Executive Summary

In early years in Rwanda and elsewhere in Africa the security issue was a big challenge to affront. Fortunately the invention of new technologies like internet, electrification of rural areas and the improvement of telecommunication networks across Africa have leaded to the new era where the whole world is becoming a global village. On the other hand the security issue is no longer a problem because nowadays sensors, microprocessors and other detector devices replaced humans for their accuracy and can be controlled in a long distance. Internet of Things (IoT's) is one of the tool that will be utilized in this project to control and acquire information of many parameters. Likely in this project, User Interfaces (UI) as Android Application or Website will be used to help the user to control this home and have access to some information.

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CHAPTER I: GENERAL INTRODUCTION

1. Introduction

An IoT based smart home security system is a microcontroller based application which will be used to control a user's home, each room with three sensors which are human presence sensor, a temperature sensor and a fire detector sensor controlled by a microcontroller. The microcontroller will be connected to the internet (Internet of Things) in order to facilitate the user to access information. Internet of Things (IoT's) can be described as connecting everyday objects like smart phones, internet televisions, sensors and actuators to the internet where the devices are intelligently linked together to enable new forms of communication amongst people and themselves. So, the user will be able to access all those data of this protected area via an account on a website or an android application. In addition the system will control the consumption of the electric power, for example preventing misuse of the lighting power when no one is using it and more.

2. Background of the study

Nowadays, security systems are much needed by customers, the reasons of this is the increasing risk of burglary, robbery and a busy lifestyle. Different ways of security system have been enhanced such as, large number of security officers, alarms, monitoring system, the production of electronic hardware and software and much more. One of the most important safety system and required for all social group is smart home security system.

Houses need to be monitored at all times such as from theft, fire outbreaks and short circuits. Recently, the rate of crimes involving robbery and fire outbreak in hot season is increasing, according to the Rwanda National Police, houses break-ins is one of the top crimes on the list released on December 14th, 2016. Therefore, home surveillance systems must be upgraded to be more effective to face the increasing of crimes rate and fire outbreaks.

Various methods can be done to improve home security monitoring including the usage of security officers. However, this method is not suitable for all levels, wasteful and less reliable compared to automatic systems. All these improvements need to work more effectively, giving advantages to the user and can be monitored without any error that may disturb the security process. At present, a lot of research on smart home systems has been done and it covers all aspects. For example, researches in terms of multimedia, security monitoring, lighting, temperature control and others. In this project manual methods are no longer used and are replaced by an automated system that helped users to monitor the condition of the house anytime and anywhere, thus facilitating information awareness and speeding up information delivery. Automatic system can prevent the effects of human error and immediate intrusion detection at all the time.

3. Problem Statement

Security monitoring system requires data transmission system, fast receiving data and accurate at a certain distance, so that users can place devices freely at important locations for the data display reception. In other words, this system must be portable and user friendly. Display system is shown to be straightforward and easy to understand, so that users can take important immediate action.

The system must not be hacked by anyone, no matter in various ways including on input source power, the content of data transmission, content of receiving data and location of security sensor device's main microcontroller. The system must also have characteristics such as water resistant, high temperature resistant and robust, so that data transmission process and data receiving will not fail.

Many of other security systems have some limitations on the usage of sensor devices. These problems will result in limitations of the security system. However, it is inevitable that a security system requires extensive use of sensors for the system to operate efficiently and be able to detect objects in every area of the house. The use of other sensors like temperature sensor, fire detection and light detection sensors are also very important in this security systems.

Sensors must be working on the most appropriate range, that is not too close and too distant to detect all those variables and should be accurate according to the nature. Common parameters or characteristics of home security system are 24 hours monitoring of the intruder, ease of use, reliability, efficient, effective and precise notification system.

4. Objectives of the Project

4.1 General Objectives

The aims of our project is to design and implement a home security system which detects a human presence, fire detection, controls electrical power usage while one is around or not around and can control system and receive alerts of the status of the system using an user interface (Webpage) through internet. This will ensure an accurate surveillance of the user home at all time.

4.2 Specific Objectives

This project aims the following specific objectives:

- Using new technologies in enhancing security, leading to inform the user accurately in real time and easy access anywhere in the world.
- Minimizing unnecessary power consumption.
- To ensure security of user's property anytime.
- To establish affordable security to everyone
- Minimizing time taken to rescue when there is problem of fire outbreak
- To detect intruders and immediately alert the user

5. Hypothesis of the project

We have possibilities of designing an Internet of Things (IoT) based application which enables our microcontroller to connect and exchange data through internet. In other words we can access our sensor's data and control our actuators through internet at any time.

6. Scope of the project

In this project we should use sensors technology which is the most important building block of Internet of Things, the system may be a thinking thing itself, controlling the misuse of electric power consumption in the house.

The project will be built on the web of things which uses simple HTTP server and Web 2.0 technology. Modern Web servers with a sufficient feature set can make do with 8 kB memory and no operating system support thanks to clever cross-layer TCP/HTTP optimization. In the Web of Things, smart objects and their services are typically addressed via URLs and controlled via a simple interface using a few well-defined HTTP operations such as GET and PUT.

7. Significance of the project

During the design and implementation of this project, we will be able to apply the knowledge and skills gained in the last 4 year we passed in Electronics and Telecommunication Engineering. We will enhance our knowledge in courses like Embedded Systems, Control system, C and C++ programming languages, Networking, database and Web design.

We should increase our experience and recognition in the field of Internet of Things and making benefits into it.
Other skills of interest are:

- Verbal and written communications
- Organization and time management
- Project management and multitasking
- Self-starter and team player
- Understand Arduino Uno board and Arduino Ethernet Shield
- Understand Arduino IDE application
- Negotiation
- Budget management
- Marketing and public relations

On the other hand the society interests are:

1. This system will guaranty security to the user anytime and everywhere.
2. The smart home security system will contribute towards Rwanda's quest for achieving the goal of making use of new technologies as the key in transformation of the country.
3. To increase the standard of living for clients.
4. To help management of security issues and affordable to the public.
5. It will help people to improve their skills in using this web based system.