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General research interest:

Diseases prevention/detection/follow-up for delayed or stop different illness based in the development of new algorithms / new mathematical models and their implementation in new clinical devices.

Areas of interest:

Biomedical Engineering and Biomechanics,
Bioinstrumentation and Biosensors, Sensor validation schemes,
Computational Intelligence, bioinformatics, Biostatistics, Mathematics, and
Neurorehabilitation.

Specific research:

Research on new ways to help in early detection, prevention and delay of different illness related with:

- Skeletal muscle diseases,
- Muscle fatigue,
- Muscular dystrophy,
- Peripheral neuropathy (in Diabetes), and
- Illness related with muscles.

Goals:

Software development based: mathematical models, algorithms, and computer simulation. To achieve novelty: sensors, devices, and health equipment for:

- Health Factors, Human Factors (Ergonomics), and Healthy disparities.
- Detection, Analysis, and illness prevention.
- Neurorehabilitation and methodologies for Follow-up.

Contribution to Science:

- » *A Mathematical Model for Ground Reaction Force Sensor Validation Scheme in Human Gait Analysis*
 - > Journal Measurement Elsevier Published January 2012. Reference: MEASUR1771 / DOI information: 10.1016/j.measurement.2011.12.015
- » *A mathematical model to predict Transition-to-Fatigue during isometric exercise on muscles of the lower extremities*
 - > Scientific Research Journal Engineering Vol. 4 No. 10B, October 2012. PP. 15-18 DOI: 10.4236/eng.2012.410B00
- » *Dynamic muscle energy expenditure Analysis (Dissertation)*
 - > Transition-to-Fatigue in limb muscle detection as a value for muscle energy consumption.
- » *Natural Fuzzy logic method for differential analysis in muscle/joint activation pattern. (Dissertation)*
 - > A pattern analysis of the mapping from electromyography data within the seven gait phases for determining the presence/absence of association, and interaction with joint angles during the gait dynamic cycle
- » *Inferred T equation analysis muscles/Joint in Diabetes Mellitus (Dissertation)*
 - > Describes the association, interaction or interconnection between elements of muscle activities with the joint angles.

Research Dissertation Defense:

Assessment and evaluation of dynamic behavior of muscles with special reference to subjects with Diabetes Mellitus. Abstract: The number of people with type 2 diabetes mellitus (DM) and pre-diabetes is rising rapidly around the world, making it imperative to develop and introduce new methods for preventing and monitoring the condition. The main objectives of this research are *new non-invasive methods for early detection, prevention or delay of Pre-diabetes and Type 2 diabetes.* Two new methods are proposed: *Dynamic muscles energy expenditure analysis.*

- > Assessment based on detection of Transition-to-Fatigue Muscles using sEMG signals during brisk walking.

Natural Fuzzy logic differential analysis in muscle / joint activation patterns

- > Assessment based on fuzzy equations for muscle activation through sEMG with Joint with respect to limbs' joint angles during phases of gait cycle

The results from DM Type 2 subjects of these methods are consolidated with the traditional Semmes-Weinstein monofilament test used to detect foot diabetic neuropathy.

Journal Publications:

Scientific Research.Vol4 No.10B October 2012/DOI: 10.4236/eng.2012.410B005, world Congress on Engineering and Technology (CET2012) Paper ID : 71401 Paper Title : “A *mathematical model to predict Transition-to-Fatigue during isometric exercise on muscles of the lower extremities*”, by Jorge Garza-Ulloa, Huiying Yu, Thompson Sarkodie-Gyan. ([Link](#))

Journal Measurement Elsevier Published January 2012.Reference: MEASUR1771 / DOI information: 10.1016/j.measurement.2011.12.015. Paper name: "A *Mathematical Model for the Validation of the Ground Reaction Force Sensor in Human Gait Analysis*", by Jorge Garza-Ulloa, Huiying Yu, Thompson Sarkodie-Gyan ([Link](#))

Conference paper: 2012 ASEE Annual Conference AC 2012-4520: “*Development Of a Design Theory And Methodology Model For Mechatronics*”, Dr. Noé Vargas Hernandez, Jose Gabriel Davila, **Jorge Garza-Ulloa**, Pablo Rangel, Julio Adrian Torres. ([Link](#))

Other papers:

International Test and Evaluation (ITEA) The T&E of Systems-Of-Systems Conference Jan 2012.White Sands Missile Range “Sensor Validation using Linear Regression for Noise Error Detection between prediction data behavior and acquired data applied for Human Gait Analysis.” [Link](#)

Artificial intelligence analysis using Neural Network to predict three stroke parameters: Surgery needed, Treatment, and Length of Stay for Rehabilitation. [Link](#)

Conferences:

2012 ASEE Annual Conference AC 2012-4520: "Development Of a Design Theory And Methodology Model For Mechatronics", Dr. Noe Vargas Hernandez, Jose Gabriel Davila, Jorge Garza-Ulloa, Pablo Rangel, Julio Adrian Torres. [Link](#)

Autodesk Vault _ by Jorge Garza-Ulloa .Autodesk Communities ([Link](#))

Seminarios de Soluciones de Diseño Autodesk: AutoCAD Electrical por Jorge Garza-Ulloa. ([Link](#))

Seminarios de Soluciones de Diseño Autodesk: Revit Diseño edificio por Jorge Garza-Ulloa ([Link](#))

Paper presentation:

UTEP Graduate School "Doctoral Research Exposition" Nov 11,2011 "A Mathematical Model for the Validation of the Ground Reaction Force Sensor in Human Gait Analysis",

Competitions:

2012_ Camino Real Venture Competition_ March 9/10 2012 Team Student Leader of project: "3d Smart Goniometer" entrepreneurs to develop a business concept from planning stage, to start up and hopefully to product commercialization of project/products ([Link](#))

2012_ IEEE President's Change the World Competition_ with project "Electronic Sensor/Data Validation a must to resolve to take right decisions!"

Societies:

2012/2011_ Industrial Relation and Co-founder of Society of Robotics and BioCybernetics ([Link](#))

2012/2013_ IEEE Robotics and Automation Society ([Link](#))

2010/2013_ Vice-president and Co-founder of Neuroscience Research Association at UTEP

2010/2013- IEEE Member (Institute of Electrical and Electronics Engineers).

2012/2013- ResearchGate member ([Link](#))

Awards:

2012-2013 Stern Foundation funds for Dissertation

2011 Award stipend from Research Schellenger Foundation

2012/2011 - Assistant Research in the Department of Electrical and Computer Engineering at University of Texas at El Paso.

Qualifications:

Fall 2010 - Spring 2013.

Ph.D. in Electrical and Computer Engineering. Research focus: Bio-medical Engineering from The University of Texas at El Paso, El Paso, TX, USA. Courses on: Interval Computations, Linear Systems Analysis, Artificial Intelligence I, Fuzzy Logic & Engineering, Neurorehabilitation, Individual studies and Graduate research in Biomedical Engineering.

Fall 2010 - Spring 2011

ECE UTEP Faculty: Link: <http://hb2504.utep.edu/Profile.aspx?ID=jgarzaulloa>

EE3321 Electromagnetic Field Theory Spring 2012, Fall2011, Spring 2011, Fall 2010

EE3338 Electronics I Fall 2011

Fall 1979- Fall 1980

Master of Science in Electrical and Computer Engineering. Graduate school at University of Massachusetts. Courses on: Modern Logic Design, Digital System Design, State Variable Analysis, Computer Architecture, Computer Communications Networks, Random Process, Perform Evaluation, 2 Independent studies: Develop a Simulation program for teaching Microprocessor SIC (Small Instructional Computer) “, this simulator was used for Senior Students to get Bachelor degree at the University of Massachusetts, New Networking Computers and simulations.

1979

Advanced Mathematics on Temple University Philadelphia Pennsylvania

1986-2010

Autodesk certified for manufacturing equipment design. Autodesk certified instructor.

Microsoft Developer Certified. Microsoft solutions certified.

Hewlett Packard solutions certified, and Flexsim simulations certified.

1972-1977

Electronic & Communication Engineer graduated on ITESM Institute Technological at Monterrey Nuevo Leon. Mexico

Teaching Assistantship at labs: Digital systems lab 1 and II, Electronics Lab & Microprocessors Lab.

Courses on: Programming Languages, Switching Circuits, Digital Circuits, Electromagnetic fields, Electric Communications Systems, Radiation and Antennas, Probability and statistics

Work experience

1984-2013

Companies Consulting: On all these years on the Computer & Electronic Business has been dedicated for entrepreneurs as consultant high tech companies, research on new methods, teaching new technologies, and design new solutions. Companies' founder: Computec of El Paso at El Paso Texas USA and Computec/MicroATEC SA de CV Juarez, México ([link](#)).

As a consultant company we have trained people in different solutions as Delphi, Thompson, Johnson & Johnson, Ethicon, and many more. Develop new custom applications to improve performance productions simplifying / creating new procedures, under our own trademark: Cube Precise®: like Cube Precise Electric Harness Manufacturing, to simplify the design of electric harness for the automotive and appliance industries, and the Cube Precise Scanning for simplify the designing and drawing of mechanical models as body holders used on Harnessing manufacturing, Cube Precise Leather technology and more ([link](#)). Special training for Manufacturing Companies at USA and Mexico: Database / ECE applications for manufacturing, developer of ECE special equipment for productivity improvement. CAD / CAM_ Mechanical Design, Workflow, digital prototyping, manufacturing process simulations, and Project Management.

2000-2002

Professor at ITESM Institute Technological of Monterrey Cd. Juarez, Chih. Mexico

Undergraduate/Graduate Teaching: Digital Systems Processing, Microprocessors and Assembly Language.

1981-1984

Professor at ITCJ Technological of Cd. Juarez, Chih. Mexico

Undergraduate /Graduate Teaching: Microprocessor, Senior Projects, and Networking Computer Control Systems, Thesis Advisor

1981-1984

Research at Graduate Center of ITCJ

Design the first Mexican MicroComputer T.A.Co (Technology & Automated Computer [link](#))

Design of the first Spanish synthesizer name RO.VO. (Robot VOice)

1982-1983

CONACYT Consejo Nacional de Ciencia y Tecnología

Grants Adviser for Universities and Technological at Mexico .Applied to research, improve equipment and labs , scholarships recommendation to improve high education on Mexico

1977-1978

Professor at ITCJ Technological of Cd. Juarez, Chih. Mexico

Teaching: Mathematics I II & III, Logic Circuit I and II, Electronics I & II. Digital Design and Advanced Digital Design

1972-1977 *ECE Engr from ITESM Institute at Monterrey Nuevo Leon. Mexico*

Teaching Assistantship at labs: Digital systems lab 1 and II, Electronics Lab & Microprocessors Lab
Courses on: Programming Languages, Switching Circuits, Digital Circuits, Electromagnetic fields, Electric Communications Systems, Radiation and Antennas. Probability and statistics.

Books:

Computer Programming by Jorge Garza-Ulloa Centro de Graduados ITCJ (Textbook used for ITCJ for 10 years).*Microprocessor & Digital Systems* by Jorge Garza-Ulloa Centro de Graduados ITCJ (textbook used for ITCJ for 8 years). *Design of Test Equipment for manufacturing process* by Jorge Garza-Ulloa (9 years as textbook on Computec companies). *AutoCAD design* by Jorge Garza-Ulloa (10 years as textbook on Computec).*Applied Database* by Jorge Garza-Ulloa (10 years as textbook on Computec)

Other information

Consider myself as a self-motivated and logical thinking person who works well independently as well as co-operating with a team. Fast learning and hard working to overcome problems and unexpected difficulties. Enjoy family life, new technologies, natural food, nature, reading books, playing and listening music.

References:

- » *Virgilio Gonzalez, Ph.D. Senior Lecturer and Associate Director*
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- » *Thompson Sarkodie-Gyan, Ph.D. Associate Professor*
Electrical and Computer Engineering Department, The University of Texas at El Paso, Texas,
USA. Email: tsarkodi@utep.edu Tel: (915) 747-7011

- » *Scott Starks, Ph.D. Professor.*
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- » *Joseph Pierluissi, Ph.D. Professor*
Electrical and Computer Engineering Department. The University of Texas at El Paso, Texas,
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- » *Noe Vargas Hernandez, Ph.D. Assistant Professor*
Mechanical Engineering Department. The University of Texas at El Paso, Texas, USA.
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- » *Jaime Sanchez, Ph. D. Lecturer*
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