Optical Wireless Home Automation System

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I. Introduction

Safety, assistance of disability, time saving, comfort, speed, prestige, right resources utilization and other deserts are achieved by using Optical Wireless Home Automation System (OWHAS). Through this research paper OWHAS is presented in detailed moreover importance and usability of OWHAS is shown.

Importance of Home Automation is discussed since 1898 by Tesla who invites remote control [1] then Tesla's idea is developed to be used in different fields; such as Home automation by Faris who originated modern home automation in Chicago and New York in 1934. In 1966 Jim Sutherland developed a home automation system called "ECHO IV" [2].

Recently, many systems had been developed by utilizing available facilities and technologies for Home Automation industry; such as:

1. Home Automation System (HAS) which is synthesized by Panth and Jivani for mobile phones having Android. HAS system uses an 8 bit Bluetooth interfaced microcomputer to control many home appliances [3].

2. Bluetooth Remote Home Automation System Using Android Application which is structured by Ramlee and his team to help an elderly and disabled in home; they implement wireless Bluetooth technology for providing remote access from mobile phone or laptop [4].
a) Android mobile platform

The Controller of OWHAS is programmed on an Android platform. The choosing of Android platform is based on the portability and mobility of Android; which is installed in many mobile phones. Also programs of Android are written based on Java programming languages so they do not have high complexity. In addition, Android are compatible with many communication networks (Wireless, Bluetooth, internet, GSM and others) [7]. These reasons support and structure the suitability of Android Platform as a controller of OWHAS.

OWHAS controller consists of: firstly, Transmitter mobile, that is used by a remote user, has Android program which presents a user interface screen as shown in Fig. 2 a.

As illustrated on "Remote user interface screen"; there is a list of home appliances in the right side and a list of "Turn on" buttons. In addition, when specified appliance is turned on by remote user the "Turn on" button is disabled on the "Remote user interface screen", then the "Turn on" button is enabled when a user refresh the "Remote user interface " screen.

The second part of OWHAS controller is a receiver mobile; which has Android program that presents a black, white screen with white part, where the photo sensor of that specified appliance is connected on the optical hardware, as shown in Fig. 2 b; which will be explained in optical hardware part.

b) Internet network

The transmitter mobile and receiver mobile is connected by internet network. Internet connection is preferred for availability, distance flexibility, efficiency and usability for different purposes [8].

Fundamentally, Internet connection is available in almost mobile phones, and no need for new hardware or software to be installed in mobile phone to access internet, moreover Internet network cancels the distance between transmitter and receiver and it also produces wireless advantage for different applications. Likewise, the user may use internet for other technologies besides this technology (OWHAS).

c) Optical Hardware

The receiver mobile is not connected directly to home appliances to remove the coupling problems and
to increase system maintainability and usability. This facility can be achieved by using new technology for Home Automation industry; optical hardware as trigger for controlled appliances. Fig. 3 shows a prototype of optical hardware [9].

Fig. 3: Prototype of optical hardware

Optical hardware consists of ordinary photo sensor; which detects light and becomes as short circuit. Therefore, the photo sensor triggers specific home appliance. Moreover, as prototyping, each controlled home appliance is represented by Light Emitting Diode (LED) as illustrated in Fig. 3.

The interaction between these three parts will be discussed and explained in next section.

III. OWHAS Implementation

OWHAS Sub-models that are presented in section II are integrated to construct executable OWHAS. Procedural steps of utilizing OWHAS are illustrated as prototype on Fig. 4.

Fig. 4: Implementation of OWHAS

OWHAS user turns on any of controlled home appliances by pressing the "turn on" button on the "Remote user interface screen"; that illustrated on Fig. 2 then a specified message will be sent to receiver mobile through Internet network, this message converts part of black screen to white part on the receiver mobile. The generated light of white part screen will be detected by photo sensor to trigger the specified home appliance; which is represented by a Light Emitting Diode (LED).

IV. Conclusion and Future Work

In conclusion, The clarification of Optical Wireless Home Appliances System has been presented. This system controls home appliances from any place that has Global System for Mobile (GSM) coverage and the maintainability of adding or removing as much appliances as customer expect is very simple.

OWHAS prototype, as shown in Fig. 4, is only for demonstration and testing but for future work OWHAS will be developed to reach high user expectations by converting prototype as shown in Fig. 3 to printed board, using colored screen for Receiver mobile instead of black-white screen so the ordinary photo sensors will be replaced by colored photo sensors to allow user to control home appliances' numbers and adopting any practical suggestion of customers.

REFERENCES