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Smart Home

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Disclaimer

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ABSTRACT

This project is based on building a model that simulates home automation with different operating modes that can also be controlled by a mobile application, a model of a miniature house has been developed so that it has many advantages and characteristics, making it easier for the customer to control the house in terms of lighting, doors and windows through a mobile phone easily, as for the external doors, some of them will be controlled Through mobile application, some via the card, and an automatic air conditioning system will be added so that the house temperature is adjusted automatically, and we will rely on sensors in particular in our project such as flame sensors to identify the presence of a fire in the house, and water sensors to check rain and control the Opening and closing windows, in addition, an automatic irrigation system that works based on the moisture of agricultural soil, using a moisture sensor as a measure of humidity, also Remotexy application used to control the features, so our project combines the IOT and automation technology, which makes life easier.

CHAPTER1: INTRODUCTION

Nowadays, the Internet has become a basic and widespread thing all over the world, and the idea of using wireless communication to control your home is a wonderful idea and provides the user with comfort and speed to control the facilities of the home.

The idea of this project is based on the use of Internet of Things technology, which allows the user to communicate in the wireless home system through a phone application and thus know what is happening in the house such as a fire, or even an indicator of rain, imagine that you came in your car and want to By opening the main gate, you will open it easily by phone, and the interior lighting control system for the house provides you with a choice between several colors of lighting, and we also provide automatic control in some parts through the use of sensors, such as closing the window automatically when it rains And lighting the stairs when going up or down it, and when plants need irrigation, there is a moisture sensor that measures soil moisture and turns on the pump automatically.

CHAPTER 2: CONSTRAINTS

We faced some obstacles during the period of work on this project, the most important of which was the time, as the project was in the summer semester, and due to the nature of the intense working hours, we were able to manage and divide our time with difficulty.

We also faced the problem of the high prices of electronic parts, and this took a lot of time to find the appropriate and reliable source to buy tools, and this is the first time that we use these parts, especially the Arduino, as it took us a lot of time to learn how to deal with them.

We used the open sources on the Internet, the most important of which is YouTube, to learn how to program the Arduino and its inputs and outputs, and how to write a code to control an electronic piece connected to one of the outputs through another piece interconnected to another input.

One of the courses that had an important and introductory role in learning how to control a device via Wi-Fi and the use of an ESP piece is the wireless course, and the microprocessor course had an important role in learning how analog and digital signals work and how take advantage of it.

CHAPTER 3: LITERATURE REVIEW

There are many projects under the name of the smart house, but they differ in the nature of the systems they contain. Some of the basic systems are found in every house and some are distinctive. We have added them as a new feature such as the interior lighting control system, which gives 255 colors, and closing the windows when raining and Stairs lighting when going up and down .

CHAPTER 4: METHODOLOGY

4.1 DESIGN THE HOME

In the beginning we drew a sketch of the model of the house we need based on the systems it contains, then we took the sketch of a carpenter to design the house for us as shown in the figure.

Figure 1: Home Design

4.2 INITIAL STRUCTURE FOR THE HOME

The measurements of the home are: height (50 cm), width (80cm) and length (60 cm).

Figure 2: Home Measurements

Then we implemented and added the following systems:

4.3 LIGHTING SYSTEM

OUTSIDE LIGHTING:

In the beginning, garden lighting for the house is one of the most important factors that play in giving a beautiful view and feeling to the people in the house, and therefore we made an external lighting system using LEDs.

And the user can control the lighting and switching off of this system when he wants through the mobile application on which the system is defined.

INSIDE LIGHTING:

The interior lighting of the house is a basic and important thing, so how if it is in 255 colors, the user can choose one of them through the RGB scale in the application, so that he chooses the color he wants and suits him and only using one lighting source, which is the LED strip.

4.4 IRREGRATING SYSTEM

There is a planting basin in the garden of the house, and these plants need care and irrigation to maintain them and their beautiful appearance, and for this reason we have added an automatic irrigation system to our house, which depends on soil moisture. We used the moisture sensor to check the soil moisture, and when it falls below a certain limit, it gives the command to the pump, to pump water on the plants until it reaches the required limit, and the user can control the operation of the pump by phone as well.

Figure 3: Irrigation System

4.5 STAIRS LIGHTING

One of the aesthetic additions to the house, lighting the stairs when going down or ascending on it, we added this feature by using a 12-volt LED strip and an Ultrasonic sensor to measure the distance between it and the person on the stairs

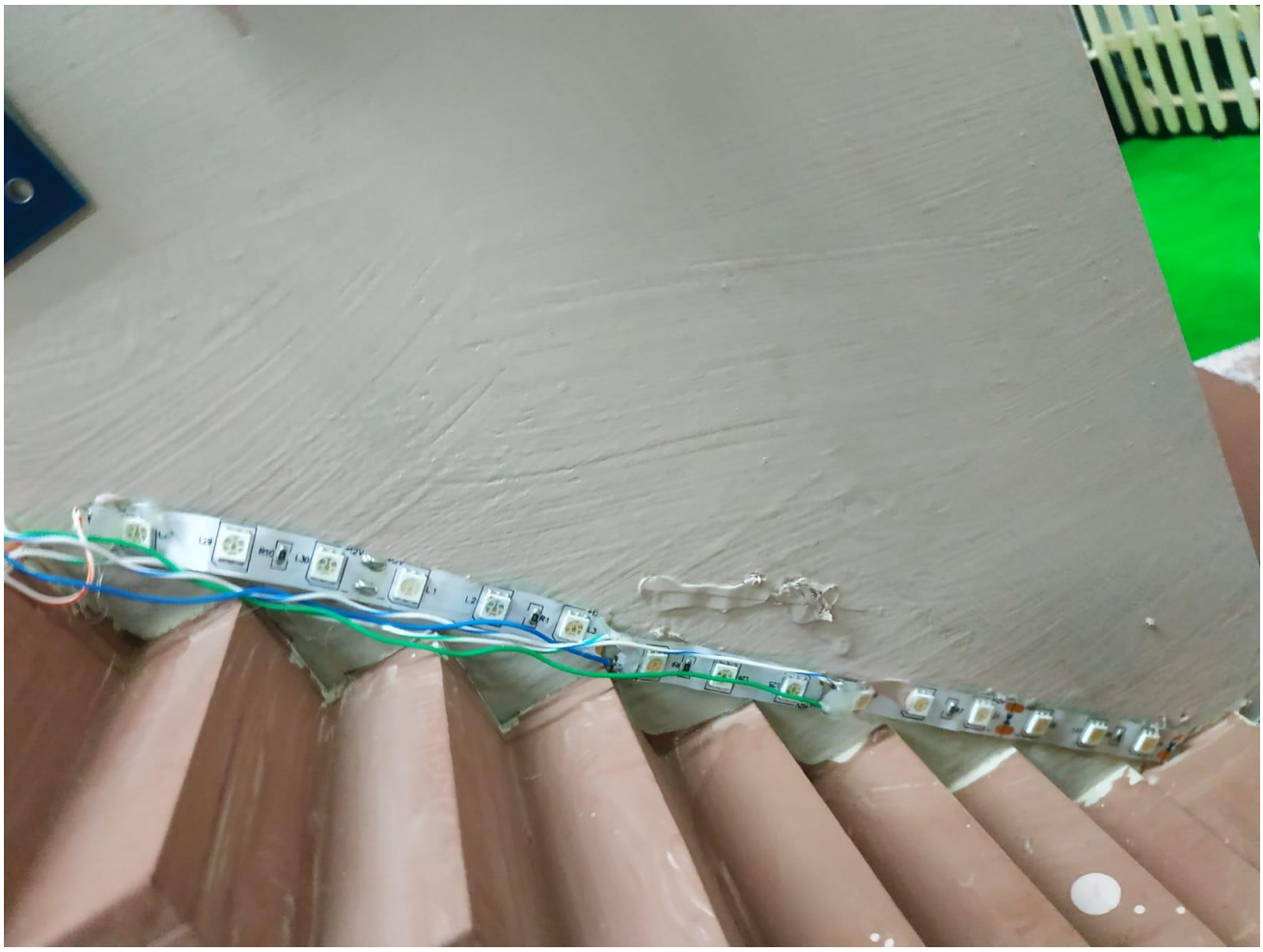

Figure 4: Stairs Lighting

4.6 DOORS SYSTEM

MAIN DOOR:

This constitutes the main gate of the house, which is a servo motor controlled by the phone, which provides convenience and ease for the user compared to the main gates that have to carry a remote control for the gate, or the normal gates that do not contain any control system.

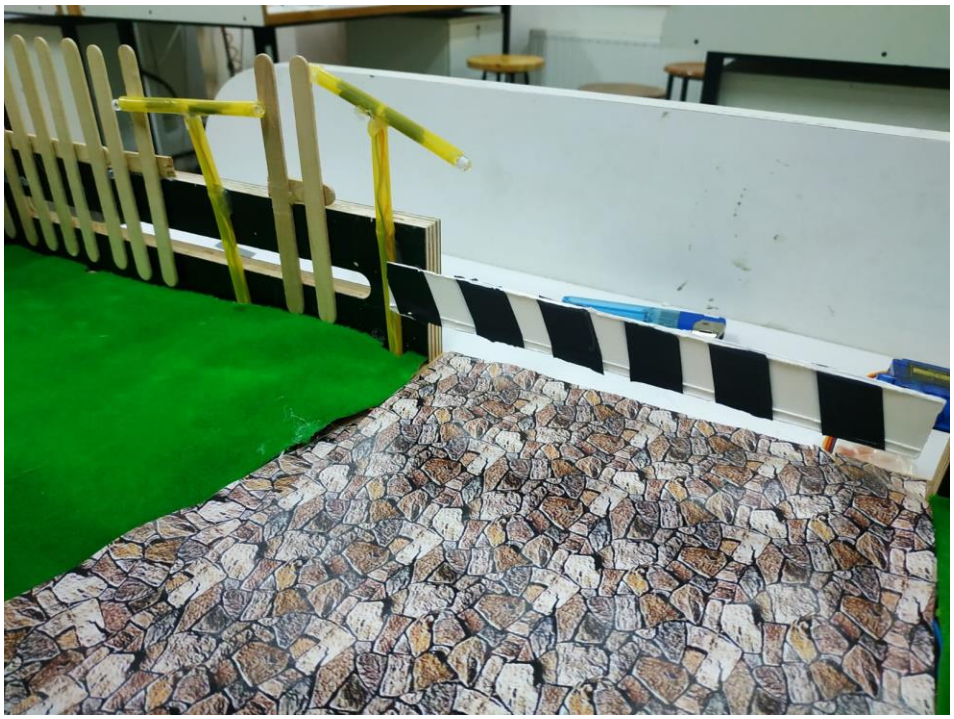

Figure 5: Main Door

GARAGE DOOR:

As for the garage door, which today has become a natural thing to operate automatically, it was designed in our house to open automatically when an object is detected near it for a certain period of time, through an IR sensor.

Figure 6: Garage Door

DOOR CARD:

And now the main house door, which is the most important, has been designed to work using its own card, it is read by RFID, and based on it the door is opened, and to ensure security, the door is opened only on this card.

Figure 7: Door Card

4.7 WINDOW CONTROL SYSTEM

Imagine that the rain is outside and you do not want the water to enter your house when it rains. Our system easily provides the feature of closing the window when it senses rain through the water sensor, and therefore it provides you with comfort and protects your home from water leakage to it when the rain falls dramatically sudden.

Figure 8: Water Sensor

4.8 COOLING SYSTEM

To provide a cool atmosphere in the hot summer and at high temperatures, we designed a cooling system, which works when the temperature exceeds a certain limit, and with ease it can be controlled to turn it on or off using the phone application.

Figure 9: Cooling System

4.9 FIRE DETECTION SYSTEM

To protect our home from any fire that may happen suddenly and without our realizing it, the Flame sensor sends an alarm to warn us of that, by using the buzzer that emits a loud sound to warn us.

Figure 10: Flame Sensor

CHAPTER 5: RESULTS AND DISCUSSION

We have built the smart home step by step, developed a plan to work on it, monitored the characteristics that we will apply, then we checked each of them separately and purchased the necessary electronic parts for them, then tested them by writing a code to represent them, and then added them to the system, then tested the feature following and checking the properties with each other.

We encountered problems related to the power source to operate the system especially that the main microcontroller (Arduino) is a voltage-sensitive microcontroller. Sometimes it did not give enough power to the system, and in some of them, a malfunction occurred due to pressure on it.

But in the end, we were able to overcome these problems and finish the project in the best possible way within the time available to us.

CHAPTER 6: CONCLUSIONS

6.1 CONCLUSIONS

And in the end, we were able to finish this project and get results as we expected. It became easy for us to deal with control panels such as Arduino and sensitive electronic parts. We discovered that it is possible and easily to implement this mini-system in real life, but using larger tools, We tried to implement the features that we were able to accomplish in the time available to us, but there are many other things that could have been added, but due to the lack of time we were unable to implement them, such as the TV remote control system using the mobile app, or the wireless elevator system, and even the Facial recognition to open and close doors.

And we aspire in the future to supervise the implementation of this model realistically and to develop it.

6.2 FUTURE WORK

As a future work that can be added to develop the system and give it a distinctive character, we aspire to:

1. To add more security to the house, a motion sensor can be added that works when all people leave the house, so that it gives an alarm in the event of a thief.

2. Add a camera at the entrance to the house so that it works on the facial recognition feature, and if someone comes to you, a notification will be sent that this person has come.

3. Adding a smart swimming pool, so that the temperature of the water inside it is controlled according to the temperature of the place so that people can use it without caring about the temperature of the water and its heating or cooling

REFERENCES

- YouTube, https://www.youtube.com/ .
- Arduino Documentation, https://docs.arduino.cc/hardware/mega-2560 .