Innovation and Entrepreneurship, Industrial Drives, Microprocessed and Microcontroller Systems, Processes and Quality in Mechatronics, Mechanical Materials and Testing, Mechanical Systems, Industrial Instrumentation, Design Methodology, Mechatronics Design I, Hydraulic and Pneumatic Systems, Industrial Automation, Control and Servomechanisms I and II, Computer-Aided Design, Mechanical Manufacturing Processes, Applied Mechatronics Design, Industrial Control and Supervision Systems, Command Computer Numerical, Integrated Manufacturing Systems, Industrial Robotics, Industrial Networks I, Course Completion Project in Industrial Mechatronics.*

- **Technical College - The State University of Campinas - COTIL UNICAMP** — Limeira, Brazil
  *Technical College of Limeira - Integrated Computer Technician with High School* — *Jan 2017 - Dec 2019*
  ***Courses: Computer Technician:*** *Database, Graphic Publishing I, Statistics, Applied Computing, Computer Networks, Programming Techniques, Information Systems Analysis and Design, Desktop Application Development I and II, Web Application Development I and II, Data Structure, Techniques Electronics and Fundamentals in Electronics, Topics in Information Technology, Project Development, Development of Embedded Systems, Development for Mobile Devices, Information Technology Management, Innovation and Entrepreneurship, Multiplatform Programming Language, Operating Systems, Course Completion Project;* ***High School:*** *Arts, Physical Education, Portuguese Language, English Language, Spanish Language, Literature, Mathematics, Biology, Physics, Chemistry, Philosophy, Geography, History, Sociology.*

## Skills Summary

- **Languages**: Python, C/C++, C#, PHP, JavaScript, SQL, Bash, Shell Script, JAVA;
- **Frameworks**: OpenCV, Scikit-Image, Pytesseract, SciPy, Pillow/PIL, NLTK, SpaCy, PyTorch, TensorFlow, Keras, Matplotlib, NumPy, Mahotas, SimpleITK, PgMagick, Django, Flask, Web2Py, MLOps, AutoML, BootStrap, CodeIgniter;
- **Tools**: Docker, GIT, RASA, MySQL, NginX, MongoDB, Apache Kafka, ElasticSearch, InfluxDB, Jenkins, Zabbix, Kubernetes, NuttX, Node-red, Grafana, CodeSys, Elipse Scada, MS office package, Overleaf, LaTeX;
- **Platforms**: Linux, Desktop, Web, Windows, Arduino, Raspberry, ESP8266, STM32, MQTT, AWS (Amazon Web Services), Amazon EC2, Amazon S3, Amazon Lex, Amazon IoT, Amazon Rekognition, Watson Assistant, IBM Cloud;
- **Soft Skills**: Leadership, Event Management, Writing, Communication, Public Speaking, Time Management, Trust, Positive Attitude, Motivation, Teamwork, Flexibility, Security;

## Experience

- **Compass UOL** — Remote, Brazil
  *Computer Vision Team Leader (Full-time)* — *Sep 2022 - Present*
  - **I**: Day-to-day Team Leading;
  - **II**: Conduction of 1:1 career-oriented meeting with team members;
  - **III**: Internal and external tech recruiting;
  - **IV**: Using Optical Character Recognition (OCR) it is possible to read legal documents, ensuring the handling of these documents more easily;
  - **V**: Using Yolo, it was possible to classify stone sizes for a quarry project, ensuring that data was received in near real-time. This data is manipulated to check tire wear on a certain road;
  - **Knowledgement**: For the development of the projects, knowledge in Digital Image Processing is required, with Fundamentals of Digital Images: human visual system, image formation, sampling and quantization, spatial resolution and image depth, basic relationships between pixels (neighborhood, connectivity, adjacency, path, distance measurements, connected components), noise in images. Image enhancement techniques: image quality, grayscale transformation, image histogram, correlation and convolution operation, spatial domain filtering, and frequency domain filtering. Image segmentation: discontinuity detection, edge detection, thresholding (global and local), and region-oriented segmentation. Representation and description: representation schemes (chain code, polygonal approximations, signatures, skeleton of a region), descriptors (basic descriptors, Fourier descriptors, moments, regional descriptors, texture), mathematical morphology. Image compression: fundamentals of image compression (coding redundancy, interpixel redundancy, psycho-visual redundancy), lossless and lossy compression. Image registration: geometric transformations, spatial transformations, image interpolation, correspondence between images. Image Classification: image analysis elements, patterns, and classes of patterns, decision methods (matching, statistical classifiers, neural networks, fuzzy logic);

- **Compass UOL** — Remote, Brazil
  *Natural Language Processing Engineer (Full-time)* — *July 2021 - Aug 2022*
  - **RASA Chatbot developer at PagSeguro PagBank [Project scope]**: Migration of private platform chatbots to Rasa technology (OpenSource - Python); Integration with new human service platform (Genesys Cloud); Exchange of the WhatsApp channel broker; Integration with corporate data lake; Development of a resilient platform to support millions of interactions a day; Support of new technology in the PagSeguro environment; Curation and support for new chatbots and channels;
  - **RASA Chatbot developer at PagSeguro PagBank [Solutions]**: Adoption of open-source technologies with wide use in the market; Resilient and scalable architecture (MicroServices in practice); New conversational flows using open-source AI (RASA/TensorFlow); Development of backends (Support for chatbots - TypeScript); Front-end development (Interfaces for IOS, Android, and Web); Curation of the new AI using CDD (Conversation-driven-development);
  - **RASA Chatbot developer at PagSeguro PagBank [Results]**: Resilient, scalable, and customer-customized architecture in each chatbot; Availability of chatbots on different devices and channels; Humanized conversational flows that promote changes in the service and solution of requests, increasing the attraction, engagement, and retention of users; Cost reduction with an internal and open-source platform; Chatbot integration with service channels such as WhatsApp, CRM, IVR, and human service platform (Genesys Cloud); Contextual menu based on user needs at the time of interaction; Fast scalability according to traffic (Financially efficient);

- **Compass UOL** — Remote, Brazil
  *Development of Artificial Intelligence to Chatbots (Intern) (Part-time)* — *April 2021 - July 2021*
  - **I**: During the interview process, 4 tests were created, I had the opportunity to develop an API, use OOP with Python, use MongoDB, create a Neural Network of Regression, a Neural Network of Classification, Data Visualization, also had a chance to create a diabetes classifier for diabetes prevention through Machine Learning, and make Sentimental Analysis of articles with SpaCy using MultinomialNB and RandomForestClassifier;
  - **II**: In the end, we created a chatbot RASA to FATEC Arthur de Azevedo;

- **Phi Innovations** — Remote, Brazil
  *Firmware Developer (Intern) (Part-time)* — *Jan 2021 - Apr 2021*
  - **Global vision**: Working with C/C++ programming and NuttX on STM32 - Nucleo L152RE & ESP8266;

- **Phi Innovations** — Remote, Brazil
  *Developer & Tester IoT (Intern) (Part-time)* — *Jun 2020 - Apr 2021*
  - **I**: Working with IoT Technologies: MODBUS, MQTT, IoT Gateway application, Node-Red, InfluxDB, Grafana, Linux, CodeSys, Elipse SCADA, IoT Security, among others. Programming with C, C#, C++, QT, Node.js, JavaScript, STM32, Testing Firmware, and Applications for the customers. Knowledge in electronics, programming, and conversation with customers. Creation of documents to cover new technologies and work methodology;
  - **II**: Lastly, instructing new employees;

- **Valore Marketing and Technology** — Mogi Guaçu, Brazil
  *Full-Stack Developer (Intern) (Part-time)* — *Aug 2019 - Dec 2019*
  - **Global vision**: Working with full-stack Technologies on Web Development: CodeIgniter (Framework), PHP, JavaScript, HTML, CSS, BootStrap, and others. Creating custom Web pages and systems for customers;

- **Wide Software** — Campinas, Brazil
  *Analyst of Information Technology (Intern) (Part-time)* — *Dec 2018 - Jan 2019*
  - **Global vision**: Working with DevOps Technologies: AWS Cloud (Amazon Web Services - EC2, Route53, S3, IAM, API-Gateway, ELB, autoscaling, and others), Jenkins, Zabbix, Puppet, Git, NGINX, PHP-FPM, MongoDB, ElasticSearch, MySQL and Apache Kafka. Programming with Shell Script Bash, SH Linux for triggers on Grafana and managing, configuring, analyzing, installing, and updating servers. Lastly documentation on Jira Software - Atlassian and agile methodology - Kanban;

## Projects

- **Blood Pressure Estimator**: Using an Artificial Neural Network (ANN) it is possible to detect and predict possible heart attacks through smart bracelet readings. Project in partnership with Mount Sinai Health System and Institute of Computer (IC) UNICAMP. Advisor: Marcos Medeiros Raimundo (December 2022 - Present)
- **Brain Anomaly Detection**: Develop an application using the Deep Learning model such as Generative Adversarial Network (GAN) to reconstruct human brains and compare them with abnormal brains, finally detecting and classifying these brain anomalies. In the digital imaging process, there is noise removal, intensity and contrast variability, MSP alignment, bias correction, image registration, intensity normalization, brightness attenuation, estimating the volume of the region of interest, and extracting features. Also, the use of segmentation of brain structures, which is based on Probabilistic Atlases (PAs). Advisor: Alexandre Xavier Falcão (August 2022 - Present)
- **Inverted Pendulum Robot**: A balancing robot is able to move around on two wheels while developing forces ensuring its stability in an upright position. The balancing robot can be represented by an inverted pendulum. Control of the inverted pendulum comes from a physical-mathematical model, guaranteeing its stability. The Graduation Project will describe the development from scratch of a balancing robot, which will be able to stand upright only with two wheels. It was also possible to describe an experience using a network neural networks, which consequently come from a study of the PID controller with the Kalman. Advisor: Renato Suekichi Kuteken (June 2022 - Present)
- **Locomotion Assistance Device for the Visually Impaired in Urban Surroundings (LADVUS)**: Course completion project at COTIL - UNICAMP, for object detection and guidance for visually impaired people. Requested patent filing. Advisor: Priscila Keli de Lima Pinto Frizzarin (November 2019 - Present)

## Publications

- **Inverted Pendulum Robot - Self Balancing Robot**: Course completion project at FATEC Mogi Mirim. Advisor: Renato Suekichi Kuteken (June 2022)

## Licenses & Certifications

- **AWS Partner: Accreditation (Technical)** — Remote
  *Check it out: credly.com/badges/d2745bd2-fdbe-4dba-81a9-dbc16be10261* — *Dec 2021*
- **AWS Partner: Machine Learning on AWS (Technical) (Portuguese)** — Remote
  *Credential ID: E-086J3V* — *Dec 2021*
- **Rasa Developer Certification** — Remote
  *Credential ID: FLTSDLDTDL-HDRHJRKH-WNWTFBWFFW* — *Oct 2021*
- **Data Science: Analysis for Health and Medicine** — Remote
  *Check it out: cursos.alura.com.br/certificate/a4b4e07f-edda-410c-b15b-ba895a8e4d6e* — *Oct 2021*
- **Neural Networks: Deep Learning with PyTorch** — Remote
  *Check it out: cursos.alura.com.br/certificate/07f6858e-6272-4d1e-9969-6e85260123b4* — *Apr 2021*
- **Previous Experiences Omitted**
  * — *Prior to Mar 2021*

## Honors & Awards

- **Silver Medal in ROBOCODE local tournament (LIAG - UNICAMP)** — Limeira, Brazil
  *Issued by UNICAMP - Faculty of Technology (FT)* — *Oct 2020*
- **Gold Medal in ROBOCODE local tournament (LIAG - UNICAMP)** — Limeira, Brazil
  *Issued by UNICAMP - Faculty of Technology (FT)* — *Sep 2020*
- **OBMEP 2019 Honorable Mention Medal - LEVEL 3** — Limeira, Brazil
  *Medal for completing the first and second phases of the OBMEP 2019 test* — *Dec 2019*
- **Bronze Medal in ROBOCODE local tournament (LIAG - UNICAMP)** — Limeira, Brazil
  *Issued by UNICAMP - Faculty of Technology (FT)* — *Oct 2019*
- **Silver Medal in ROBOCODE local tournament (LIAG - UNICAMP)** — Limeira, Brazil
  *Issued by UNICAMP - Faculty of Technology (FT)* — *Oct 2019*
- **Medal in Brazilian Astronomy and Astronautics Olympiad - OBA** — Mogi Mirim, Brazil
  *Bronze medal, earning a grade of 8.75 in the OBA test* — *Nov 2016*
- **1TPR - Brazilian Robotics Olympiad: 1st Paulista Robotics Tournament** — Americana, Brazil
  *1st Paulista Robotics Tournament with rules of Brazilian Robotics Olympiad (OBR)* — *May 2016*

## Volunteer Experience

- **Programming and Arduino Tutoring** — Mogi Mirim, Brazil
  *Education - Arthur de Azevedo Technological Faculty – FATEC Mogi Mirim* — *Jan 2021 - Dec 2021*
- **Student & Room Representative** — Mogi Mirim, Brazil
  *Education - Arthur de Azevedo Technological Faculty – FATEC Mogi Mirim* — *Jan 2020 - July 2022*
- **Student & Room Representative** — Mogi Mirim, Brazil
  *Education - Arthur de Azevedo Technological Faculty – FATEC Mogi Mirim* — *Jan 2020 - July 2022*
- **Tutoring & Presenter** — Campinas, Brazil
  *Education - The State University of Campinas – UNICAMP* — *Sep 2018 - Aug 2019*
- **Previous Experiences Omitted**
  * — *Prior to Sep 2018*