Design and Implementation of Home Automation with Comforting Sensors (HACS)

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Abstract. In this research we proposed designing a house that facilitates the daily life of human and makes it safer. This was done by identifying some of the necessary actions in our daily lives and applying the idea to them. We did this by developing sensors that work similarly to the five human senses and design a reaction that fits the circumstances. This was done using some mini electronic devices.

Keywords. Home Automation with Comforting Sensors (HACS)

1. Introduction
Smart Home is a common term used for homes that use an integrated central controller with an operating system for different home appliances. Common master controls are those that connect to a Windows PC (PC) programmed by certain functions, and are left to perform home control duties on an independent basis. The integration of home systems allows the devices to communicate with each other and allows the beneficiaries to communicate with these devices through the home automated remote control. The field of home automation is expanding rapidly with the convergence of electronic technologies. The home network includes communication, entertainment, security, convenience and information systems [1], [2].

This paper presents a project of a model designed for Automation home where sensors have been used for sense intensity lighting, smell of gas, temperature and to detect people outside the home. It also provides the possibility to control various home devices by using text messages from mobile phone and this project presents the following characteristics:

- Create an electronic system characterized by speed and high efficiency.
- replacement of human effort electronic remote-control systems.
Facilitate the management process of the home through the network telephone communications.
- Provide ease of handling tools and home appliances.
- Ensure remote access and control of devices.
- Provide effort, time and guarantee more security for home accidents.

2. Using and Implementing Sensors
There are different places and spaces to be monitored frequently and devices to be checked inside and outside the house. For example, doors and windows should be watched from thieves if they try to open them, and suspicious movements should be monitored throughout the house. Similarly, a home member may want to know the status of electronic devices after leaving the home and may need to turn the equipment on or off. In addition, you should monitor the temperature of the house or children's room to trigger the alarm when the critical point is reached. The temperature and movement of a stranger and the opening and closing of doors and windows are monitored by designated sensors. These sensors can be implemented using several different types of sensors depending on the user's desire. [1]

3. Home Automation with Comforting Sensors
This paper was demonstration a project of (HACS) System using four sensors and light system. Home automation system with convenient sensors such as alarms in case of thieves trying to enter the house through the doors in addition to the movement of human around the house or around the restricted areas. The system can also monitor the temperature of certain rooms or gas, sensing light, humidity and alarm when critical temperatures are reached.

The entire system is built by connecting all sensors on the Arduino Uno platform, programming them, connecting connectors and experimenting with ordinary lighting lamps as an alternative to home appliances and then connecting those lamps with the GSM900 platform for remote control by using a mobile phone text message.

3.1. DHT11 (Temperature sensor)
Figure 1. below show the connection of DHT11 sensor with Arduino Uno.

When this sensor is achieved from the temperature inside the home and compares it to the temperature provided in the 20C program as the warmer temperature is more suitable for the home if it is found that it rose from this limit is the reaction is to give the system to cool and the central centre represented here in a small fan installed With him to reduce the temperature and return again after a short period of time to study whether it was found to have decreased and became suitable for the very temperature of the house and sent an order to the fan to stop. This saves the home owner time and effort to rely on the human effort to do such things as shown in figure 2. below.
3.2. The MQ-2 (Gas Sensor)
This sensor works to measure the ratio of the presence of gas in the air of the home. This sensor senses the gas in the air. If it is found that there is a percentage of gas in the air, it will send a message to the buzzer to issue a sound warning the owners of the house or anyone in the area that there is a leak of gas and take the necessary precautions as show in figure 3. below.

3.3. The PIR Sensor (Motion sensor)
This sensor works to sense the movement around it at 360 degree to alert the owners of the house to the presence of strange movement or danger close to home, for example the backyard of the house at night or the approach of one of the house during the absence of the owners and the sound of alert Buzzer every two seconds to stay away from The range surrounding the sensor as show in figure 4. below.
3.4. LDR Sensor (Light Sensor)
This light sensor works on sensing the intensity of the light around it. If the intensity of the lighting in the home is reduced due to the power outage or light damage, it sends an order to run the lighting associated with it to compensate for the lost lighting. This helps the owners of the house to overcome the obstacles and accidents in the electrical current and known problems as shown in figure 5. below.

![Figure 5. LDR Sensor Connecting and Testing](image)

3.5. The GSM900
The GSM900 is the one that will contain the mobile phone chip which will receive the messages controlled in the operating orders and stop the devices connected with the relays for remote control and without the need to be near. The owner of the house to send encrypted codes known only and is the one who chose or the engineer programmed to run or shutting down the device that carries the symbol of it separately, in case of forgetting one of the main devices of the home and that can cause a serious accident can easily be extinguished thousands of kilometres away, which will increase the emphasis on protection and safety home without relying on the existence of the Internet, for example. The coverage of the satellites around the ball ground wider and broader for the network of telephone communications and towers spread almost everywhere even in remote places, as well as that the Internet needs to have a constant power supply and this can be followed by the interruption of the current as often happens so the network does not rely on communications. The presence of electricity mainly can operate on a low voltage battery with ease and safety as shown in figures 6, 7. below. This device of the system connecting all of home devices remotely by using semi card and the user send text message with texting 0 to turn the device off and 1 to turn it on.

![Figure (6) GSM Connecting](image)
The second message control another device to turn on/off it from far away as show below.

![GSM Testing](image1)

**Figure 7.** GSM Testing

The final shape of the project is shown in figures below:

![Home with HACS System](image2)

**Figure 7.** Home with HACS System

**References**

[1] Kit Walsh. "Nest Reminds Customers That Ownership Isn't What It Used to Be". Retrieved 2016-04-07

[2] Chadwick, Susan. "The His and Her Gift". Texas Monthly. p. 147. Retrieved August 16, 2013.