USING THE WEINTEK HMI IN SMART HOME CONTROL

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Abstract*: The importance of smart homes is growing rapidly due to growing industrial demand. One of the main goals of a smart house is to make our daily lives easier by increasing the level of comfort. This paper presents the process of designing an interface of a smart home through which we can control certain devices and features of the house such as: lighting, alarm and surveillance system, outlets, air conditioning system and so on. The application was made using the EasyBuilder Pro software. The great thing about Weintek screens is that they are compatible with a multitude of PLCs, and due to their modern appearance, it is easy to include them in the interior design of a home. Smart homes will gain massive popularity in the future as current trends indicate that they are becoming the center of smart services consumption.*

1. INTRODUCTION

In a world where technology is advancing from one second to the next at a rapid pace, we must adapt and learn to keep up with it. We live in an almost entirely digital world where a simple voice command or a simple click acts on an electronic device which, in turn, will receive and further execute the received command. The terms smart homes and intelligent homes have been used for more than a decade to introduce the concept of smart devices and equipment in the house [1,2].

According to the Smart Homes Association the best definition of the smart home technologies is “The integration of technology and services through home networking for a better quality of living” [3]. Smart homes are not only an interesting topic, but also a growing

industry as well as entering to a broad audience home gradually. Most programmers have to design smart home systems case by case and spend a lot of time managing them [4,5].

This paper presents the process of designing an interface of a smart home through which we can control certain devices and features of the house such as: lighting, alarm and surveillance system, outlets, air conditioning system and so on.

2. WEINTEK EMT3120A TOUCHSCREEN

For this simulation, we used the Weintek eMT3120A touch screen and the EasyBuilder Pro software. The touch screen makes it easy to create a graphical interface for a large number of PLCs on the market. This is more than a simple screen; it is able to program the PLC and transfer data and programs between several similar devices from this manufacturer.

There are many things that this panel can do. It connects to over 300 different protocols/devices (PLCs, inverters, etc.), the CAN Bus port supports the CANopen protocol, it can communicate with different devices/protocols at the same time, it has a switching function (PLC program via HMI connection), remote monitoring and error diagnosis, it has Internet Of Things (IoT) connectivity and access to any HMIs via EasyAccess. Weintek eMT300 series brings together in a single HMI robustness (aluminum box), high speed process (up to 800 MHz CPU), communications and remote management of alerts [6].

EasyBuilder is a powerful software that greatly simplifies the visualized project editing and supports more types of communication protocols like Ethernet/IP, Modbus TCP. Users are ensured to communicate with peripheral devices all with ease and complete project designs swiftly in the shortest possible time [7].

Fig. 1. Weintek eMT3120A touch screen

3. SMART HOUSE CONCEPT AND APPLICATION

The concept of smart homes is widely preferred because it improves the lifestyle of its residents through easy control of lighting, temperature, security, and many other features. As smart home networks continue to grow in size and complexity, it is essential that we address many of the challenges like data loss due to interference and efficient energy management. The field of home automation is expanding rapidly as electronic technologies converge [8]. The only thing that remains constant is the permanent control of the intelligent system that the residents of an automated house have. In addition, a lot of routine tasks that are part of the owner's comfort such as (adjusting the heating, activating, or deactivating the security system, lowering and raising the blinds, etc.), become an ensemble that can be transformed into simple sets of pre-programmed and customized operations. As soon as such a plan is set up, the comfort level of the house will increase to a level that previously seemed unimaginable.

3.1. Home page of the interface

The program opens with the home window where we find the general button which gives us access to all the rooms in the house. In the figure below, you can see the buttons for the upstairs rooms. You cand choose wich room you want to enter and change the lighting, blinds, temperature and security control individually.

Fig. 2. Home page

3.2. Lightning control

Lightning is one of the most important aspects in terms of home comfort. So, we are talking about the use of lighting in certain areas of the house considering the needs and the season or time (whether it is day or night). At the same time, we need the access roads lighting at night or lighting for surveillance cameras, as well as outdoor lighting for the garden or pool lighting. We can also talk about the light architecture that automatically contributes to the comfort and ambiance of the home. In the bedroom plan presented below, we marked the two-way switches together with their corresponding light with the red color. This way, you can turn on the light as you enter the room, and you don't have to worry about turning it off, because you can do this through the other switch next to the bed.

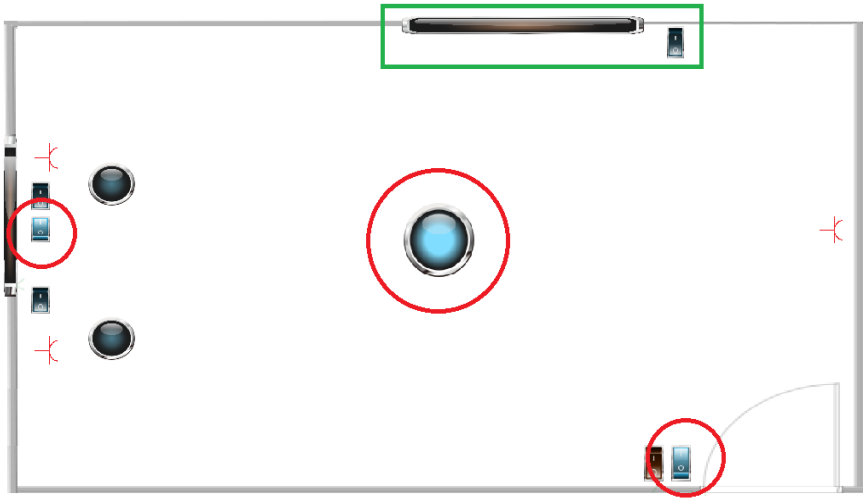
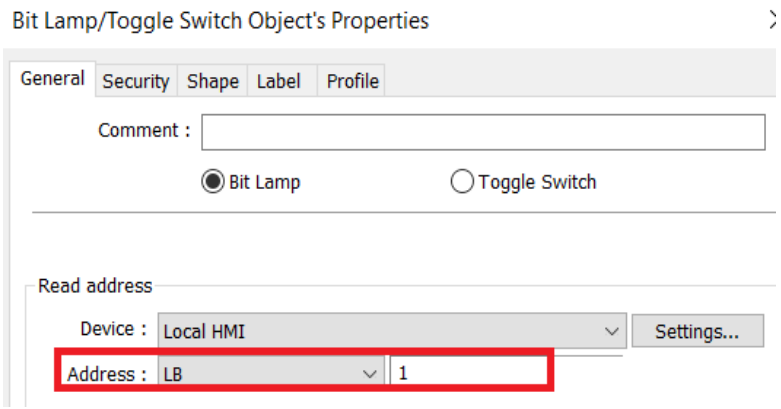


Fig. 3. Bedroom plan

The switch connects to the lamp through an address number. How this works is that the bit lamp with the address LB 1 will be turned on/off by the toggle switch with the address LB 1 as seen in *figure 4*.



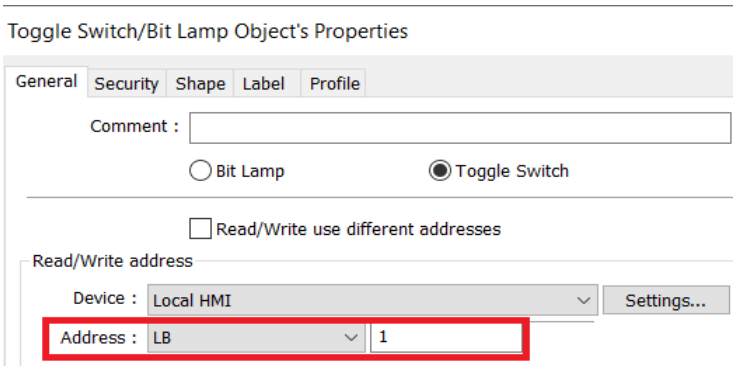


Fig. 4. Lamp/Switch selection

3.4. Temperature control

Temperature comfort increases with the automation of the heating system. An automated system will ensure a set temperature in any room, which is created to the liking of residents, regardless of its orientation or space. For example, in the figure below we presented the case for the living room. The ideal temperature was set at 23 degrees Celsius. If the temperature drops below 23, the heating system will automatically start, and it will be warming up the room until the desired temperature is achieved. On the other hand, if the temperature rises above 23, the air conditioning system will start, and it will be cooling down the room in order to achieve the ideal temperature.

Temperature control is performed on each area of the house and on hourly levels, with the possibility of changing the scenario at any time, through the application or remotely via the Internet from any phone, tablet, or PC.

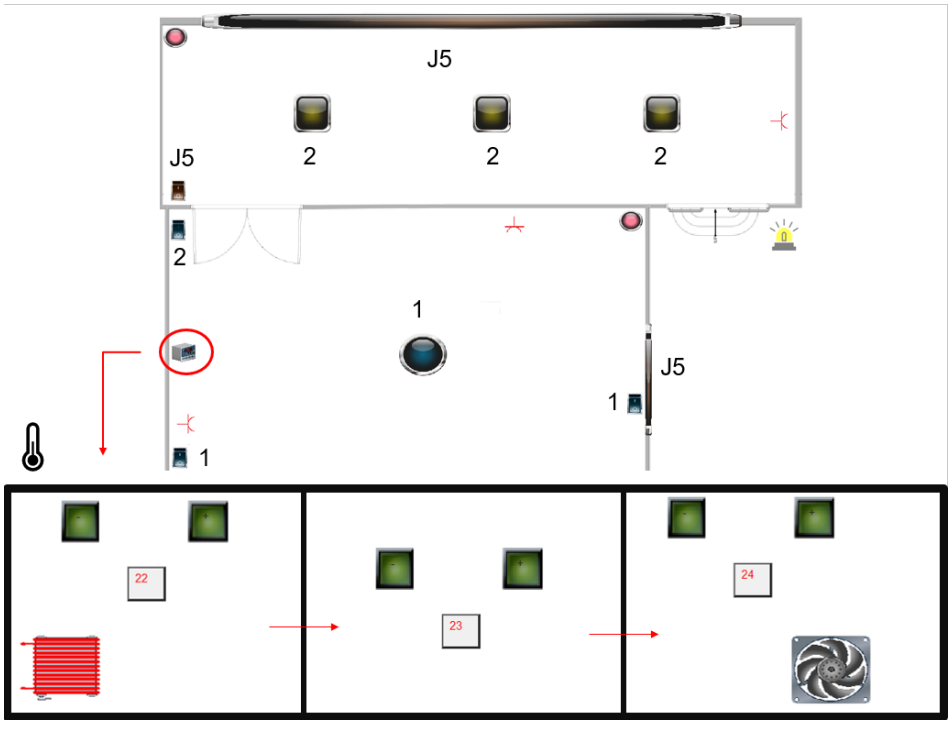


Fig. 5. Temperature control

The properties used for the heating and cooling system can be seen in the figure below.

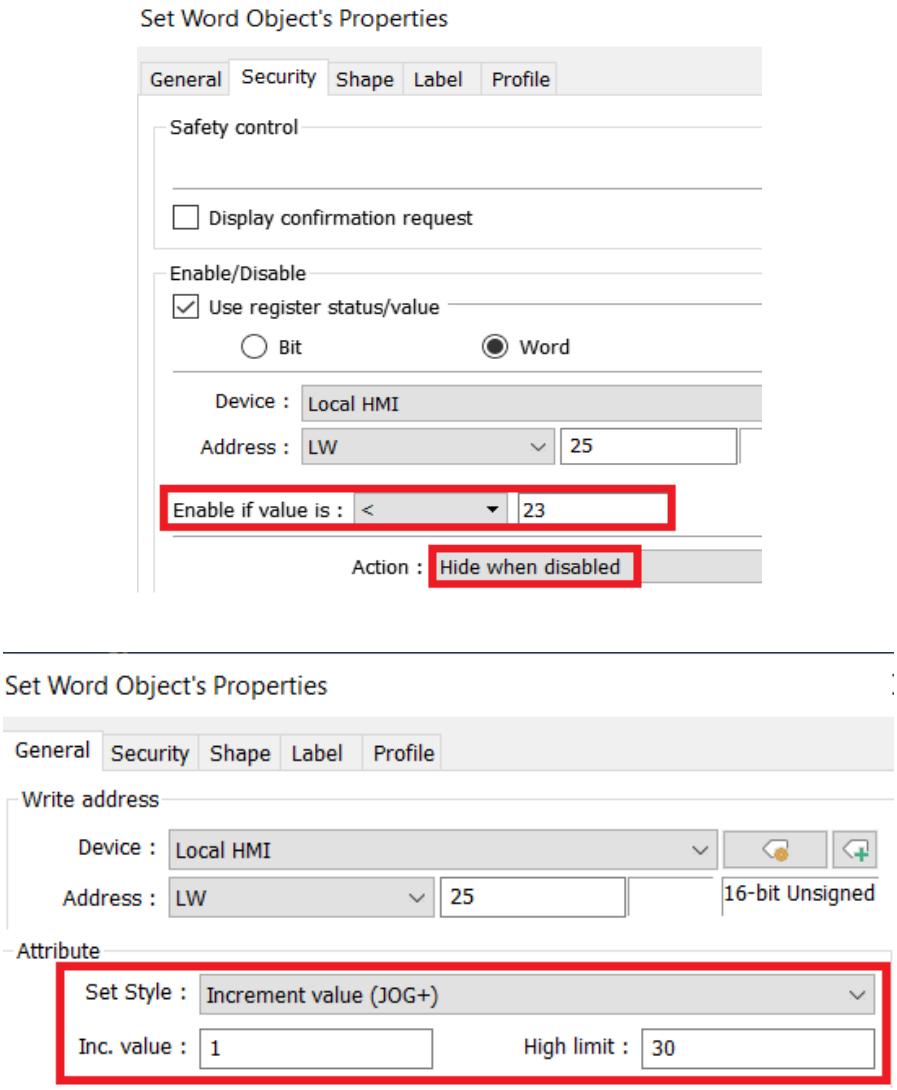


Fig. 6. Heating/Cooling system properties

3.5. Security control

You can "teach" your home to call people close to you or even you if there is an alert situation. You can save money on security monitoring services or even to monitor non-traditional security events such as the baby, water, or gas. Each resident of the house is assigned an access code with which, once entered, he is allowed access to certain devices in the house depending on the class corresponding to the device. The passwords for each resident are assigned individually from the system parameter settings tab like in *figure 7*. Also, from this menu, you can choose which class the residents have access to.

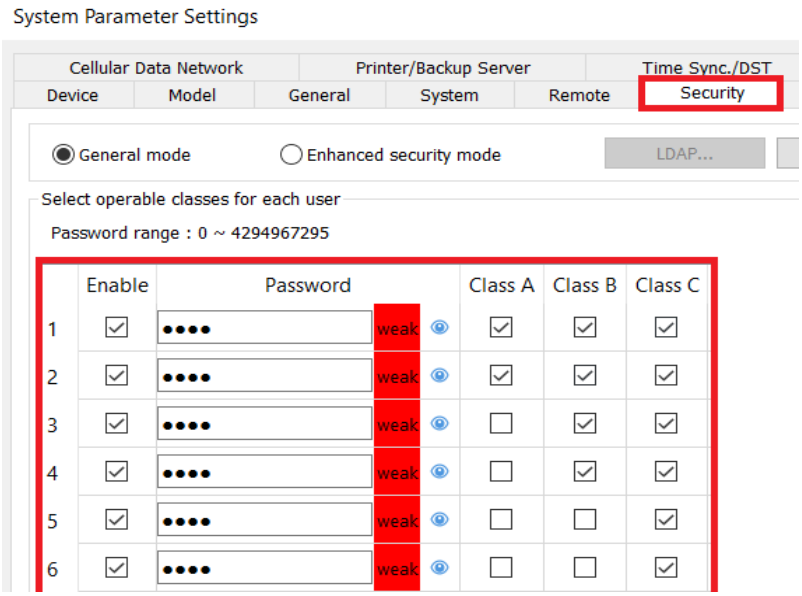


Fig. 7. Password distribution

The plan of the entrance of the house is presented in *figure 8*. In this scenario the alarm sensors are off, thus the whole security system is off.

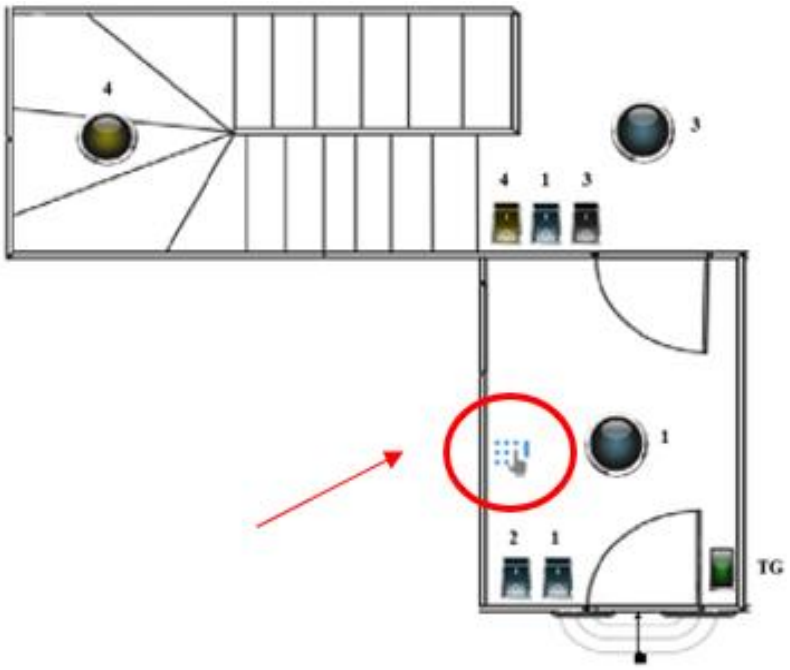


Fig.8 Entrance Hall plan (alarm off)

When you press the keyboard image that is circled with red from *figure 9*, it will pop up a new page where you have to choose the resident and insert the password. In the top left corner of *figure 10*, there is a list with the residents and the allocated password for each one that consists of a four-digit number.

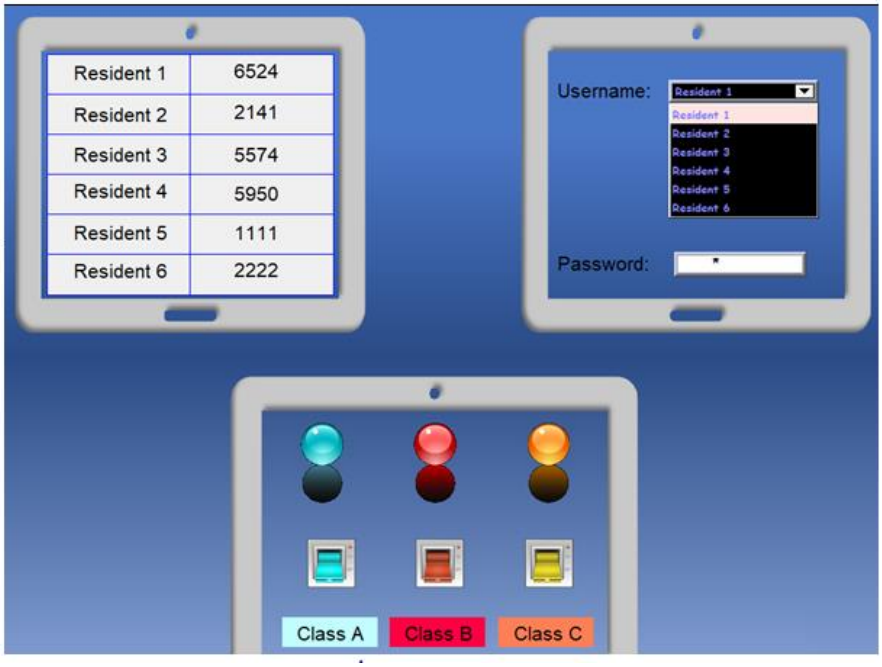


Fig. 9. Access control

By logging in with the username and password designated to resident 1, you get instant access to the security system by turning on the class A switch. After that, the moving sensors will activate instantly.

4. CONCLUSIONS

The importance of smart homes is growing rapidly due to growing industrial demand. One of the main goals of a smart house is to make our daily lives easier by increasing the level of comfort [9]. This paper presents the process of designing an interface of a smart home through which we can control certain devices and features of the house such as: lighting, alarm and surveillance system, outlets, air conditioning system and so on. The application was made using the EasyBuilder Pro software.

The great thing about Weintek screens is that they are compatible with a multitude of PLCs, and due to their modern appearance, it is easy to include them in the interior design of a home. Smart homes will gain massive popularity in the future as current trends indicate that they are becoming the center of smart services consumption.

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