PERSONAL INFORMATION

Dr. Juan Manuel Jacinto Villegas, PhD, MEng, Eng.

CURRENT JOB POSITION Research professor of the program “Investigadoras e Investigadores por México” of CONAHCYT & SNII 1

WORK EXPERIENCE

	External consultant activities
December 2022 – February 2023	Design of an electronic control board and software for IoT technology. Company: BTR Simulators, Spin-Off of Scuola Superiore Sant’Anna, Livorno, Italy.
Junio 2019 – up to day	Design, development and programming of an embedded system for measuring and monitoring the humidity level in containers. Company: Allende Ingeniería, Control y Servicios, S.A. de C.V. Lerma, Estado de México. CIF/RFC: AIC1809131D8.
January – February 2022	Design of an electronic board for railway transport, with thermal, space and electrical limits. Company: ARTES4.0 - Advanced Robotics and enabling digital Technologies & Systems. Pontedera, Italy. CIF/RFC: 90062630505.
July 2018 – Current Job	Research Professor (**SNII 1**)
	System Dynamics and Control, Autonomous University of the State of Mexico, Toluca, Mexico
	I’m a research professor of the Catedras CONAHCYT program assigned to the Autonomous University of the State of Mexico, Toluca, Mexico. In the project n. 2726 with the title "Mechatronics systems and Human Human-Robot interfaces" to design robotic systems from a functional and ergonomic point of view. Design and integrate medical, industrial, electronic, mechanical, security devices, etc. I teach classes at the master's and doctoral levels. I write patents and publications in conferences and/or indexed journals. I write proposals and manage scientific resources for funded projects. Research projects completed: 1. **2022-2023 - Technical manager.** Development of a platform for training and learning of the Punción Lumbar activity by implementing Realidad Virtual, with UAEM funding 6482/2022CIB. 2. **2022-2023 - Collaborator.** Prediction of national indices product price of construction materials in Mexico using artificial neural networks, with UAEM funding 6473/2022CIB 3. **2020-2021 - Collaborator.** Towards the identification of academic stress using the technique of remote photoplethysmography in real time, with UAEM funding 6210/2020CIB. 4. **2019-2020 - Collaborator.** Design of a soft mobilizing robot for assistance and rehabilitation of the upper limb, with UAEM financing 5015/2020CIA. 5. **2019-2020 - Technical manager.** Development of a lower cost Robotic system for rehabilitation of the upper limb of the arm in patients who have suffered Cerebrovascular Accidents using a Virtual Teaching Environment, with UAEM funding.
	Business or Sector
	This group of research is focused on the development of intelligent systems with applications in distributed data acquisition systems, medical robotics, human-robot interaction, rehabilitation, and autonomous systems.
January – February 2022	External collaborator as PCB designer
	Company “Artes 4.0 – Advanced Robotics and enabling digital TEchnologies & Systems 4.0”, viale Rinaldo Piaggio 34, Pontedera, Italy
	Activities: Design and review of PCB electronic board for rail transport, with thermal, spatial and electrical limits. The general system had to fulfill the phases of conceptualization, development,

	dimensioning and validation in collaboration with the staff of Artes 4.0
	Business or Sector
	The ARTES 4.0 Competence Center is a highly specialized network in the areas of advanced robotics and digital technologies. Associated with University centers, Research Organizations, among others, in order to provide partners and industry (particularly SMEs) with technologies and services dedicated to responding to their needs through guidance, training, innovation projects, research industrial and experimental development.
April 2017 – July 2018	Postdoctoral Research Fellow
	PERCRO Laboratory of the Scuola Superiore Sant'Anna, Pisa, Italy
	I've worked on different projects: Continental is a leading German automotive manufacturing company. 1. I'm working in the development of a system controller, which integrates a mechatronic design as well as the embedded system programing connected with a vision system. Trenitalia is the primary train operator in Italy. 2. Hardware development and Embedded Software programming of a microcontroller (ARM Cortex-M7) for remote monitoring and control of a vision system. 3. Design and development of the controller that is connected with the main control unit of the train and face tracking system, using UP-BOARD and commercial Off-the-shelf components. Moreover, collaboration with the main programmer to integrate the software and hardware.
	Business or Sector
	The Perceptual Robotics Laboratory is a research unit of the Scuola Superiore Sant'Anna - TeCIP Institute.
November 2013 – March 2017	Ph.D. Student
	PERCRO Lab. Of the Scuola Superiore Sant'Anna, Pisa, Italy
	I worked in two different projects: 1.- EU FP7 -ICT -2013.10.2. An European Union project under grant agreement n° 610902. The ReMeDi (Remote Medical Diagnostician) project a robot system designed to features medica l tele tele-examination of patients. The development of a novel electronic controller system to control the position and motion of different Haptic Interfaces (Delta, GRAB, etc.). Embedded Software programming of the Control loop with admittance and impedance for each medical task. Link: https://hci.sbg.ac.at/remedi/ 2.- An Industrial project YANMAR RE. A novel Wearable Haptic Controller. The mechatronic design and development of a novel wearable haptic controller System suitable for the teleoperation of a wide range of robotic platforms. Design of the haptic interface and enclosure, electronic embedded system, the embedded software programming of the Kinematic (ARM Cortex M4 processor) and haptic control using a custom developed compiler tool toolchain using Simulink. Additionally, the software development of a Virtual Environments with XVR. Link: http://www.yanmaritaly.it/index.asp?lang=ita
	Business or Sector
	The Perceptual Robotics Laboratory is a research unit of the Scuola Superiore Sant'Anna - TeCIP Institute.
May 2016 – October 2016	Ph.D. Internship
	Bristol Robotics Laboratory (BRL) of the University of the West of England (UWE), UK
	TACTIP project. Development and integration of a force sensor based on Stereo Vision system suitable for physical examination (palpation) in the EU project ReMeDi. Activities: CAD design, Stereo vision calibration, force algorithm implementation, implementation of the computer vision system toolbox of Matlab, electronic design, use of ROS, programming of the manipulator ABB IRB-120 robot. Tools: Vacuum chamber machine, 3D printer, solder station, laser cutting machine.
	Business or Sector
	BRL- is the largest and leading academic center for multidisciplinary robotics research in UK.
December 2012 – October 2013	PCB designer engineer at R&D department
	TECNOMOTUM S.A. de C.V., Ixtaczoquitlan, Ver, Mexico (https://tecnomotum.com.mx/).
	▪ Design of PCBs (Printed Circuit Boards) multi-layers (6-layers) for telemetry and tracking ▪ Implementing IPC rules for RF and Mixed-signals. ▪ PCB Design for production versions including the schematic circuit, BOM, layout, libraries, footprints, and Multi Multi-Layer track routing (up up-to 6 layers), tests for

	electrical/electronic systems and reports. ▪ CAM files (.txt, .csv) elaboration for programming of machines: P&P "ESSEMTEC FLX 2011 V" and Automated Optical Inspection (AOI) "VI TECHNOLOGY 2K SPECTRO" ▪ Homologation of component footprints with Altium Designer, the P&P and AOI machine. ▪ 3D CAD design of the step models and analysis of different components.
	Business or Sector
	Development of equipment for tracking and telemetry of vehicles.
May – June 2012	Master internship
	GRYMA, CINVESTAV Unidad Saltillo, Ramos Arizpe, Coahuila, Mexico.
	▪ Kinematic control development of a Hand Exoskeleton Robot focused for the upper motor rehabilitation.
	Business or Sector
	The Center for Research and Advanced Studies of the National Polytechnic Institute .
May 2011 – August 2012	Master internship
	DISEÑO INDUSTRIAL Centro de Diseño, Desarrollo y Manufactura de productos para el Servicio Humano. Orizaba, Ver., Mexico.
	▪ Mechanical design of a Hand Exoskeleton Robot.
	Business or Sector
	Development of industrial projects
March 2006 – April 2010	Cashier
	Fábricas de Francia (Liverpool), Plaza Cristal, Cordoba, Veracruz, Mexico.
	▪ Cashier at Fabricas de Francia.
	Business or Sector
	Mexican company that operates shopping centers, department stores and restaurants, both focused on the middle and high income consumer.
July – December 2009	Engineering internship
	INDUSTRIAL PATRONA S.A. DE C.V., Cordoba, Veracruz, Mexico.
	▪ Design and automation of a second line of edible vegetable oil, to filling 20-liter gallon in the packaging stage.
	Business or Sector
	Production of edible vegetable oils.

EDUCATION AND TRAINING

November 2013 – March 2017	PhD in Emerging Digital Technologies (Summa Cum Laude) Thesis title: Teleoperation, Teleoperation-Robotics and Industrial Context.
	Perceptual Robotics Laboratory of the Scuola Superiore Sant'Anna, Pisa, Italy.
	Research activities: Tele-robotics, Robotics, Mechatronics, Automation, Haptic control, VE, CAD

August 2010 – October 2012	Master's Degree in Electronic Engineering (Summa Cum Laude). Thesis title: Mechatronic design of a hand exoskeleton robot for rehabilitation
	Instituto Tecnológico de Orizaba, Orizaba, Mexico.
	Research activities: Automation and process control

August 2005 – April 2010	Bachelor of Electronics Engineering. High grade point average
	Instituto Tecnológico de Orizaba, Orizaba, Mexico.
	Research activities: Control, Robotics, Circuits, hydraulic, pneumatic and electrical, CAD-CAM,

PERSONAL SKILLS

Mother tongue (s)	Spanish				
Other language (s)	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	C1	C1	C1
Italian	B1	B1	B1	B1	B1
	Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2 Proficient user Common European Framework of Reference for Languages				

Communication skills	Good communication skills earned through my work experience, able to communicate effectively with a wide range of people, by showing interest and carefully listening to their needs. Strong presentation and demonstrating skills; Confident, articulate and professional speaking abilities.

Organizational / managerial skills	I describe myself as a responsible person, looking at my personal growth, with initiative and perseverance. About work, I have a good performance working as individual, teamwork or team leader, with enough abilities to solve problems and propose ideas to achieve the goals. I perform every job in the best way possible and with quality to always offer a satisfactory service. As part of my career, I have experience teaching and supervising students' projects at the university (bachelor, master, and PhD level)

Job-related skills	Thanks to my work experience, I have a deeper knowledge as a PCB designer (using IPC rules), in sensors implementation, SMD components, use of Electronic Design Automation (EDA) software (ALTIUM, DESIGNSPARK, PROT EUS), use of Computer Aided Design (CAD) software (SOLIDWORKS), Microcontrollers, Automation, Mechatronics, Robotics, Telerobotics, Haptic control, Force algorithms, XVR for Virtual Environments, Matlab, Simulink, LabView, Arduino, Latex, ABB RobotStudio (basic simulation) and Microsoft Office. In addition, I also need to be constantly up to date and search for new applications as software, hardware, and algorithms.

Other skills	I have a wider knowledge in the use of pneumatic, electronic, mechanical and instrumentation equipment and the use of mechanical tools (caliber, wrench with different measures, etc.) and different office software.

RESEARCH ACTIVITIES

Publications	❖ Ríos-Hernández, M., Jacinto-Villegas, J. M., Zemiti, N., Vilchis-González, A. H., Padilla-Castañeda, M. A., & Debien, B. "Development of a lumbar puncture virtual simulator for medical students training: A preliminary evaluation". The International Journal of Medical Robotics and Computer Assisted Surgery, 19(6), e2572, **2023.**
	❖ German-Alonso, D., Hernández-Ramos, M., Flores Cuautle, J. D. J. A., Landeta-Escamilla, O., Jacinto-Villegas, J. M., Aguila-Rodriguez, G., & Sandoval-Gonzalez, O. O. "Electronic System to Determine Proximal and Medial Phalanges Strength in a Hand Exoskeleton Robot". In Congreso Nacional de Ingeniería Biomédica (pp. 781-790). Springer, Cham. **2023**.
	❖ Dávila-Vilchis, J. M., Ávila-Vilchis, J. C., Vilchis-González, A. H., Zúñiga-Avilés, L. A., & Jacinto-Villegas, J. M. "Fabric Inflatable Soft Actuators for Soft Wearable Devices: The MOSAR Case". Machines, 10(10), 871, Septiembre **2022**.
	❖ Rìos-Hernández, M., Jacinto-Villegas, J. M., Vilchis-González, A. H., Zemiti, N., & Padilla-Castañeda, M. A. "Virtual lumbar puncture simulators: where are we today?". In 2022 IEEE Mexican International Conference on Computer Science (ENC) (pp. 1-8). IEEE, Agosto **2022**.
	❖ Hernández-Rámos, M. A., Flores-Cuautle, J. D. J. A., Filippeschi, A., Rodríguez-Jarquin, J. P., Landeta-Escamilla, O., Jacinto-Villegas, J. M., & Sandoval-Gonzalez, O. O. (2022). "Design of a Biomechatronic Device for Upright Mobility in People with SCI Using an Exoskeleton Like a Stabilization System". Applied Sciences, 12(16), 8098, Agosto **2022**.

	❖ Camacho-Ramirez, A., Ávila-Vilchis, J. C., Saldivar, B., Vilchis-González, A. H., & Jacinto-Villegas, J. M. (2022). "Adjustable Stiffness-Based Supination–Pronation Forearm Physical Rehabilitator". Applied Sciences, 12(12), 6164, **2022**.
	❖ Manuel Montaño, Serrano, Victor, Manuel Jacinto-Villegas, Juan, Herlinda Vilchis, González, Adriana, Otniel Portillo-Rodríguez, "Escenarios para determinar los estímulos que brindará un asistente tecnológico a una persona con deterioro cognitivo". Komputer Sapiens, vol. 2, no. 14, p. 10-15, **2022**.
	❖ Ríos-Hernández, M., Jacinto-Villegas, J. M., Portillo-Rodríguez, O., & Vilchis-González, A. H. (2021). "User-Centered Design and Evaluation of an Upper Limb Rehabilitation System with a Virtual Environment". Applied Sciences, 11(20), 9500, **2021**
	❖ Montaño-Serrano, V. M., Jacinto-Villegas, J. M., Vilchis-González, A. H., & Portillo-Rodríguez, O., "Artificial Vision Algorithms for Socially Assistive Robot Applications: A Review of the Literature". Sensors, 21(17), 5728, **2021**
	❖ Castro Martínez C., Ávila-Vilchis J.C., Jacinto-Villegas J.M., Saldivar B., Vilchis-González A.H., "Sliding mode control for the regulation problem of an aerodynamic angular system: experimental platform and validation", International Journal of Control Automation and Systems. Aceptado, a publicarse en **2021**
	❖ Eduardo Sanchez-Fontes, Juan Carlos Avila-Vilchis, Adriana H. Vilchis-González, Belem Saldivar, Juan Manuel Jacinto-Villegas, Rigoberto Martínez-Méndez. "New Stable by Construction Autonomous Aerial Vehicle: Configuration and Dynamic Model." Revista Iberoamericana de Automática e Informática Industrial, volumen 17, núm. 3, **2020**.
	❖ Juan Manuel Jacinto-Villegas, Otniel Portillo-Rodríguez, Rigo Martinez- Mendez, Carlos Daza-Merino, Adriana H. Vilchis-González, and Juan Carlos Avila-Vilchis, "Sistema para control de posición basado en rapid control prototyping (rcp) usando Simulink y SWB32," Komputer Sapiens, vol. 3, no. 11, p. 11–15, Dec **2019**.
	❖ Carlo Alberto Avizzano, Paolo Tripicchio, Emanuele Ruffaldi, Alessandro Filippeschi, Juan Manuel Jacinto-Villegas. "Real-Time Embedded Vision System for the Watchfulness Analysis of Train Drivers." IEEE Transactions on Intelligent Transportation Systems, **2019**.
	❖ Alessandro Filippeschi, Filippo Brizzi, Emanuele Ruffaldi, Juan Manuel Jacinto Villegas, Lorenzo Landolfi, and Carlo Alberto Avizzano. "Evaluation of diagnostician user interface aspects in a virtual reality-based tele-ultrasonography simulation." Advanced Robotics 33, no. 15-16 (**2019**): 840-852.
	❖ Alessandro Filippeschi, Juan Manuel Jacinto-Villegas, Massimo Satler, and Carlo Alberto Avizzano, "A novel Diagnostician Haptic Interface for Tele-Palpation." 27th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), NanJing-Tai'An, China, August 27th-31th, **2018**
	❖ Matteo Tanzini, Juan Manuel Jacinto-Villegas, Massimo Satler, Marta Nicolini, and Carlo Alberto Avizzano, "Embedded Architecture of a Hydraulic Demolition Machine for Robotic Teleoperation in the Construction Sector." 14th IEEE International Conference on Automation Science and Engineering (CASE), Munich, Germany, August 20th-24th, **2018**
	❖ Juan Manuel Jacinto-Villegas, Alessandro Filippeschi, Massimo Bergamasco, Matteo Ragaglia, Alfredo Argiolas, Marta Niccolini and Carlo Alberto Avizzano. "A novel Wearable Haptic Controller for teleoperating Robotic Platforms." IEEE Robotics and Automation Letters, vol. 2, no. 4, pp. 2072-2079, **2017**.
	❖ Juan Manuel Jacinto-Villegas, Massimo Satler, Alessandro Filippeschi, Carlo Alberto Avizzano and Emanuele Ruffaldi. "Preliminary Stiffness Perception Assessment for a Tele-palpation Haptic Interface." In International Conference on Human Haptic Sensing and Touch Enabled Computer Applications, EuroHaptics **2018** (pp. 175-185). Springer.
	❖ Sandoval-Gonzalez, Oscar, Juan Manuel Jacinto-Villegas, Ignacio Herrera- Aguilar, Otniel Portillo-Rodriguez, Paolo Tripicchio, Miguel Hernandez-Ramos, Agustin Flores-Cuautle, and Carlo Avizzano. "Design and Development of a Hand Exoskeleton Robot for Active and Passive Rehabilitation." International Journal of Advanced Robotic Systems **2016**.
	❖ Matteo Tanzini, Juan Manuel Jacinto Villegas, Alessandro Filippeschi, Matteo Ragaglia and Marta Niccolini. "New Interaction Metaphors to Control a Hydraulic Working Machine's Arm." SSRR **2016**.
	❖ Filippeschi, F Brizzi, JM Jacinto-Villegas, E Ruffaldi, CA Avizzano, C Taddei, EM Pasanisi, C Petersen, M Emdin, D Szczesniak-Stanczyk, M Janowski, R Blaszczyk, M Giuliani, G Stollnberger, M Tscheligi. "Preliminary usability assessment for a novel robotic interface for remote Doppler-echocardiography." European Heart Journal, vol. 37, pp. 1043, **2016**.
	❖ Juan Manuel Jacinto Villegas, Carlo Alberto Avizzano, Emanuele Rufaldi, and Massimo Bergamasco. "A Low Cost Open-Controller for Interactive Robotic System." EMS **2015** Madrid, IEEE Conference.
	❖ Avizzano, Carlo Alberto, Alessandro Filippeschi, Juan Manuel Jacinto Villegas, and Emanuele Rufaldi. "An Optimal Geometric Model for Clavel's Delta Robot." EMS **2015** Madrid, IEEE Conference.

	❖ Rufaldi, Emanuele, Alessandro Filippeschi, Filippo Brizzi, Juan Manuel Jacinto Villegas, and Carlo Alberto Avizzano. “Encountered haptic augmented reality interface for remote examination.” In 3D User Interfaces (3DUI), 2015 IEEE Symposium on, pp. 179-180. IEEE, **2015**.
	❖ Alessandro Filippeschi, Filippo Brizzi, Emanuele Rufaldi, Juan Manuel Jacinto Villegas, and Carlo Alberto Avizzano. “Encountered-type haptic interface for virtual interaction with real objects based on implicit surface haptic rendering for remote palpation.” IEEE In Intelligent Robots and Systems Conference (IROS), pp. 5904-5909. IEEE, **2015**.
	❖ Mauricio Chavez-Gamboa, Ignacio Herrera-Aguilar, Oscar Sandoval-Gonzalez, Fernando Malagon-Gonzalez, Juan Manuel Jacinto-Villegas, “Anthropomorphic robotic system with 6 DOF for space positioning in the virtual reality applications for human machine interaction.” IEEE Intertational Conference on Electronics, Communications and Computing (CONIELECOMP), pp. 212-217, **2013**.
	❖ I. Herrera-Aguilar, O. O. Sandoval-González, B. E. G. Sánchez, J. M. Jacinto-Villegas, A. R. González, G. Alor-Hernandez, and O. Portillo Rodríguez, “Visuo-vibrotactile stimuli applied for skills transfer and rehabilitation.” Workshop Proceedings of the 8th International Conference on Intelligent Environments (Workshops), **2012**, pp. 362-369.
Patents granted	❖ Industrial design registration title no. 5993, “Modelo industrial de dispositivo para la medición de fuerzas de corte en el proceso de fresado”, number: MX/f/2021/001267, 2023. ❖ Industrial design registration title no. 64667, “Modelo industrial de dispositivo para rehabilitacion de pronosupinacion de antebrazo”, number: MX/f/2021/001268, 2022. ❖ Sistema innovativo di visione e di assistenza all’Agente di Condotta nel settore ferroviario domanda N. 102018000005222, 25 maggio 2020, IT201800005222 (A1). ❖ Industrial design registration title no. 63361, “Modelo industrial de dispositivo para rehabilitación de miembro superior”, number MX/f/2020/002234, 2022.
Courses & Certifications attendance	❖ Proof of your participation in the online seminar on "Basic Robotics" that was broadcast live from April 10th to 17th with a total duration of 10 hours of training, for FESTO Pneumatic S.A., register S.T. y P.S.: FPN710301GQ30013.
	❖ Proof of your participation in the online seminar on "Basic Pneumatics" that was broadcast live from April 20th to 24th with a total duration of 10 hours of training, for FESTO Pneumatic S.A., register S.T. y P.S.: FPN710301GQ30013.
	❖ Proof of attendance and accreditation in the "Introductory Course to Virtual Environments with Unreal Engine 4"; taught from January 13 to 16, 2020, with a duration of 28 hours, in the Continuing Education department of the UAEM.
	❖ Proof of attendance and accreditation in the "Biomedical Signal Processing Course in Python"; taught from January 21 to 24, 2020, with a duration of 28 hours, in the Continuing Education department of the UAEM.
	❖ S.I.D.R.A. 2015 PHD Summer School, Bertinoro University Residential Centre (Italy) from 13 to 18 July 2015, attended 40 working hours, referring to the following Courses: “Robot Control” & “Underwater Robotics”.
	❖ Certificate of Completion by ALTIUM DESIGNER “Altium Designer Essentials training”, Abril 25th, 2013, México, Charley Yap - Instructor.
	❖ Certificate of training, attended 40 hours, by ViTECHNOLOGY, course “Inspección Óptica Automatizada: 2K SPECTRO”, April 12th, 2013, Mexico, Armando Faz - Support Engineer.
Acknowledgments Teaching/Courses taught	❖ Recognition for having taught the course "Design of printed circuits (PCB) with Altium and IPC rules", from January 26 to 31, 2023, with a duration of 24 hours; in the Department of Continuing Education of the Faculty of Engineering, UAEM.
	❖ Recognition for having taught the course "creation of high-quality documents using LATEX", held on August 29, September 5, 12, 19 and 26, 2022, lasting 30 hours; in the Master's Degree in Electronic Engineering from the Tecnológico Nacional de México, Campus Orizaba.
	❖ Recognition for having given the Workshop called "Creation of high-quality documents using LaTez" held on Friday, October 2 from 14:00 to 17:00 in the afternoon, Colombian time, given at the Catholic University of Colombia, CONIITI 2020
	❖ Recognition for having taught the "course on writing scientific articles with the LATEX software and the TEXMAKER and OVERLEAF editing tools" held from July 15 to 17, 2020 with a total of 30 hours; taught at the Technological University of Tehuacán
	❖ Recognition for having taught the "ARM Cortex-M7 Embedded Systems Course" carried out from February 24 to March 6, 2020 with a duration of 30 hours, to two students from CINVESTAV Saltillo unit, at the facilities of the Faculty of Engineering , UAEM

	❖ Recognition for having taught the "Programming Course with Matlab and simulation with SIMULINK" from January 27 to 30, 2020 with a duration of 28 hours, in the Department of Continuing Education of the Faculty of Engineering, UAEM.
	❖ Recognition for having taught the course "Introduction to ARM Cortex-M7 Embedded Systems and its programming using C code and Rapid Control Prototyping with Simulink" carried out from January 7 to 10, 2020, with a duration of 25 hours, taught to the program from the Master's Degree in Electronic Engineering, from Tecnológico Nacional de México, Campus Orizaba.
	❖ Certificate for having taught the course "CAD Design with SolidWorks" from November 27 to 29, 2019; in the 2nd Engineering Research Colloquium and 110 Course-Workshop "Current Issues in Water Sciences" at the Faculty of Engineering, UAEM.
	❖ Recognition for having taught the "ARM Cortex-M7 Embedded Systems Course" from June 24 to 27, 2019, with a duration of 25 hours; within the facilities of the Faculty of Engineering, UAEM.
	❖ Recognition for having taught the "Solidworks program" on January 16, 17, 21 and 22, 2019, with a duration of 30 hours; in the Department of Continuing Education of the Faculty of Engineering, UAEM.