Abstract No: SE-19 **Systems Engineering**

A solution for reducing electricity in residential sector using image processing

[*]D. S. Ekanayake and W. G. D. M. Samankula

Department of Statistics & Computer Science,
Faculty of Science, University of Kelaniya, Sri Lanka
**sheran141@gmail.com*

Abstract

Energy saving is a critical issue that should be addressed in a worldwide scale. In the residential sector of Sri Lanka, there are many houses. Each household on average includes four people and has diverse electronic needs to be fulfilled. This paper proposes a solution to reduce the electricity consumption of residential sector. The solution has the ability to manage the use of electricity consumption of households. It identifies each and every household electric item and connects through *Wi-Fi.* Each household electric item which has the ability to connect to a *Wi-Fi* network, will be connected to the system via the routers *port forwarding* function. The user has the ability to check the system and identify which electric item is wasting energy and then the user can switch it off remotely through the system. Furthermore, the proposed solution is equipped with *image processing algorithms.* Image processing is fast, flexible and opens a whole new world of real time computer vision. A video camera located in several places in the house is used to identify presence of humans and then automatically switch off unnecessary electronic items. The proposed detection process depends on the light condition, camera angle and the efficiency of the real time detection. *Matlab's* SVM classifier people detection algorithm was used as the *image processing algorithm*. One thousand six hundred images were split equally into two data sets as images with humans, and images without humans. The analysis revealed a unique threshold value as 6 220 800 in images to identify humans images in it. In the future, the system is envisaged to connect to an IoT (Internet of Things) platform to derive more benefits to the end user.

Keywords: Energy saving, Image processing, IoT, Port forwarding

Introduction

In the past few years, many studies have come up with various solutions in order to save energy. Since it has a main impact in society's economy, the interest of many stakeholders including the Government has increased (Brandt, 2011). This study presents an optimal solution in reducing primary energy consumption in the residential sector of Sri Lanka. Energy in the form of electricity or oil is commonly used in the residential sector to operate equipment for the safety, efficiency, convenience and comfort of its occupants and users. Such equipment includes emergency systems, air conditioning system, artificial lighting, ventilation and other appliances. In Sri Lanka, electricity is the predominant form of the energy used in the residential sector. Due the lack of natural resources (other than hydro) fundamental to the generation of electricity and with energy demand rising, energy is one of the critical factors needed for the development of the economy. Image processing can be used as a means to save energy consumption (Olstad, 1991).

Methodology

Improving classifier effectiveness has been an area of intensive machine learning research over the last two decades. It has led to a new generation of state-of-the-art