**Student Name: Nina Nguyen**

**Date: 10/21/2019**

**Topic: IOT**

**Article:** [**Energy efficient IoT-based smart home**](https://ieeexplore-ieee-org.proxy.seattleu.edu/document/7845449)

**Citation: L. Salman et al., "Energy efficient IoT-based smart home," 2016 IEEE 3rd World Forum on Internet of Things (WF-IoT), Reston, VA, 2016, pp. 526-529.**

**Summary of Article:**

Internet of Things (IoT) are so integrated into our lives that we aren’t even surprised or amazed anymore. We always wonder, when is there going to be a technology that makes my life easier? The article introduces such a technology and looks into the possibility of Internet of Things devices and sensors in a home being connected to control heating/cooling, lighting and any utilities. The tricky thing is to get all the different IoT to share information with each other, in order to create a chain of events. However, it should be done in a way that’s energy efficient. A simulation model of a kitchen was created to test the signal, sensors, and communication between the devices. Although only a small test was done, the authors’ suggested that such computational methodologies can be extended to other parts of a home and other commercials buildings.

**Article Purpose:**

The purpose of the article is to share the authors’ research into a smart-home that is environmentally friendly. Instead of having individual IoT devices to make smart home, the authors’ looked into connected IoT devices from multiple interacting physical properties. Therefore, the article covered some important features such as communication between devices and coupling/RF interferences (RFI) between antennas integrated in the devices. However, I feel like the article is more of a marketing paper for the different ANSYS software. Models and different technologies by ANSYS were used to simulate the models and analysis of the research.

**Methodology**

Different Multiphysics simulations (electromagnetic, thermal, and structural) were done using a model of a kitchen by the ANSYS products. One of the focuses was the signal strength of the various antennas placed in the room. ANSYS HFSS FEM Solver software was used to design and simulated the antennas. ANSYS EMIT then provided models for sensors to be compared with RF models to compute the RF link margin between the sensors and the home control unit. It found that Lightbulb-to-HCU have a link of 2.2 dB which fall short of a 10dB goal which suggest a lot of interference. Then the authors’ tested the integrity of the antennas inside smart LED bulbs when it’s under thermal stress.

**Conclusion**

This article was very theoretical. The title and abstract suggested a more complete analytical research of smart-homes that are energy efficient, but it feels lacking. Most of the concepts and simulations were done using software from ANSYS with very simplified results. It feels like the authors looked more into possible failure points of connecting all IoT devices in the home than actual benefits that the title suggests. The paper was more about showing a single simulation in hoping to help people make a smart home more energy efficient.

**Article Strengths:**

The article considered different antenna frequencies that can be installed in a smart-home. There are models for the individual antenna models and their antenna reflection coefficients. In addition to that, the antennas were designed and simulated using ANSYS HFSS FEM Solver and it shows the different frequency bands shown on the energy control unit antenna. The models reflect the Far Field Antenna Gain, the 900MHz, 2.45GHz, and 5.8GHz bands. If anything, I think the software from ANSYS is pretty neat even though I don’t have a lot of knowledge about it. But the fact that it can modeled a Multiphysics analysis approach is awesome.

**Article Weaknesses:**

The article analysis was all done on simulations of a virtual world, so I’m not sure how practical this can be. There was not much in the article to help me apply this to any real-world situation. For example, it talked about the different antennas frequencies and how there might be interference of the connected devices. There was a quick mention about the frequencies having different dB link margin and a higher link margin might be more costly but there’s no monetary value included for the readers to better grasp the concept. The article can be more relatable if there were at least some monetary calculations as the title suggests.

**Recommendation:**

There was no recommendation. I wish the authors would do a real-life analysis in the future since connected IoT devices for smart-homes is already in in place.

**Checklist:**

Number of Authors: 7

Number of Citations of Article: 12

Number of Citations to other articles: 11

Methodology Explained (Yes/No): Yes

Technology Explained (Yes/No): Yes

Experiments and Data Reviewed (Yes/No): Yes

Conclusion Exist (Yes/No): Yes

Recommendations Exist (Yes/No): No