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INTRODUCTION TO C PROGRAMMING

Individual Assignment ICP

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Total number of pages including this cover page.			**17**

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1. INTRODUCTION AND ASSUMPTIONS

In this C programming project, I have designed a model of Hydroponic System for tomatoes. Said Hydroponic System allows the user to get into different information such as Ph level, temperature, humidity, and nutritional needs or elements so that it is effective and works in the best possible way. Basically, according to the requirements of the hydroponic system for tomatoes regarding Ph level. It establishes that Ph level should be regulated from 5.5 to 6.5 to maintain the growth and the state of the Hydroponic System. However, it is additional requirement that contributes to the tomato Hydroponic System. On the other hand, I have to point out the importance of the light and dark time period that should be set at 16 to 18 hours while the darkness should be set at 8 hours. Therefore, the next and penultimate requirements are humidity and temperatures. These two factors play an important role since first you should be very careful and pay attention to the temperature and humidity. The humidity is regulated from 65% to 75% during the night while during the day it is between 80% to 90%. On the other side, the temperature during the day is around 21 to 26 degrees Celsius while it is from 13 to 18 degrees Celsius. Finally, it is advisable to mention the last feature that I added in my system which is nutritional needs for the system that are Nitrogen, Phosphorus, and Potassium.

2. PSEUDOCODE

```
START
    Enter option as character to show MENU SELECTION

    While SELECTION is different of 5
        start switch choose
        CASE 1
            call function infopH
            break
        CASE 2
            CALL function lighting
            break
        CASE 3
            CALL function humidity
            break
        CASE 4
            CALL function humidity
            break
        CASE 5
            CALL function Nutritional Needs
            break
        switch DEFAULT return
    ENDDO
END
```

diagram 1.11

In diagram 1.11 the function int main can be reflected. From there you can call different functions according to the case that it is been chosen.

```
MENU option

    DECLARE choice as character
    DISPLAY  menu principal
    DISPLAY  WELCOME TO MY HYDROPONIC SYSTEM as new line
    DISPLAY Enter information of pH level as new line
    READ pH level
    DISPLAY Enter information of Lighting cicle level as new line
    READ lighting
    DISPLAY Enter information of Humidity as new line
    READ humidity
    DISPLAY Enter information of Temperature as new line
    READ Temperature
    DISPLAY Enter Nutritional Needs as new line
    READ Nutritional Needs
    DISPLAY Enter an option
    return choice
```

diagram 1.12

diagram 1.13

```
START infopH FUNCTION
    DECLARE pH level1, pH level2 as float
    register fp file as pointer
    open data file file in writing MODE
    DISPLAY enter the first pH level 1
    DISPLAY the second pH level

    WHILE if pHlevel 1 is EQUAL TO 5.5 and pH Level 2 is EQUAL TO 6.5
        DISPLAY You have gotten the correct values for pH
            break the loop
        ELSE Please enter again, issues in pHof the system
            continue with the loop
            DISPLAY the level of pHlevel
            adding those values into the data file file
            DISPLAY added succesfully
            close data file
    ENDWHILE
END FUNCTION
```

diagram 1.14

```
START lighting FUNCTION
    DECLARE lightSun and darkness AS INTEGER
    register filehandling fp as pointer
    open data file in writing MODE
    DISPLAY Enter the Sun light
    DISPLAY Enter the darkness period

    WHILE if lightSun is in between 17 and 19
        DISPLAY the plant is getting the best lighting
            break
        ELSE IF darkness is around 8
            DISPLAY Suitable darkness for respiration
            break
        ELSE invalid please enter again
            continue
            DISPLAY the the correct values for lihtSun and Darkness
            adding those values into data file
            DISPLAY added succesfully
            close data file
    ENDWHILE
END FUNCTION
```

diagram 1.15

```
START  Humidity FUNCTION
    DECLARE structure for night and day humidity as strings
    night humidity IS EQUAL TO 65 and 75 as string value
    day humidity IS EQUAL TO  80 and 90 as string values
    register filehandling fp as pointer
    open data file  in writing MODE
    adding those string values into data file
    DISPLAY added succesfully
    DISPLAY refer to the file
    close data file

    DISPLAY Here is the humidity night humidity
    DISPLAY Here is the humidity day humidity
END FUNTION
```

diagram 1.16

```
START temperature FUNCTION
    INITIALIZE tempDay and tempNight as INTEGER
    register filehandling fp as pointer
    open data file  in writing MODE
    DISPLAY Enter the temperature day (21-26)
    DISPLAY Enter the temperature night (13-18)
    while if tempDay is around 20 and 27
        DISPLAY Suitable temp range for the system
            break
        ELSE IF tempNight is in between 12 and 19
            DISPLAY Correct value for night temp
                break
        ELSE Invalid temperature please enter again
                continue
            DISPLAY tempDay and tempNight
            adding those values into data file
            DISPLAY added succesfully
            close data file
    ENDWHILE
END FUNCTION
```

diagram 1.17

```
START FUNCTION Nutritional Needs
    DECLARE structure for night and day humidity as strings
    register filehandling fp as pointer
    open data file  in writing MODE
    adding those values into data file
    DISPLAY added succesfully
    DISPLAY Please check the file
    close data file

    DISPLAY Nitrogen(N), Phosporons(P), potassium(K)
ENNFUNCTION
```

3. FLOWCHART

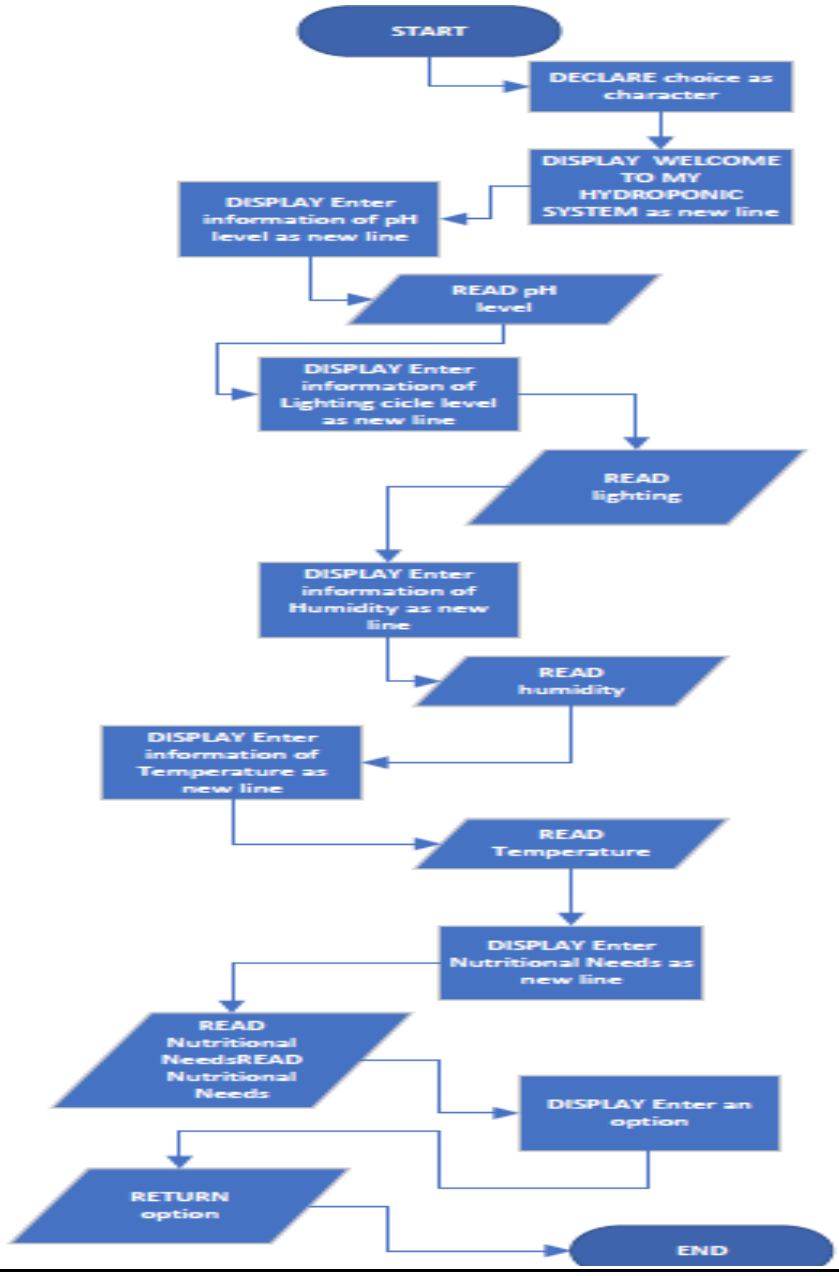


figure 2.11

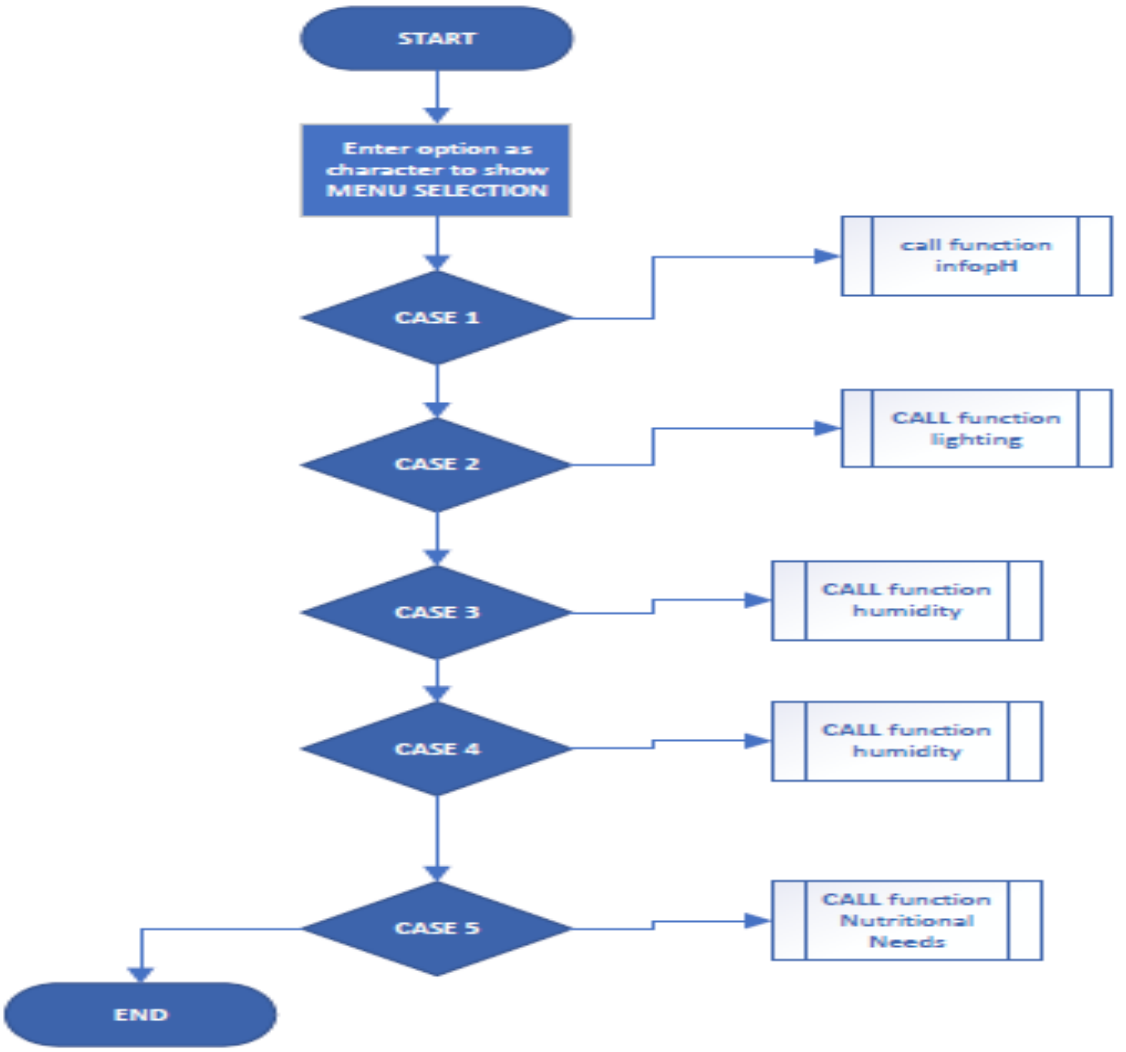


figure 2.12

figure 2.12 int main

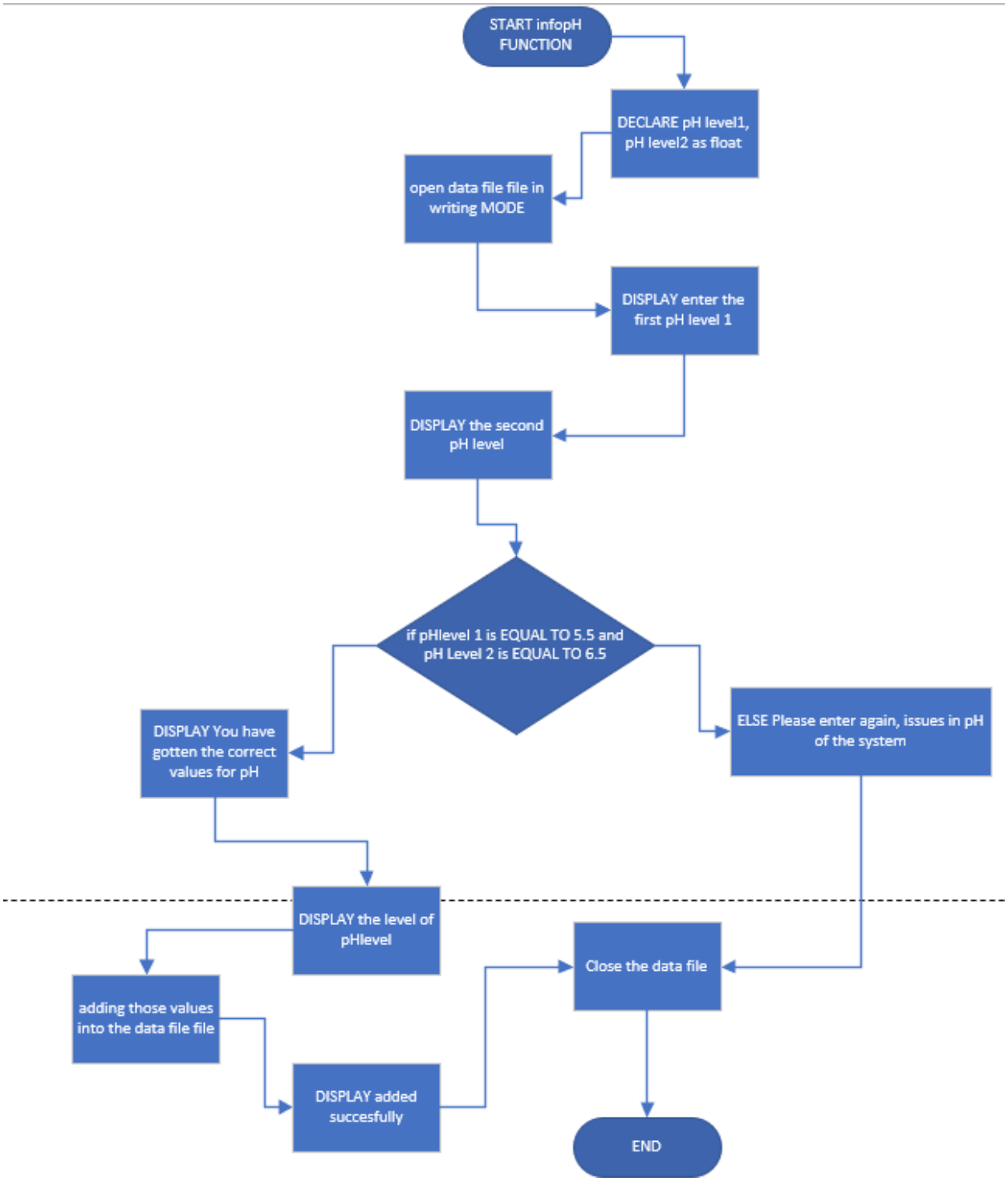


figure 2.13

figure 2.13 function pH

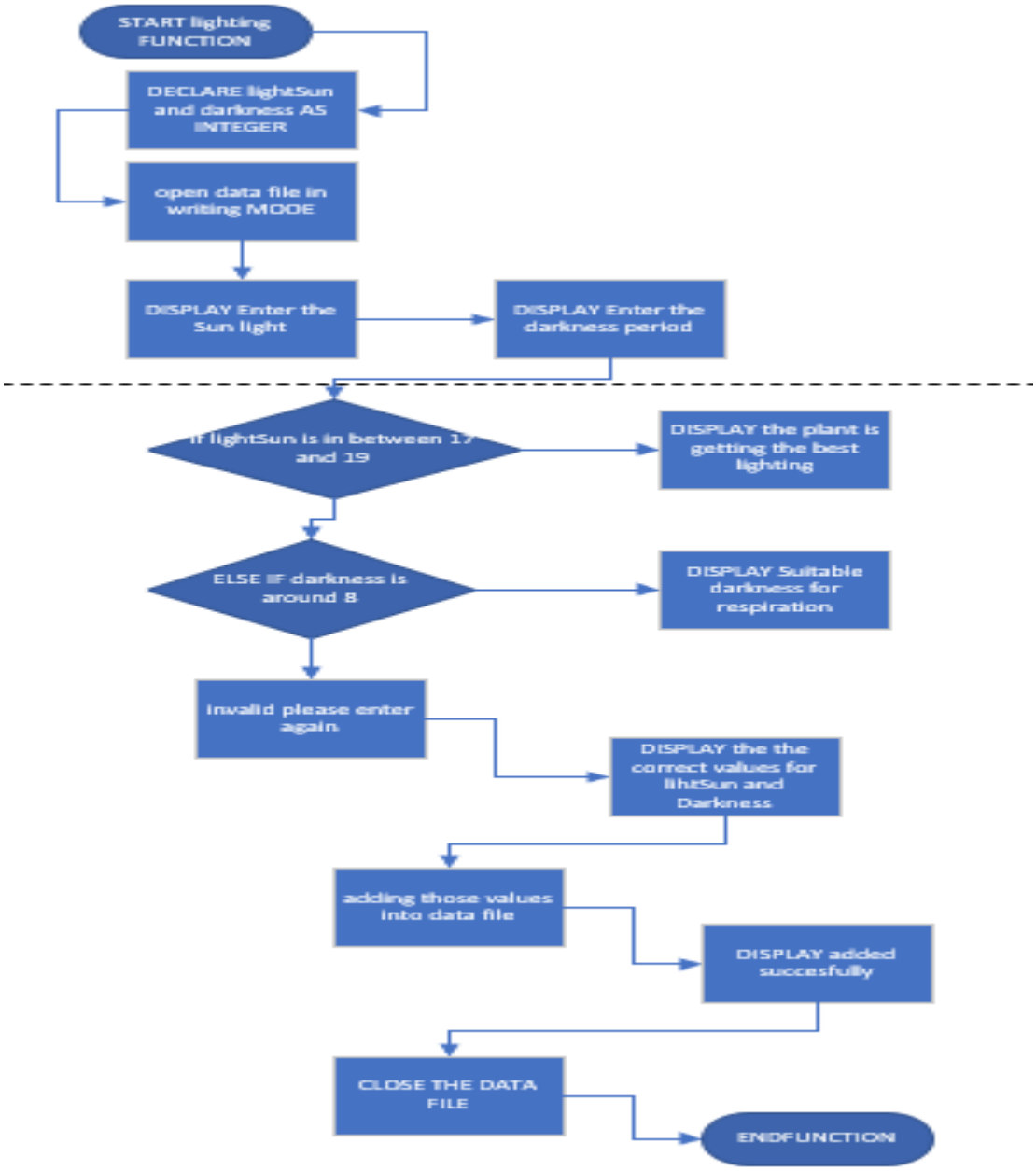


figure 2.14

figure 2.14 lighting function

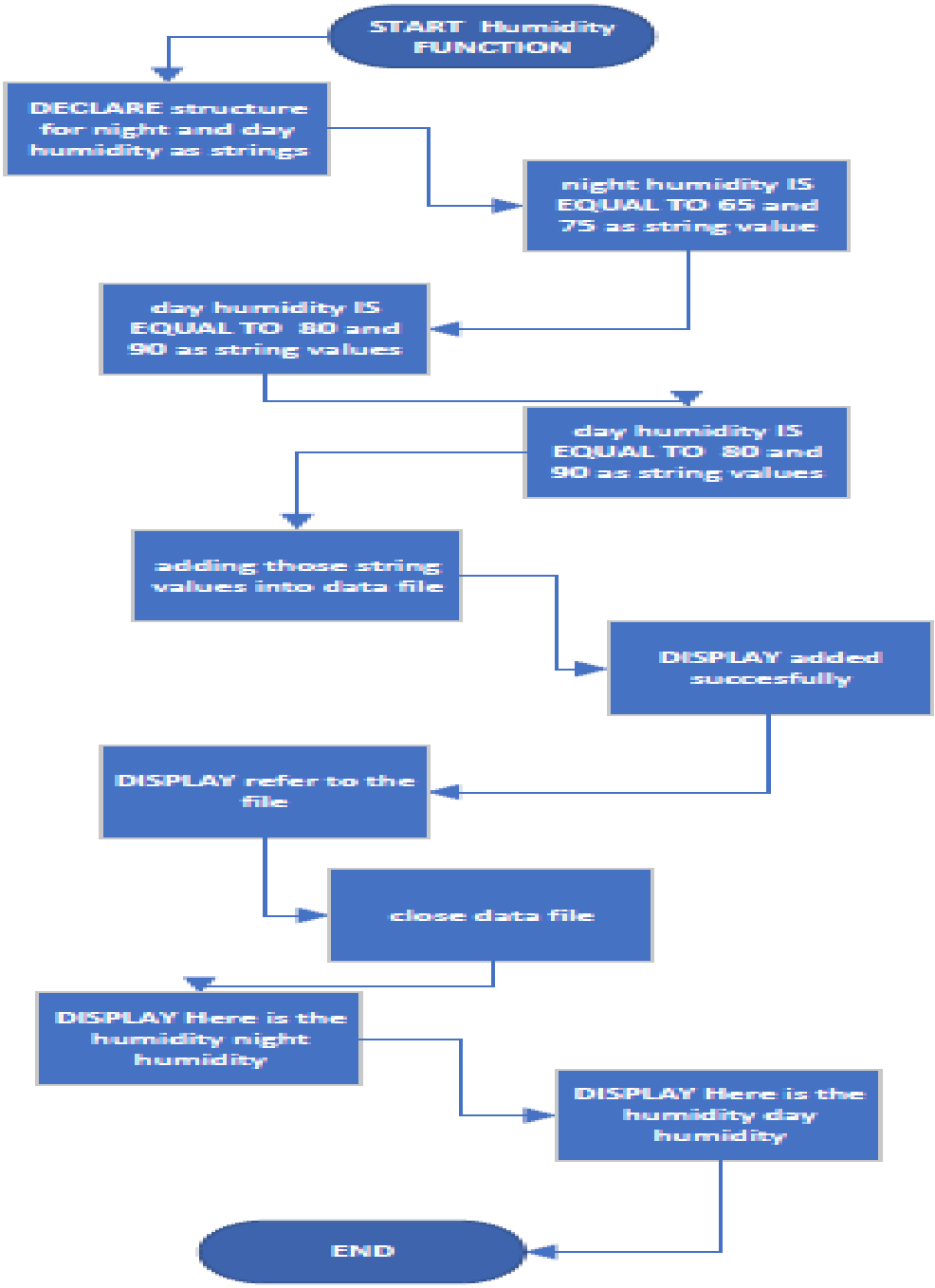


figure 2.15

figure 2.15 humidity function

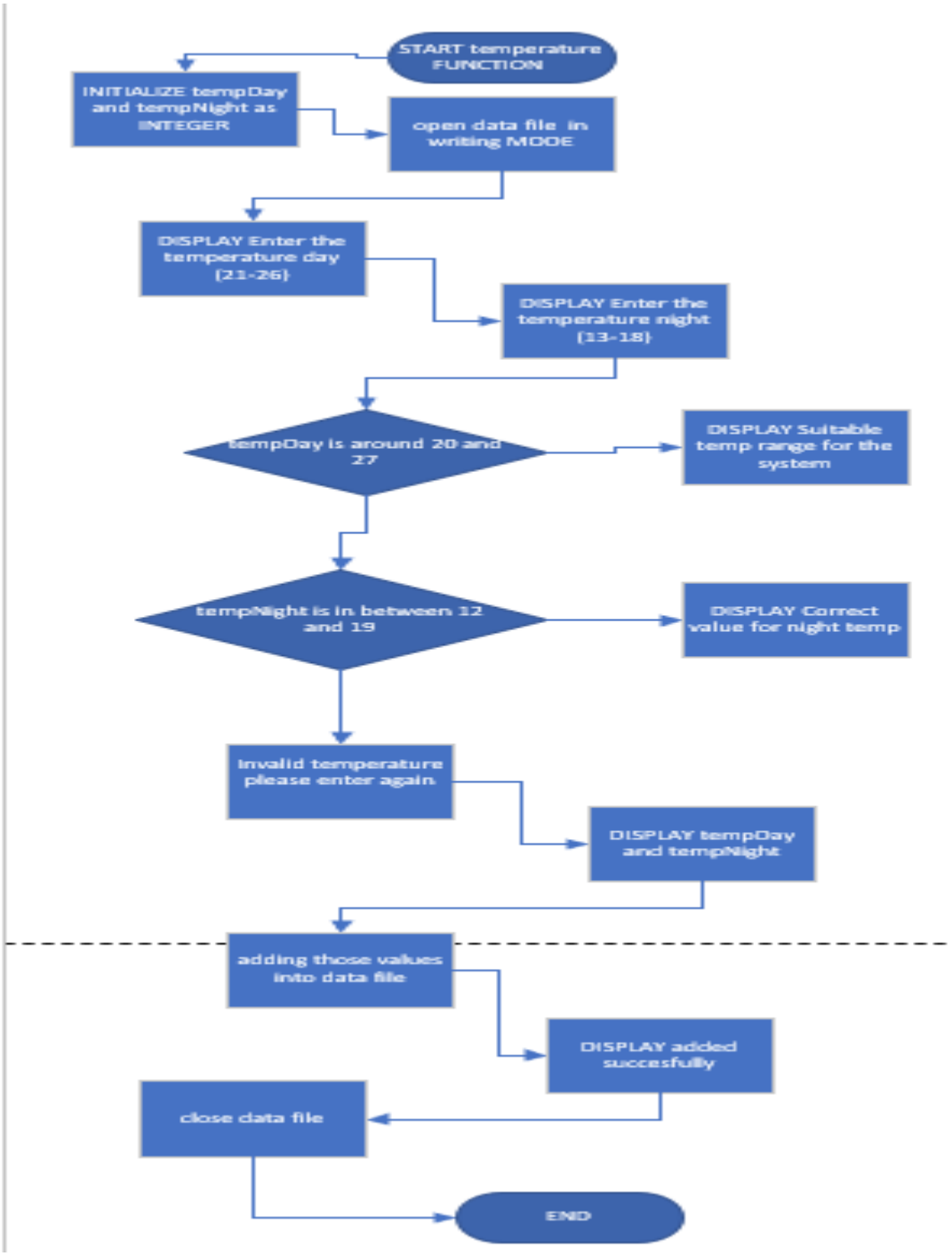


figure 2.16

figure 2.16 temperature function

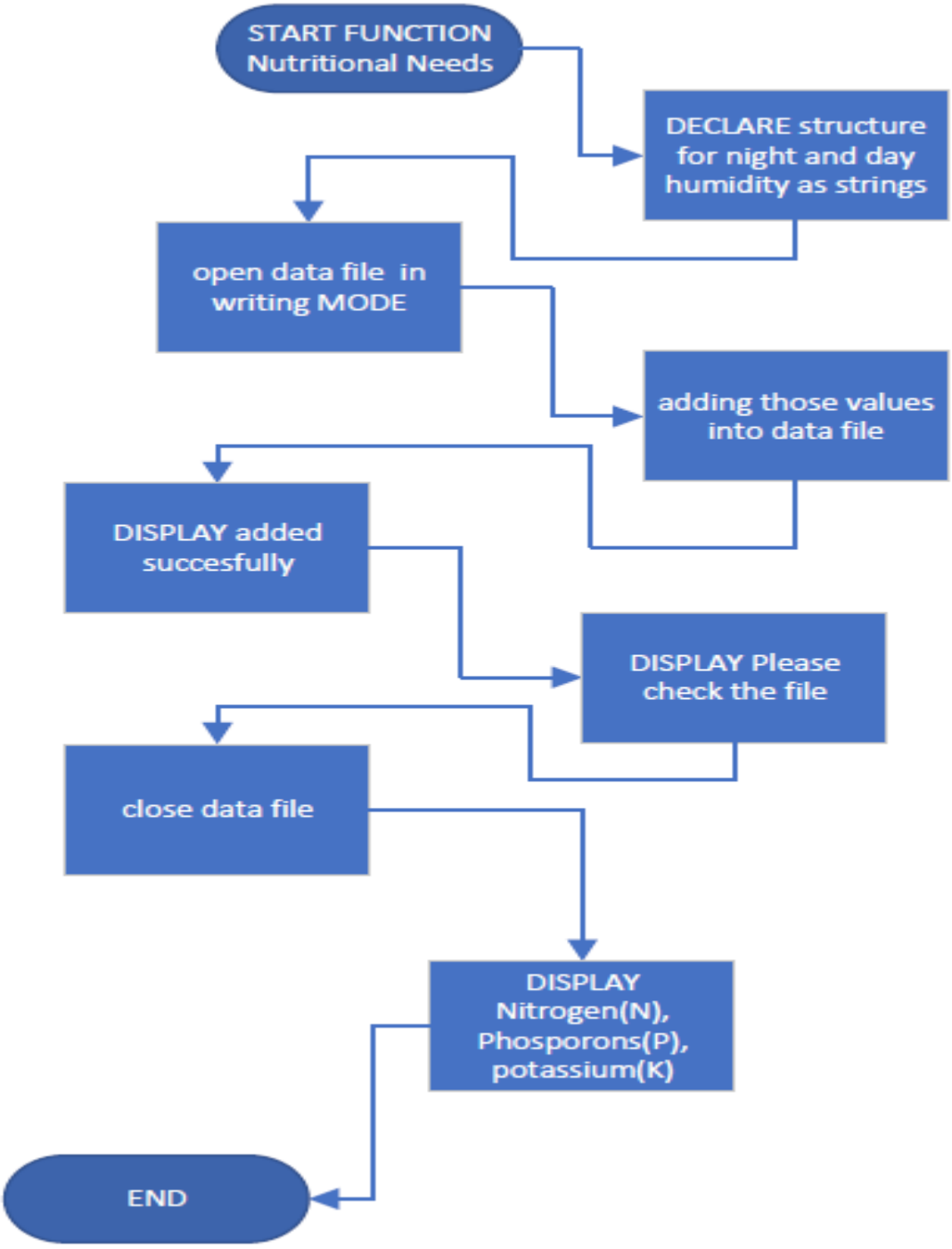


figure 2.17

figure 2.17 Nutritional need's

4. SOURCE CODES

Libraries:

```
#include <stdio.h>

#include<string.h>
```

```
                WELCOME TO MY HYDROPONIC SYSTEM
------------------------------------
1).Enter information of pH level
2).Enter information of Lighting cicle level
3).Enter information of Humidity
4).Enter information of Temperature
5).Enter Nutritional Needs
Enter an option:
```

diagram 3.11

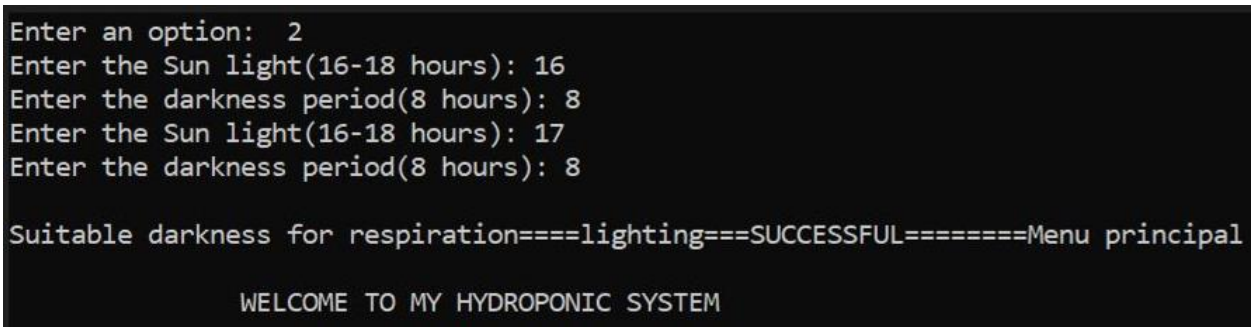
In diagram 3.11 you can see the menu of the hydroponic system with different functionalities such as information for pH, temperature, etc., you only have to select a number to access a specific function for the system.

```
Enter an option:  1

Enter the first pH Level 1(==5.5): 5.5

Enter the second pH Level 2(==6.5): 6.5

Enter the first pH Level 1(==5.5): 5.5

Enter the second pH Level 2(==6.5): 6.5

You have gotten the correct values for pH.
=pH=SUCCESSFUL==Menu principal
```

diagram 3.12

In diagram 3.12 the pH level information has been accessed and basically it is necessary to enter 5.5 and 6.5 as these represent the pH required for the tomato. In case you enter something different the system will reject it until you enter the correct values for pH, and those values will be stored in a file.

diagram 3.13



In diagram 3.13 the user asks us the period to provide light to the system and the necessary time it should take in the dark. The times are indicated, and these values will be stored directly in a file.

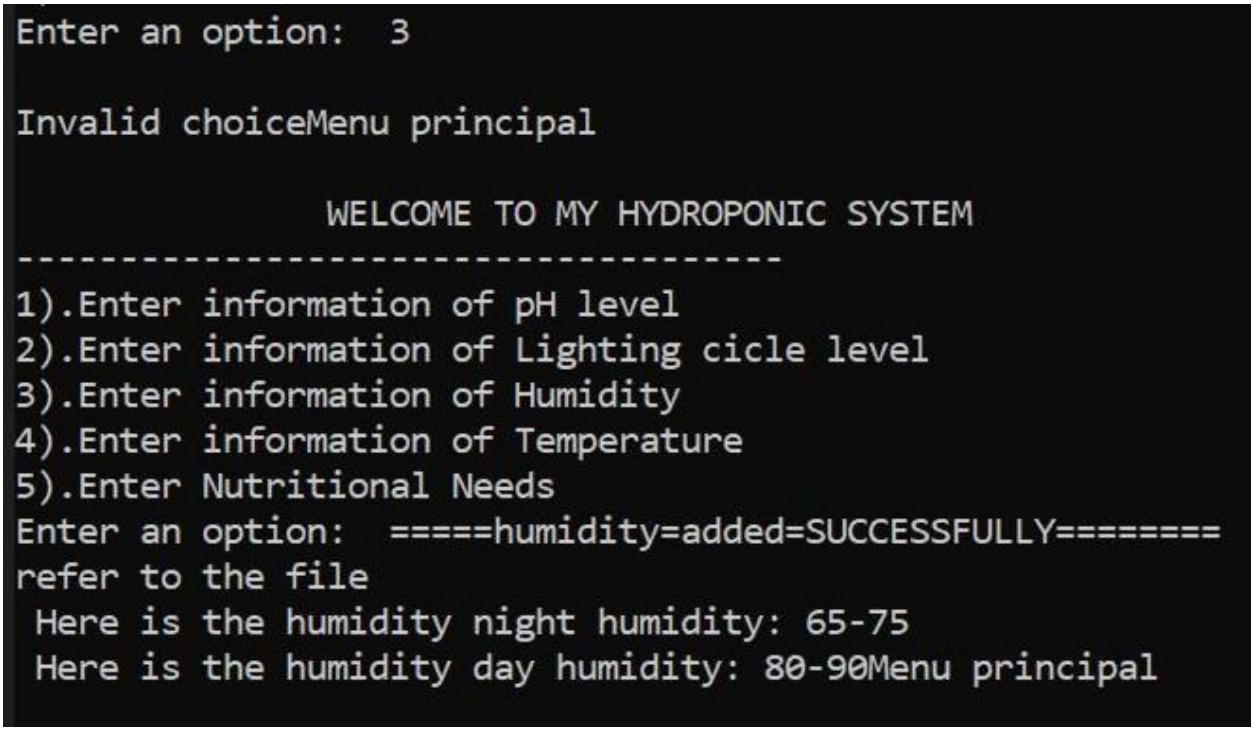


diagram 3.14

In the diagram 3.14 the information is already displayed in the structures and is going directly into the file.

```
Enter an option:  4

Invalid choiceMenu principal

              WELCOME TO MY HYDROPONIC SYSTEM
-----------------------------------
1).Enter information of pH level
2).Enter information of Lighting cicle level
3).Enter information of Humidity
4).Enter information of Temperature
5).Enter Nutritional Needs
Enter an option:  Enter the temperature day (21-26): 21
Enter the temperature night (13-18): 13
Enter the temperature day (21-26): 22
Enter the temperature night (13-18): 17

Suitable temp range for the system.====Temperature===SUCCESSFUL======Menu principal
```

diagram 3.15

In diagram 3.15 we are getting input of temperature considering that the correct temperatures values are visible from the input. In case you enter to a different one, the system will ask you to enter again until you put the correct values which are showed in the input.

```
Enter an option:  5

Invalid choiceMenu principal

               WELCOME TO MY HYDROPONIC SYSTEM
-----------------------------------
1).Enter information of pH level
2).Enter information of Lighting cicle level
3).Enter information of Humidity
4).Enter information of Temperature
5).Enter Nutritional Needs
Enter an option:  =====Nutritional==SUCCESSFUL========Please check the file
Nitrogen(N), Phosporons(P), potassium(K)...
```

diagram 3.16

Unlike the humidity, the elements of nutritional needs in diagram 3.16 are displayed from the structures and it goes directly to get into the file where you can find them as NPK, but in the output screen you can see them clearly.

Pin Descriptions

I have assigned the VCC input pins to the int light Sun variable and the other GND pin to the darkness variable as shown in figure 1. On the other hand, in figure 2 you can see the ADC7 input pin for the night humidity variable and AVCC for the day humidity variable.

```
void lighting(){

    int lightSun;//VCC PIN
    int darkness;//GND PIN

    FILE *fp;
    fp=fopen("data.txt", "a+");
```

Figure 1

```
void humidity(){

    struct info_humidity
    {
        char night_humidity[30];//ADC7 PORT
        char day_humidity[30];//AVCC PORT
    };
```

Figure 2

CONCLUSION

In conclusion in this project the Atmel-7810 microcontroller was used to describe certain inputs as you will see in the final description of the input pins. The work on a hydroponic system based on the tomato plant and its characteristics has been completed.

REFERENCES

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