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Daylight-artificial light integrated system with the camera as the sensor and Wireless Sensor Actuator Networked (WSAN) system

Susan G. Varghese Dr.

Faculty Name: Dr. Susan G Varghese

Dept: Electrical & Electronics Engineering

Institution: Manipal Institute of Technology, MAHE, Manipal

Mail ID: susan.varghese@manipal.edu

Research Contributions : *Funding*

Title : *Test workbench and proof of concept prototype for building energy efficiency solutions*

Funding Agency : Department of Science and Technology, India [DST_ (I-PHEE) – 2016]

Status:

- *Completed*
- *Co- PI*
- *47 Lakhs*
- *2017 – 2020*
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Paper Publications:

International Journal

- Varghese, Susan G., Ciji Pearl Kurian, and Cyril Joseph. "Wireless Sensor Actuator Network Architecture and Energy Model of a Camera Based Lighting Management System." IEEE Access 10 (2022): 22700-22711.
- Kumar, T. S., Kurian, C. P., & Varghese, S. G. (2020). Ensemble Learning model-based test workbench for the optimization of building energy performance and occupant comfort. *IEEE Access*.Vol 8,96075- 96087
- Kumar TM, S., Kurian, C. P., Varghese, S.G, (2020). A Prototype of Wireless Networked IoT Based Lighting Control in Open Platform. *Recent Advances in Electrical & Electronic Engineering*, *13*(3), 405-416
- Varghese, S. G., Kurian, C. P., George, V. I., & Kumar, T. S. (2019). Daylight-Artificial light integrated scheme based on Digital Camera and Wireless Networked sensing-actuation system. *IEEE Transactions on Consumer Electronics*, *65*(3), 284-292
- Varghese, S. G., Kurian, C. P., George, V. I., (2019). Comparative study of ZigBee topologies for IoT-based lighting automation, *IET Wireless Sensor Systems.*, *9(4),* 201-207
- Varghese, S. G., Kurian, C. P., George, V. I., Varghese, M., & Sanjeev Kumar, T. M. (2019). Climate model based test workbench for daylight-artificial light integration. *Lighting Research & Technology*, *51*(5), 774-787

- Varghese, S. G., Kurian, C. P., George, V. I., & Kumar, T. S. (2018). Control and evaluation of room interior lighting using digital camera as the sensor. *International Journal of Engineering and Technology (UAE)*, *7*(2), 99-105
- Varghese, S. G., Kurian, C. P., & George, V. I. (2017). Rapid prototyping of lighting control system using reconfigurable device. *Journal of Engineering and Applied Sciences*, *12*(Specialissue10), 8936-8943
- Kumar, Sudheer TS, Kurian, Ciji Pearl, and Susan G. Varghese. "High Dynamic Range Imaging System for Energy Optimization in Daylight–Artificial Light Integrated Scheme." International Journal of Renewable Energy Research (IJRER) 5.2 (2015): 435-442.
- Online Journal: Susan G Varghese, Dr.Ciji Pearl Kurian , Dr,V.I George, "Image based Wireless Networked Lighting Control for Daylight-Artificial Light Integrated Scheme-A Literature Review", International Journal of Computer Science and Engineering, Vol 1, Issue 2, pp 172, 2013

International conference

- Kumar, Sanjeev, Susan G. Varghese, Ciji Pearl Kurian, and Chandra Mouli. "Low-Cost Image-Based Occupancy Sensor Using Deep Learning." In Advances in Renewable Energy and Electric Vehicles, pp. 277-290. Springer, Singapore, 2022. [Lecture Notes in Electrical Engineering, 2022, 767, pp. 277–290] -BEST PAPER AWARD
- Susan G Varghese, Ciji Pearl Kurian, Cyril Joseph, V.I George, "Synthesis, fusion and FPGA implementation of image based algorithms for occupancy based LED luminaire control, International conference on Electrical, Electronics, Instrumentation and Computer Communication, TamilNadu, Jan 24-25, 2019
- Susan G Varghese, Ciji Pearl Kurian, V.I George, Rapid Prototyping of Lighting Control System Using Reconfigurable Device, Thailand, 2017
- George, Mrs Anna Merine, Mrs Mary Ann George, and Mrs Susan G. Varghese. "Camera Based Street Light Control System on FPGA Platform. "Proceedings of 2015 International Conference on Green Buildings, Civil and Architecture Engineering (ICGBCAE'15) Dubai, Dec. 25-26, 2015 pp. 120-126
- Varghese, Susan G., Ciji Pearl Kurian, and V. I. George. "A study of communication protocols and wireless networking systems for lighting control application." 2015 International Conference on Renewable Energy Research and Applications (ICRERA),November 22-25, Palermo, Italy. IEEE, 2015. (http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=7418618)
- International Conference: Susan G Varghese, Dr.Ciji Pearl Kurian , Dr,V.I George, "Image based Wireless Networked Lighting Control for Daylight-Artificial Light Integrated Scheme-A Literature Review", 2nd International Conference on Electrical and Electronics Engineering, March 13-14, Dubai,2013
- BIST pattern generation with LT-RTPG and 3 weight weighted random BIST, Proceedings of 3rd International conference on intelligent systems and control(ISCO2009), Karpagam college of Engineering, Coimbatore(in collaboration with Asian Institute of Technology, Bangkok),feb 6,7-2009

National conferences

- Simulation of Building interior with Lighting and Window Blind Control" , 27-28 May, 2022.NCRTE 2022, Dayanda Sagar University, Bengaluru , Karnataka [BEST PAPER AWARD]
- Research colloquium: - Susan G Varghese, Camera based daylight –artificial light integrated scheme, April 2019.
- Susan G Varghese, Ciji Pearl Kurian, V.I George, Control and evaluation of room interior lighting using digital camera as the sensor, XIV Control Instrumentation System conference, Manipal, Nov.3-4,2017.
- Poster Presentation : Susan G Varghese, Dr.Ciji Pearl Kurian, Dr. V.I George **,"**Image based Wireless Networked Lighting Control for Daylight-Artificial Light Integrated Scheme", Manipal University, 2015 March 03.
- A BIST TPG for high fault coverage and switching activity reduction" March 06-07,2009, Advances in communication systems(NCACS-09), St. Josephs college of Engineering &Technology, Palai
- "Generation of low power dissipation random test patterns by adding weight sets"April 04, 20093rd national conference on Advances in Energy conversion Technologies(AECT 2009)M.I.T., Manipal
- "VLAN Implementation in Layer Two Switching"Nov 09-10, 20074th National Control Instrumentation System Conference 2007(CISCON-07)M.I.T., Manipal
- "Survey of low power BIST techniques of VLSI circuits" Oct 24-26, 2007, 32nd national symposium on Instrumentation, K.S.R college of technology, Tiruchengode

Projects Guided (in last 5 years):

1. IoT based water monitoring system
2. IoT based food processing system
3. Wireless Networked IoT Based Lighting Control with conventional sensors
4. Rapid prototyping of Lighting control system on FPGA
5. Climate based Daylight harvesting scheme using LabVIEW
6. Occupancy detection using Spartan 6 FPGA
7. Comparative study of ZigBee topologies for IoT based lighting using Qualnet simulation software
8. Control and evaluation of room interior lighting using digital camera
9. Low-Cost Image-Based Occupancy Sensor using Deep Learning
10. IoT Based Automation towards Human Centric Lighting