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Shen Treratanakulchai

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OFFICE ADDRESS
Center for Biomedical and
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OUTSTANDING PROFILE

- Member of BART LAB robotics team awarded in several international robotics competitions
  e.g. 1st runner-up of RoboCup Japan Open 2012, the 2nd runner up of World RoboCup 2014, in Rescue Robot League
- Leading developer for electronics and sensing systems for several medical robotics projects at BART LAB
- Successful co-proposal developer for multiple research funds of 3 Million USD in accumulation
- Author of several international publications and holder of patent pending for inventions

EDUCATION

Master Degree in Biomedical Engineering *2012-2016*
Mahidol University, THAILAND
Master Thesis: Fusion Sensory Schemes for Real-Time Survival Searching on Extreme-Terrain Rescue Robot: A Further Study from A Real Experience
Advisor: Dr. Jackrit Suthakorn and Dr. Songpol Ongwattanakul

Bachelor Degree in Biomedical Engineering with Distinction Program (2nd Honor) *2008-2012*
Mahidol University, THAILAND
Senior Project: Simulation and Image Reconstruction for Magnetic Resonance Imaging
Advisor: Dr. Jackrit Suthakorn, Dr. Udomchai Techavipoo, and Prof. Pairash Thajchayapong

RESEARCH EXPERIENCE

Center for Biomedical and Robotics Technology (www.bartlab.org),
Faculty of Engineering, Mahidol University, Thailand: Research Assistantship under Supervision of Dr. Jackrit Suthakorn

Rescue robot and @Home robot for real applications and international leveled robotics competition *2007 - Present*
- Design and develop electronics and sensing system
- Develop and implement for victim detection algorithm
- Team leader of BART LAB Rescue Robot in World RoboCup 2017
- Development of autonomous navigation based on laser scan and fuzzy logic control

Deep learning for human part classification with Thermal-RGB image bi-modality convolutional neural network *2015 - 2016*
- Develop and implement the classification algorithm for urban search and rescue scenario
- Create Thermal and RGB coupling image dataset
- Create new approach by bimodality convolutional neural network
- Algorithm Performance Evaluation

Novel robotic monofilament inspector for diabetic neuropathy screening *2015 - 2016*
- Design and develop electronics and control of multiple solenoid for monofilament insertion
- Experimental study and system evaluation
- Design and develop embedded system to interface with computer

BARTLAB LL-EXOSKELETON Rehabilitation Robots *2014 - 2015*
- Design and develop electronics for motor driving and control
- Design and design a motor feedback for rehabilitation robot control

Retrobulbar block of opthalamic anesthesia practical simulator *2014 - 2015*
- Manage project and medical consult coordinator
- Design and develop sensing system based on hall-effect array sensor
- Develop passive magnetic field tracking system and algorithm
- Design and implement for the mannequin installation, Medical experimental study and system evaluation
- Design and develop for human-skin force profile acquisition system for making artificial skin with silicone based

Robotic Drug Storaging and Dispensing System in Drug Logistics for A Mid-Sized Hospital *2009 - 2010*
- Design and develop drug packaging sensing system for drug conveyer, drug shelf, and robot internal storage
- Design and develop electronic for the drug warehouse and drug delivery AGV robot
- Implement process control schemes

MRI Simulation for pulse sequence development *2007 - 2008*
- Develop software simulation of MRI to be a platform for pulse sequence experiment

Closed intramedullary nailing of femur surgical navigation *2007 - 2008*

- Experimental study and system evaluation
- Develop image processing feature to extract and label fiducial point for auto image calibration

WORK EXPERIENCE

- Junior Lecturer and Teaching Assistant:
  - Introduction to robotics and robot control *2017*
  - Biomedical Engineering Lab, H-Bridge circuit for motor control *2015 - 2016*
- Research Assistant and Lab Manager: Center for Biomedical and Robotics Technology (BART LAB) *2015 - 2017*
- Internship: Technical Assistant, Cyberknife center, Radiosurgery Center at Ramathibodi Hospital *2007*

SELECTED PUBLICATION

- **Treratanakulchai, S.,** and Suthakorn, J., "Needle Tip Position Tracking for Eye Anesthesia Practical Simulator Based on Hall-Effect Array Sensor," *Proceeding of the 20th Annual Conference of the International Society for Computer Aided Surgery **(CARS 2016)***, Heidelberg, Germany, June 21-25, 2016.
- **Treratanakulchai, S.**, and Suthakorn, J.,"Effective Vital Sign Sensing Algorithm and System for Autonomous Survivor Detection in Rough-Terrain Autonomous Rescue Robots," *Proceedings of the 2014 IEEE International Conference on Robotics and Biomimetics **(ROBIO 2014)***, Bali, Indonesia, December 5-10, 2014, pp. 831-836.
- **Treratanakulchai, S.**, Suthakorn, J., Techavipoo, U., and Thajchayapong, P., "μ-MRI Simulation Tool Development: An MRI Simulation Tool Software Based on Bloch's Equation for Studying the Magnetic Computing and Pulse Sequencing Research in Magnetic Resonance Imaging," *Proceedings of the 35th Electrical Engineering Conference **(EECON-35)***, Pattaya, Thailand, December 12-14, 2012.

AWARDS AND SCHOLARSHIPS

- Royal Thai Government Scholarship for fully-financial support to study Ph.D. in UK, *2017-2023*
- Biomedical Engineering Scholarship from Mahidol University for financial support to study Master Degree, *2012-2016*
- Silver Award from BES-SEC Student's Design Competition at the 16th International Conference on Biomedical Engineering, Singapore, 2016
- 1st Runner-up Award for Rescue Robot League in RoboCup Japan Open 2012, Osaka, Japan
- 2nd Runner-up Award for Rescue Robot League in World RoboCup 2014, Joao Pessoa, Brazil
- 2nd Runner-up Award for Rescue Robot League in RoboCup Iran Open 2014, Teheran, Iran
- Best Technique @Home Robot Award, Thailand Robot @Home Championship 2012
- Best Autonomous Rescue Robot Award, Thailand Rescue Robot Championship 2012
- Best Creativity Robot @Home Award, Thailand Robot @Home Championship 2011
- Finalist, Rescue Robot League, World RoboCup 2015, Hefei, China
- International Society for Computer Aided Surgery (ISCAS) Travel Award 2016

SKILL AND SPECIAL

- Programming Language: C/C++, Python, JAVA
- Software: Microsoft Visual Studio, MATLAB, Tensorflow, Weka, Open Haptic, Open GL, LABVIEW
- Operating System: Windows, Mac, and Linux
- Research tools: NDI Polaris Vicra, NDI Aurora, Haptic Phantom Omni Sensable, Yaskawa Motoman HP-2 Robot, MTS Tensile testing machine, Force/Torque sensor ATI Nano17, Maxon Motor and EPOS Controller, LIDAR Hokuyo URG-04 & UTM30, IMU Sensor Xsens, Thermal Camera Optris 160, 3D printer Objet24, 3D Scanner ARTEC Spider
- Microcontroller programming: Arduino, dsPIC Microchip
- CAD design: Solid Work, Altium
- Piano Instructor: Trinity guildhall piano and Yamaha Music school
- Language: Thai-Native, English-***IELTS Overall Score 6.5***

PATENT PENDING

- 3D Localization Technique in Hall Effect Magnetizing Tracking System
- Eye Anesthesia Practical Simulator for Ophthalmic Anesthesia

RESEARCH FUNDING PROPOSAL DEVELOPMENT

- Transitional Research of Military Robots from Rescue Robots based on the Global Standardized Field Level for Enhancing Active Defense Strategy: Office of Higher Education Commission – Co-PI/ 147,000 USD/ *2017-2018*
- Medical Device and Healthcare Innovations Development Hub: Mahidol University - Co-PI/ 2,938,600 USD/ *2017-2018*
- National Advanced Medical Robotics Center Project: Thailand Ministry of Science and Technology – Co-PI/ 15 millions USD/ *2014-2018*
- Intelligent Robotic Doctor for Diagnosis and Therapeutics via Tele-Medicine: Thailand Health Systems Research Institute – Co-PI/200,00 USD/ *2013-2015*
- Drug Logistic Robot Research and Development Project for Product Development under Collaboration between Panasonic-Siriraj Hospital-Engineering: National Research Council of Thailand – Co-PI/ 39,000 USD/ *2016*-2018
- Development of Prototype AGV Intelligent Mobile Robotic System for Drug Logistic in Hospital: National Research Council of Thailand – Co-PI/ 120,000 USD/ *2012-2013*
- Intelligent Robotic Wheelchair for Elderly and Disable Persons to Use in Daily Life and Stair Climbing Under HRH Princess Maha Chhakri Sirindhorn's Suggestion: Thailand Ministry of Science and Technology – Co-PI/ 40,000 USD/ *2017-2018*

TECHNICAL INTERESTS

- Medical Robotics, Biomechanics, Sensing Technology, Navigation, Image Processing, Biomimetic, New Technology, Deep Learning, Artificial Intelligence

Reference Upon Request