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Profile Summary

Prof.Dr. Sai Kiran Oruganti is with the School of Electrical and Automation Engineering, Jiangxi University of Science and Technology, Ganzhou, People's Republic of China as a full Professor since October 2019. He is responsible for establishing an advanced wireless power transfer technology laboratory as a part of the international specialists team for the Center for Advanced Wireless Technologies. Between 2018-2019, he served as a senior researcher/Research Professor at Ulsan National Institute of Science and Technology. Previously, his PhD thesis at Ulsan National Institute of Science and Technology, South Korea, led to the launch of an University incubated enterprise, for which he served as a Principal Engineer and Chief Designer in 2017-2018. After his PhD in 2016, he served Indian Institute of Technology, Tirupati in the capacity of Assistant Professor (Electrical Engineering) between 2016-2017.

Research

Prof.Dr.Oruganti, prime research focus is in the development of Wireless Power Transfer(WPT) for applications- Internet of Things(IoT) device charging, Agriculture, Electric Vehicle Charging, Biomedical device charging, Electromagnetically induced transparency techniques for military and defence applications, Secured shipping containers, Nano Energy Generators.

Achievements

Prof.Dr.Oruganti has more than 21 patents pending on his credit and with several of those patent applications passing the NoC stage. He is credited with the pioneering work in the field of Zenneck Waves based Wireless Power Transfer system. Most notably, he has been regarded as one of the only few researchers in the field of WPT to be able to conduct power and signal transmission across partial Faraday shields. His recent paper accepted by Nature Scientific Reports has generated a lot of interest and excitement in the field. International Union of Radio Science(URSI) recognized his

research efforts and awarded him Young Scientist Award in 2016. He is also recipient of IEEE sensors council letters of appreciation.

PROFESSIONAL EXPERIENCE

Jiangxi University of Science and Technology, Ganzhou China Oct 2019 – Ongoing
Professor, School of Electrical and Automation Engineering (Foreign Talents Program)

- Taught courses to foreign undergraduate students- High Voltage Engineering, Power Plant Automation and Electric Circuits.
- Identified and planned the laboratory equipment and experimental setup for wireless power and data transmission systems.
- Published in reputed scientific outlets- nature publishing group's Scientific Reports, IEEE Access, Journal of the Electrochemical Society.
- Patented biomedical wireless power and data transmission system.

Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea
Senior Researcher/Research Professor Sept.2018-Sept. 2019

- Physically realized the Zenneck wave power and data transmission system in order to operate under partial Faraday shields.
- Developed the intuitive analytical mathematical model of the Zenneck wave system.
- Provided design assistance to ZN Ocean Technologies, Seoul, South Korea.

ZN Ocean Technologies, Seoul Republic of Korea Aug 2017-2018
Principal Engineer and Senior Designer

- Designed the resonators for the metal wave wireless system of ZN Ocean Technologies.
- Optimized the performance of the metal wave resonators.
- Conducted feasibility data studies for wireless transmission systems aboard the marine vessels.

Indian Institute of Technology, Tirupati July 2016 – May 2017
Assistant Professor, Electrical Engineering

- Taught courses in Electrical Engineering to undergraduate students- Electric Circuits, Basic Electrical Engineering, Electromagnetic Fields.
- Committee member for establishing the High Computational server facility.
- Committee member for establishing the Electrical laboratory.

PATENTS

1. Bien, F., Oruganti, S.K., et. al, Door lock charging system and door lock apparatus **US20190006875A1**. US Patent
2. Bien, F., Oruganti, S.K., et. al, Signal and power transmission system, **US 10,636,565B2**, 2020. US Patent
3. Bien, F., Oruganti, S.K., et. al, Signal and power transmission system, **EP3331171A1**, 6/6/2018 European Patent
4. Bien, F., Oruganti, S.K., et. al, **CN108141248A** CN PCT, 08/06/2018.
5. Bien, F., Oruganti, S.K., et. al, Lock and wireless charging system **WO2019/004535A1** KR PCT 03/01/2019.
6. Bien, F., Oruganti, S.K., et. al, Through metal communication system **KR 10-1952908**, KR PCT.
7. Bien, F., Oruganti, S.K., et. al, Wireless power and high rate data transmission system **10-2017-0014857 and JP2016520986A**, KR JP PCT, 04/2018.
8. Bien, F., Oruganti, S.K., et. al, Wireless power and high rate data transmission system **10-1804683** PCT, 01/2016.
9. Bien, F., Oruganti, S.K., et. al, Wireless Charging system for locks **10-1770512** KR PCT, 01/2016.
10. Bien, F., Oruganti, S.K., et. al, Ship communication system **10-2019-0017484**, KR PCT, 2016.
11. Bien, F., Oruganti, S.K., et. al, Ship communication system **10-2019-0017481** 2016, Hyundai Heavy Industries-UNIST Cooperation Patent.
12. Bien, F., Oruganti, S.K., et. al, Ship wireless data communication system **10-2019-0006641**, KR PCT 2016.
13. Bien, F., Oruganti, S.K., et. al, surface wave charging **10-2019-0002246**, KR Domestic PCT.
14. Bien, F., Oruganti, S.K., et. al, Wireless Power transmission and communication system, **US000010797399B2; US2019/0214734A1**, US patent.
15. Bien, F., Oruganti, S.K., et. al, Signal and Power transmission system **US000010636565B2; US2018/0226187A1** 08/2018, US Patent.
16. Bien, F., Na, K., Choi, Y.H., Oruganti, S.K.” Fine pulse generator and method for generating fine pulse” US 20140361822 A1, Dec 11, 2014. US Patent.

PUBLICATIONS

1. S. Arya, P. Mahajan, S. Mahajan, A. Khosla, R. Datt, V. Gupta, S.J. Young, **S. K. Oruganti**, "Influence of Processing Parameters to Control Morphology and Optical Properties of Sol-gel Synthesized ZnO Nanoparticles - A Review", *Journal of the Electrochemical Society*, 10, 023002. DOI: <https://doi.org/10.1149/2162-8777/abe095>
2. A. Sharma, A. Ahmed, A. Singh, **S.K. Oruganti**, A. Khosla and S. Arya, Review—Recent Advances in Tin Oxide Nanomaterials as Electrochemical/Chemiresistive Sensors, *Journal of The Electrochemical Society*, 168 027505. DOI:<https://doi.org/10.1149/1945-7111/abdee8>
3. S.K.Oruganti,A. Khosla, F. Liu,MD Nahin I. Shiblee, Kumkum Ahmed, and Thomas Thundat, " Comparative Study: Zenneck Wave & Single Wire Energy Transmission Under Harsh Conditions", *Scientific Reports (Under revision)*
4. S. K. Oruganti*, A. Khosla and T. G. Thundat, "Wireless Power-Data Transmission for Industrial Internet of Things: Simulations and Experiments," in *IEEE Access*, vol. 8, pp. 187965-187974, 2020, doi: 10.1109/ACCESS.2020.3030658.
5. S. K. Oruganti*, F. Liu, D. Paul, H. Kim, Y. Liang, T. Thundat, F. Bien, J. Liu, J. Malik, K. Feng," Experimental Realization of Zenneck Type Wave-based Non-Radiative, Non-Coupled Wireless Power Transmission", *Scientific Reports*, Nature Group,2019 [Q1,L1 category] <https://www.nature.com/articles/s41598-020-57554-1>
6. S. Song, J. Malik, N. Ko, W. Park, S. Seo, B. Lee, S. K. Oruganti, Haksun Kim,F. Bien, "Alignment- and Metallic-Obstacle-Insensitive Contactless Power Transmission System Utilizing Surface-Guided Mode", *IET Microwaves, Antennas & Propagation*, vol. 13, no. 11, pp. 1826-1831, 11 9 2019, doi: 10.1049/iet-map.2018.5286.
7. . J. Malik, S.K. Oruganti, N. Kyoung, S. Song and F. Bien," Electromagnetically Induced Transparency in Sinusoidal Modulated Ring Resonator" *Applied Physics Letters*, 112, 234102 (2018); <https://doi.org/10.1063/1.5029307>
8. Oruganti, S.K., Heo, S.H., Ma, H. and Bien, F.," Wireless energy transfer: touch/proximity/hover sensing for large, contoured displays and industrial applications industrial applications", *IEEE Sensors Journal*, vol.15, no.4, pp.2062-2068, April 2015.
9. Oruganti, S.K. and Bien, F.," Investigation of near-field wireless energy transfer for through metal-wall applications," *IEEE Wireless Power Transfer Conference (WPTC)*, vol., no., pp.247-250, 8-9 May 2014
10. Oruganti, S.K., Heo, S.H., Ma, H. and Bien, F.," Wireless energy transfer-based transceiver systems for power and/or high-data rate transmission through thick metal walls using sheet-like waveguides," *IET Electronics Letters*, vol.50, no.12, pp.886-888, June 5 2014.
11. N. Nguyen, Oruganti, S.K.; Kyungmin Na, Bien, F., "An Adaptive Backward Control Battery Equalization System for Serially Connected Lithium-ion Battery Packs," *IEEE Transactions on Vehicular Technology* , vol.63, no.8, pp.3651-3660, Oct. 2014.
12. Bien, F., Oruganti, S.K., "Investigation and analysis on EMC reduction with impedance matching technique in wireless power transfer system," in *Electromagnetic Compatibility, Tokyo (EMC'14/Tokyo)*, 2014 International Symposium on , vol., no., pp.442-444, 12-16 May 2014.

13. Kyungmin Na, Heedon Jang, Oruganti, S.K., Bien, F., "An improved wireless power transfer system with adaptive technique for Implantable Biomedical Devices," in Microwave Workshop Series on RF and Wireless Technologies for Biomedical and Healthcare Applications (IMWS-BIO), 2013 IEEE MTT-S International , vol., no., pp.1-3, 9-11 Dec. 2013.
14. Oruganti, S.K., Bien, F., "Flexible wireless energy transfer systems by carbon fiber as a dielectric material: Study and experiments," in Wireless Power Transfer (WPT), 2013 IEEE , vol., no., pp.159-162, 15-16 May 2013

HONORS

1. URSI Young Scientist Award 2016, Seoul.
2. IEEE Sensors Council Letter of Appreciation

EDUCATION

PhD, Electrical Engineering,

Ulsan National Institute of Science and Technology, Ulsan Republic of Korea 2016
THESIS - Beyond Evanescent Electromagnetic Fields: Via Metal Wireless Surface
Wave Power-Data transmission System and Wireless Power Transfer Based Sensor
Thesis Grade A+

MS, Electrical Engineering,

Hochschule Darmstadt, Hessen, Germany 2008
THESIS - MIROS: Parametric Evaluation of MEMS based paramagnetic oxygen sensor
Thesis Grade A+

Bachelors, Electrical Engineering

Raipur University, India 2004

Research Activities

My research activities are focused on finding new methods of efficient wireless power transmission to multiple receivers for internet of things device charging in the industrial settings, such as marine vessels, oil and gas pipelines. I have been successful at finding a fundamentally different class of wireless power transmission, based on Zenneck Waves.

The propagating wave property of the ZW's were used for transmission of uniform and efficient power to multiple receivers under harsh environments- metal shielded zones and transceiver misalignment. My PhD research and its continuation has led to a startup company incubated by Ulsan National Institute of Science and Technology- ZN Ocean Technologies.

We (my collaborators and me) have identified twelve key areas where battery and wireline dependency may be reduced by using the Zenneck Wave concept; Internet of Things (IoT), aerospace, space payloads and satellites, military hardware, railways, mining, tidal power systems, consumer electronics and industries, nuclear sites, secured shipping containers, dynamic charging of electric vehicles and weight reduction of electric vehicles.

The efforts in this area have led to 21 patents comprising of an amalgamation of US, Domestic, Chinese, European and PCT variants. We have attracted funding from the bodies which are considered extremely competitive in nature, notable examples- Korean Ministry of Education and Research, Korea Industrial Technology Association (KOITA), Sunbo international, National research foundation of Korea, Hyundai motor company, LG Electronics, Samsung, Hyundai Heavy Industries and ICT.

Teaching Statement

The traditional classroom-based teaching is an important part of instilling engineering concepts

in a young undergraduate student's mind, however, science and engineering requires a student to cultivate the intricate art of critical thinking. Therefore, during my time at IIT Tirupati, I formulated various paradoxical scenarios in the assignments and would later discuss them in dedicated tutorial lectures. As a result, it lead to a clearer understanding of the said concepts for not only the students, but also for me. This style of teaching became a solid feedback mechanism through which I improved my art of teaching. At JXUST Ganzhou China, I have continued this method of teaching which has received a positive feedback from the students to the relevant authorities.

1. Electromagnetic Fields
2. Numerical methods in Electromagnetic Simulation
3. Analog IC design
4. Microelectronic circuit design
5. High Voltage Engineering
6. Power Plant Automation and integration