

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Overview

This chapter describes the concepts and steps taken in implementing the system, containing detailed description of all the system hardware and software components. It also shows the results of the system with aid of images.

4.2 Simulation Results

Proteus 7.9 Professional program was used for simulating components and arduino IDE for writing the code.

4.2.1 Results of fire detection using four flame sensors

The four switches in figure 4-1 and 4-2 below represent the equivalent circuit of the four flame sensors, also the resistor in this circuit work as a pull up resistor.

When any of the flame detector detect a fire it will send a five volt signal to the main controller, otherwise it will send a zero volt signal. These two cases are shown in figure 4-1 and 4-2 respectively.

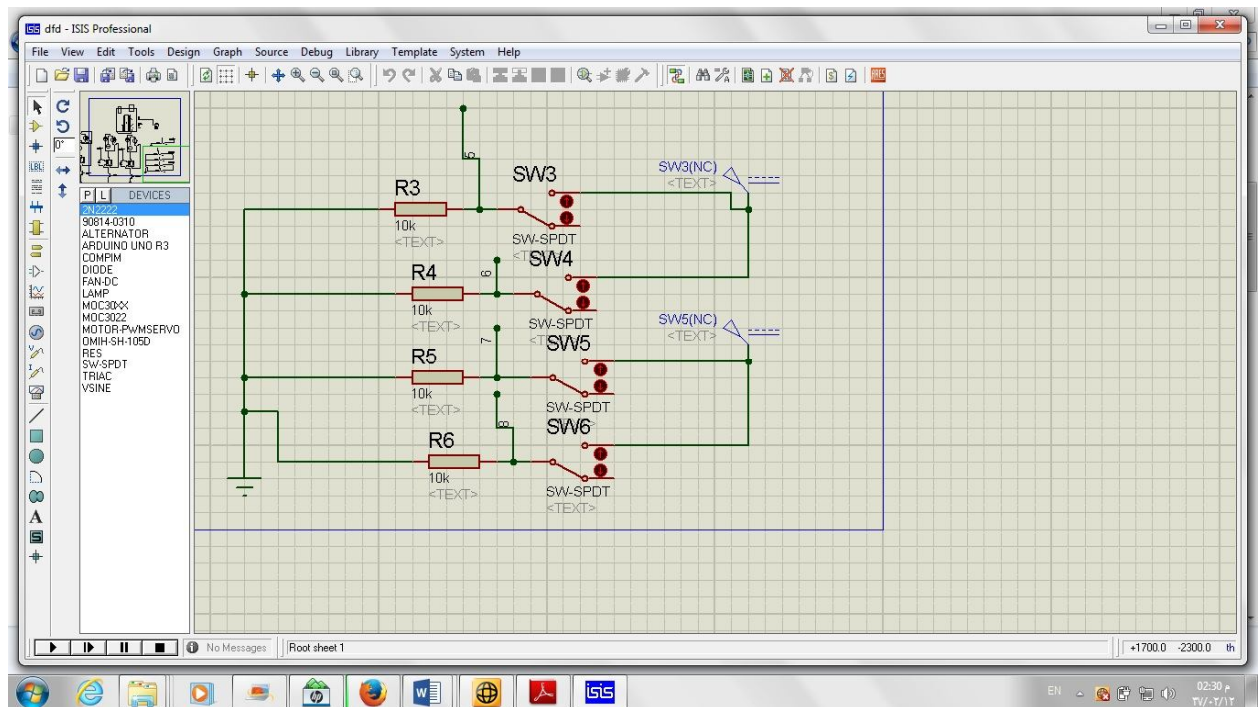


Figure 4-1 Case one: No fire is detected

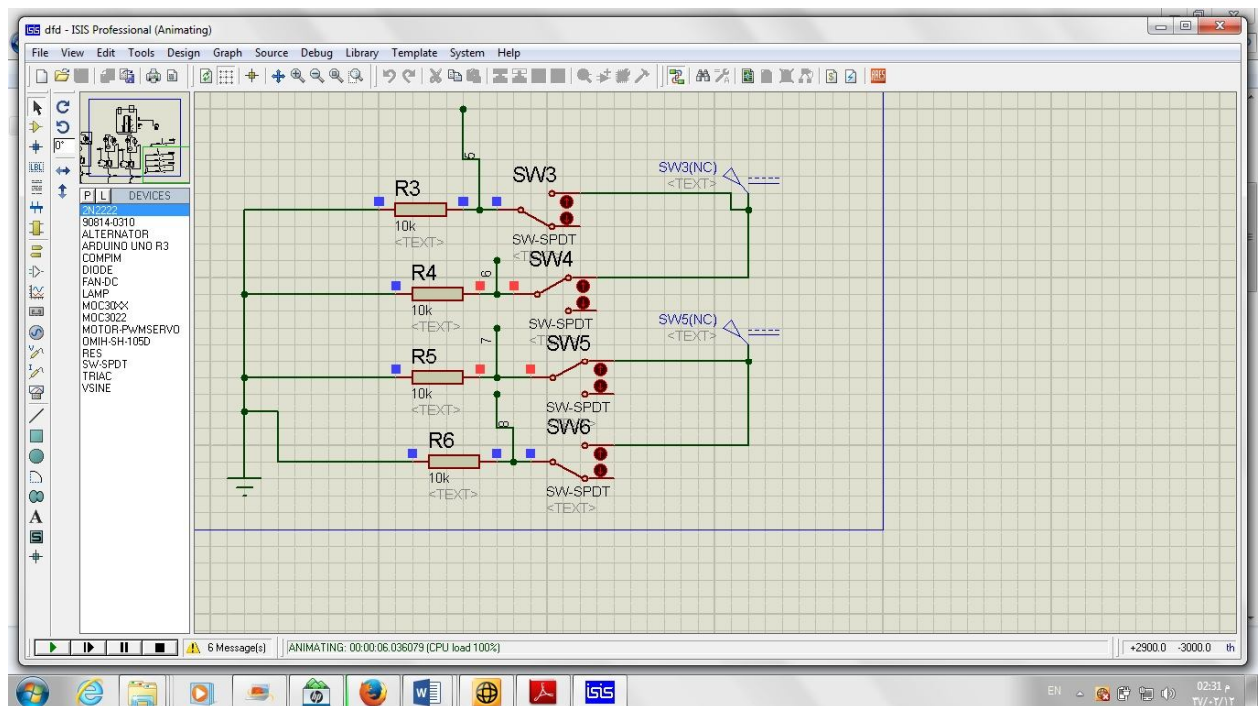
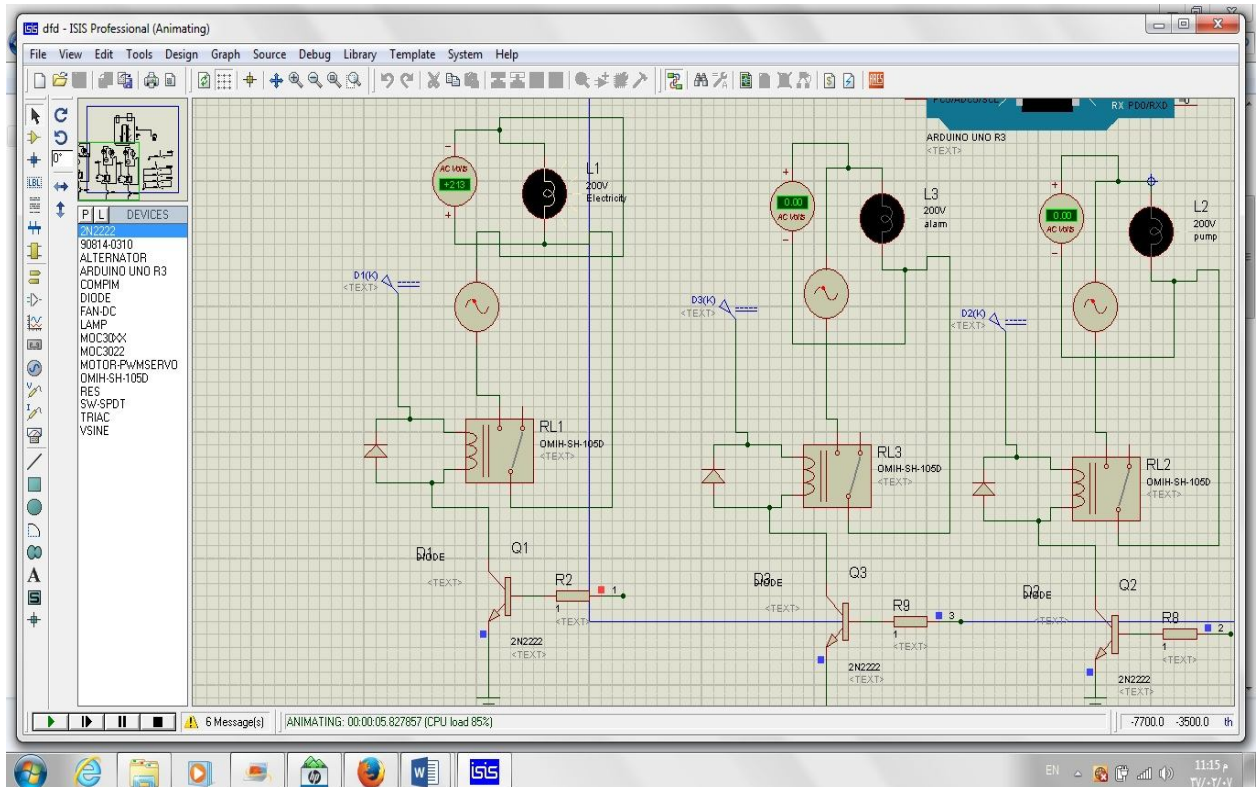


Figure 4-2 Case two: Flame sensors detecting fire

4.2.2 Results of relay control circuit

As shown in figure 4-3 and 4-4 below three relay circuits (as explained in chapter three) are used for controlling electricity of the location, opening the water pump and activating the alarm system, it will receive a signal from the main controller to control these functions, these functions will be



explained in next section.

Figure 4-3 Case one: Fire is not detected

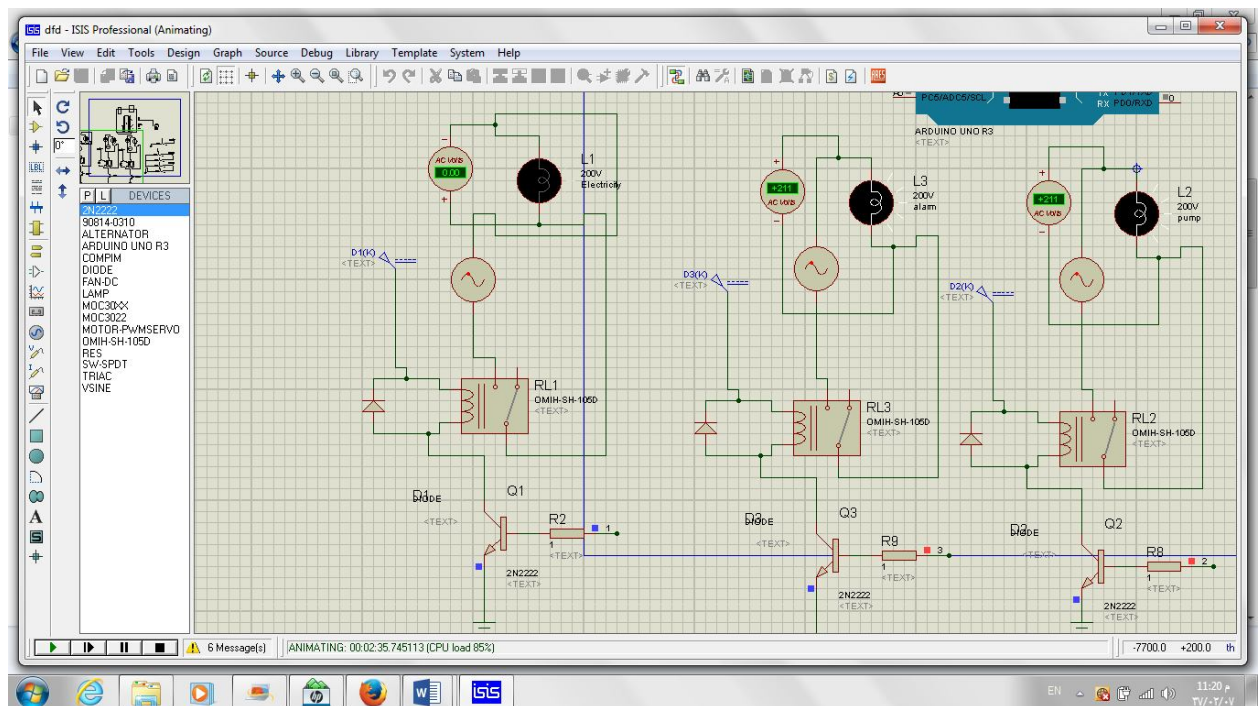


Figure 4-4 Case 2: Fire is detected

4.2.3 Results of gas sensor and servo motor

The switch in figure 4-5 and 4-6 represent the equivalent circuit of gas sensor. Also the resistor in this circuit work as a pull up resistor.

When the switch turn on it will send a five volt signal to the main controller to rotate the servo motor 180 degree counter clockwise, as explained in chapter three.

When its turn off it will send a zero volt signal to the main controller to rotate servo motor 180 degree clockwise.

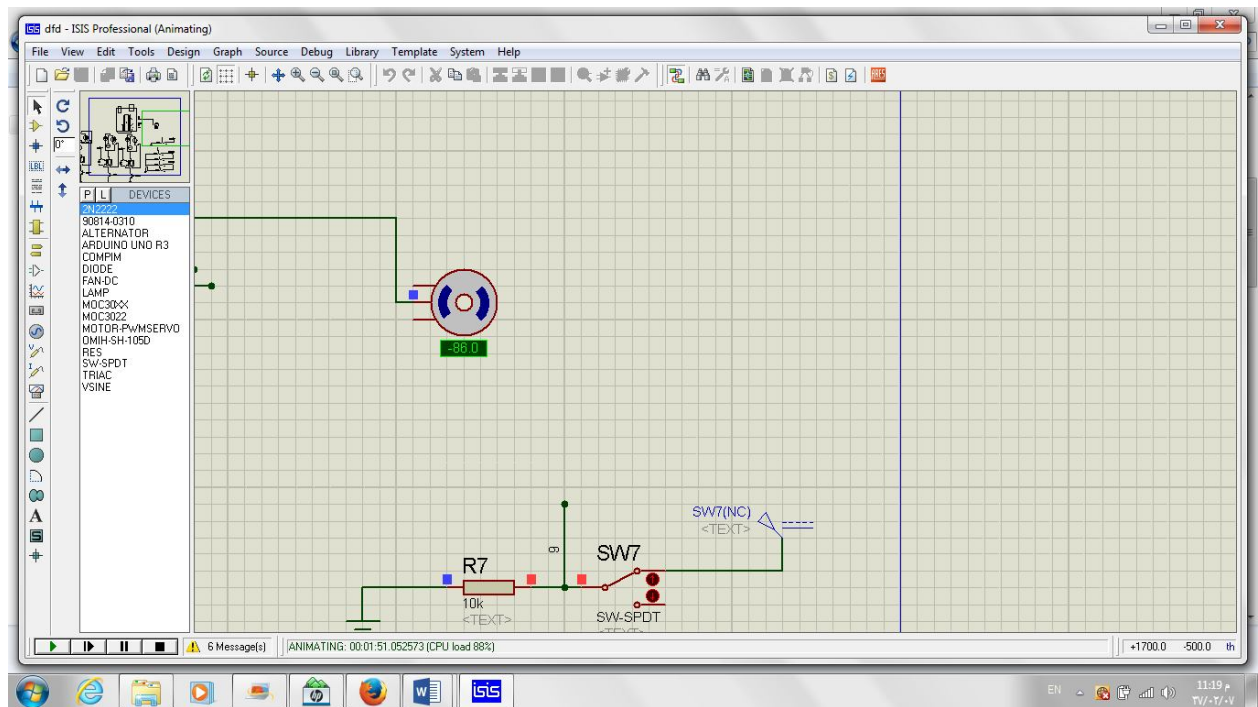


Figure 4-5 Case 1: Gas is detected

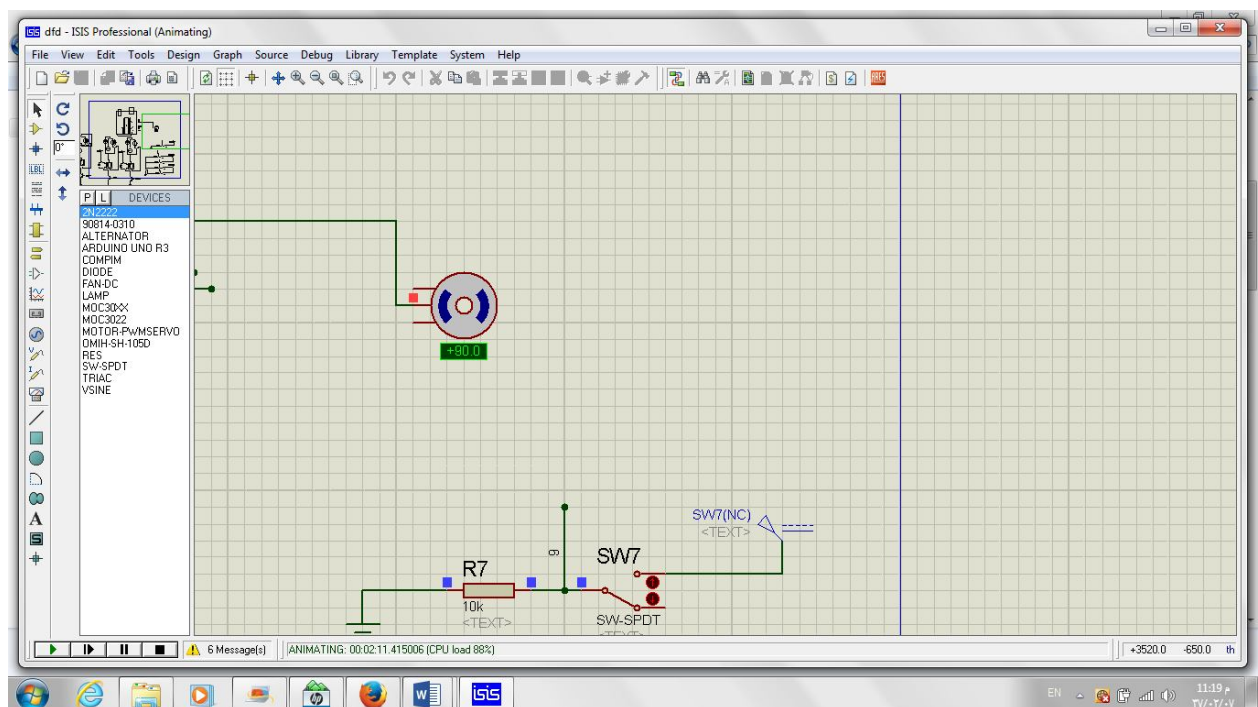


Figure 4-6 Case 2: Gas is not detected

4.2.1 Results of the main controller signals

The main controller receive signal from flames and gas sensors (as it explain in the previous sections).

There are two cases in detecting fire:

Case 1 when the main controller receive a five volt signal from any flame sensor which indicate that there is a fire detected, the main controller send a control signal to the relays:

- To disable the electricity of the facility
- To enable the water pump
- To activate the alarm system

Case 2 when the main controller receive a zero volt signal from all the flame sensors which indicate that there is no fire detected, the main controller send a control signal to the relays:

- To enable the electricity of the facility
- To disable the water pump
- To deactivate the alarm system

Note that case 2 is the default case.

There are two cases in detecting gas leakage:

Case 1 when the main controller receive a five volt signal from the gas sensor which indicate that there is a gas leakage detected, the main controller send a control signal to the relay to close the gas valve.

Case 2 when the main controller receive a zero volt signal from the gas sensor which indicate that there is no gas leakage detected, the main controller send a control signal to the relay to open the gas valve.

Note that case 2 is the default case.

Figure 4-7 and 4-8 illustrate case 1 were there are fire and gas leakage detected and case 2 where there are no fire and gas leakage detected.

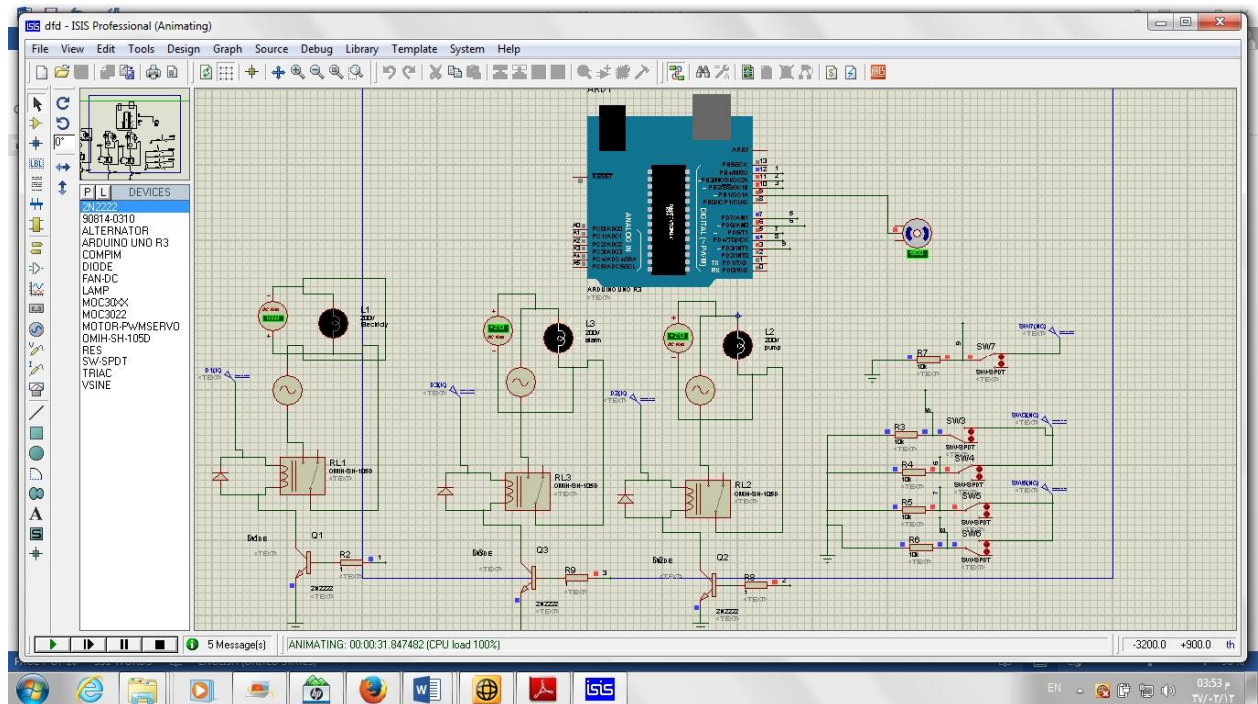


Figure 4-7 Case 1: Gas and fire detected

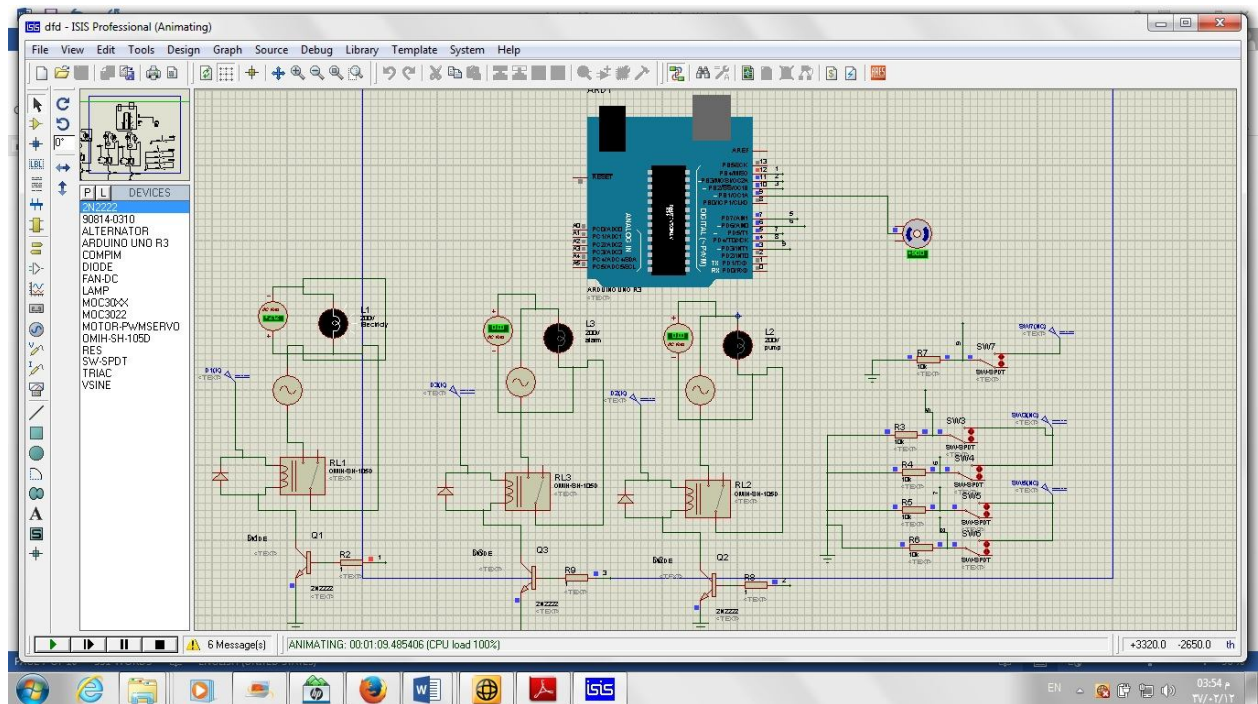


Figure 4-7 Case 1: Gas and fire not detected

4.3 Web server Result

This section describe the web server uploading process and the web server page.

4.3.1 Serial Monitor Result

When the Arduino is attached to a computer, it can use the computer screen as a way to show its data (serial monitor), figure 4-9 shows the data uploading process to the web server in the serial monitor.

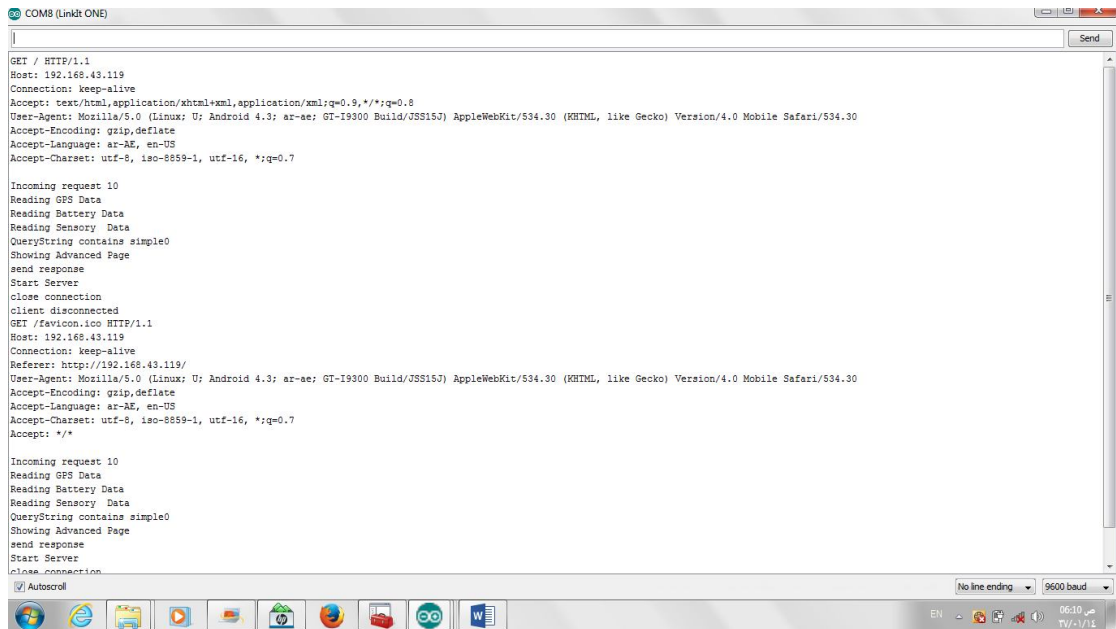
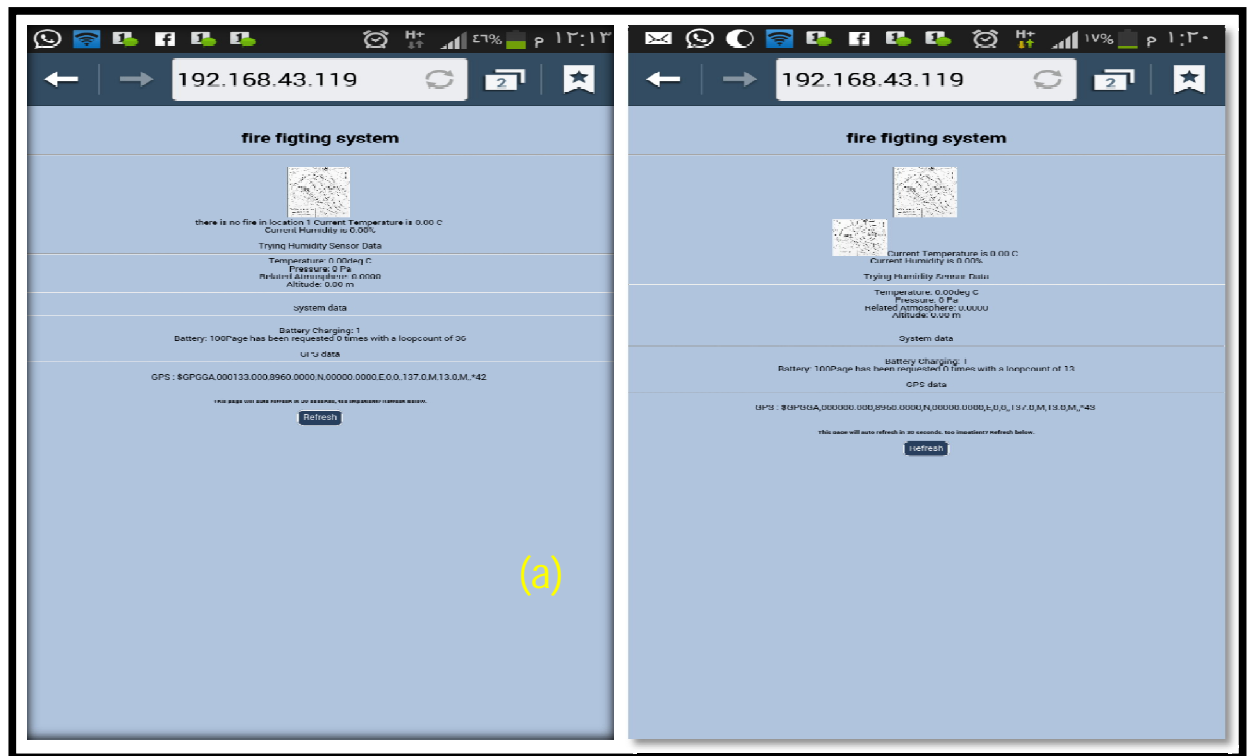


Figure 4-9 the data uploading process to the web server in the serial monitor

4.3.2 Web Server Page

The web page receive updated information about the facility situation, in case there was a fire in the facility, it will show the exact location of the fire illustrated in the map, as shown in figure 4-10.

Figure 4-10 The Web Server Page when
(a) there is no fire detected (b) there is fire detected



4.4 Hardware Implementation

Figure 4-11 shows the hardware implementation of the system which include the flame and the gas sensors, the servo motor, the Wi-Fi antenna and the main controller Arduino Linkit ONE which is connected to the computer through USP cable.

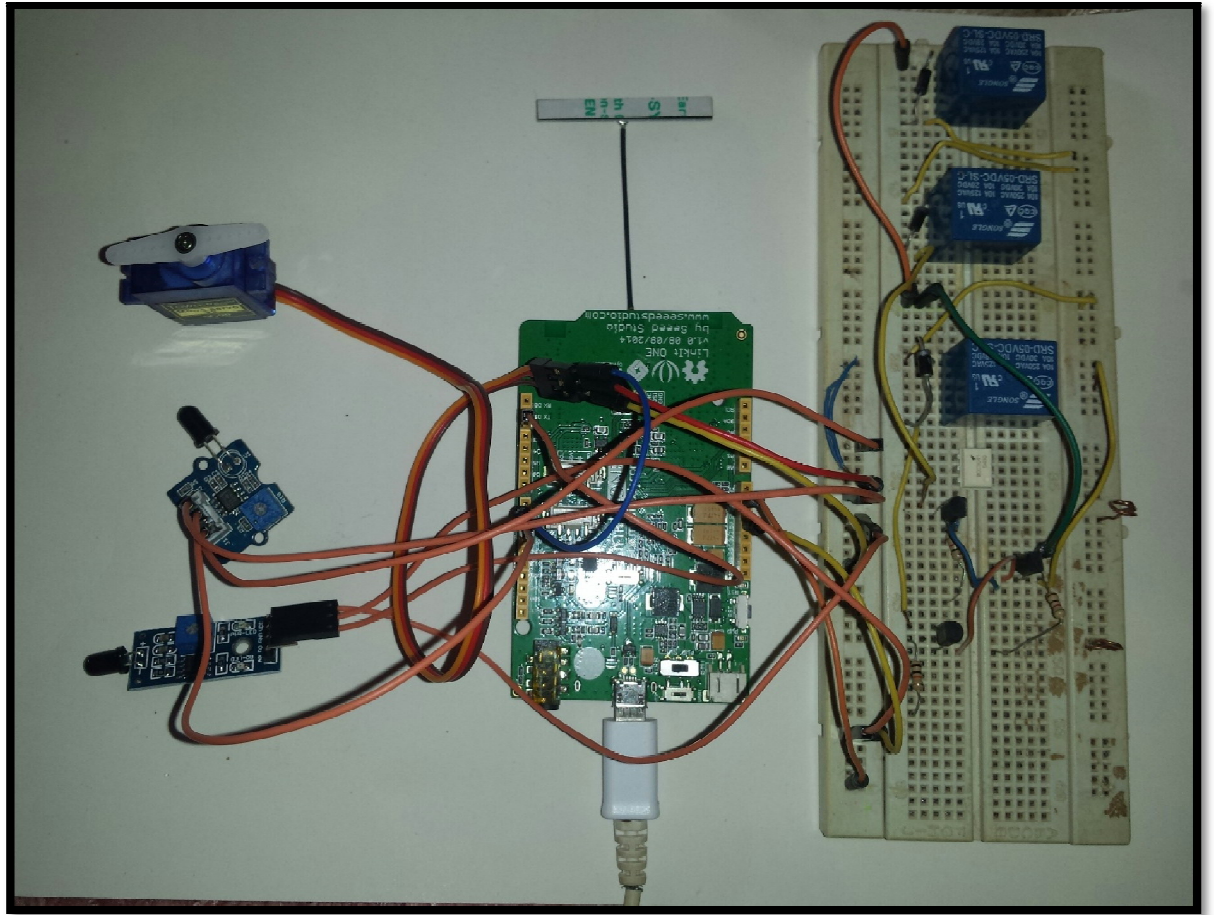


Figure4-11TheHardware circuit