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Semester and Section	BS CS 5th A
Home Assignment:	01
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SHORT ANSWERS

QUESTION ; 1 PART A

Question no 1:

What is the purpose of web server server (80) and What does port 80 represent?

Answer:

Webserver:

- The web server is a software which contains the web pages(HTML ,CSS) and According to the client requests provide them the access of the specific web pages
- So the main purpose of the web server server 80 is to provide access of the specific web pages according to the clients request by using HTTP protocol

Port 80:

- The port 80 is basically the default port which is used for HTTP (Hypertext Transfer Protocol)
- So if a person enters in the browser in the URL as http//: it automatically connects to the port 80 which is for HTTP .

Example:

- A person want to access the Daraz web site so in the Browser he wrote in the URL http\\: daraz.com.pk
- As he wrote http so the web server connects to the port 80 which is the default port for (HTTP).Then the web server receives the request of the client and according to that request provide access of daraz web pages to the client

Question no 2:

Explain the role of server. On ("/" ,handleRoot); in this program?

Answer:

The role is

- ***Server. On () :*** It is used to tell the server how to handle a client request
- **/ :** It is basically the address which the client the URL like http//: daraz .com .pk

- ***handleRoot:*** It is the function which is called to handle the client request in the specific URL and provide appropriate response to the client regarding that request

- So Basically , this Server. On("/",handleRoot) is used when a client requests a specific URL so it tell the server how to handle that request and handleRoot function runs helps in providing response regarding that client request in the specific URL

Question no 3:

Why is server.HandleClient () placed inside the loop function ? What will happen if it is removed ?

Answer:

Reason:

- The **server. HandleClient()** function is placed inside the loop function so that it continuously check whether the client wants to send a request or not .It helps in handline the client request and response to that specific request at any time .If it is placed inside the loop function so client can send the request or get its response at any time .Moreover he can send more then one request at a time .Therefore ,it is necessary to place it inside the loop function

Removed:

- If this server.HandleClient() function is removed so there will be no function to handle the client request or provide response to that specific request even if the client will type something in the URL due to the absence of server.HandleClient() function he will not get any response back

Question no 4:

In handleRoot() explain the statement server.send(200,"text/html",html)?

Answer:

- In **HandleRoot ()** function the statement **server.send(200,"text/html",html) is** used to send a response to the client regarding the client request .In it **server.send** function is used to send response to the client request and 200 means that the request was successful **,"text/html"** means that it tells the server that its for the web page and **html** actually contains the contents of that specific web pages . So, basically this statement tells the handle root function that the request to the specific web page is successful and provides the response regarding the client request

Question no 5:

What is the difference between in displaying the last measured sensor values and taking fresh DHT readings inside handleRoot()?

Answer:

The difference is that :

Last Measured Value:

- If we take last measured sensor values stored in the varaibles we can have them easily access and it did not take readings from the sensor . but suppose our environment changed so it can be possible that know our readings according to that environment are not correct as it did not take the readings from the sensor

HandleRoot():

- Where as if we take fresh readings using handleRoot() function so it will help us get accurate readings as whenever the client will request the web page so the handleroot () function will take the readings from the sensor and provide the readings a response with that specific web page to the client so in this case even if our environment changed it will still give us accurate readings as it will always take the readings from the clients

SHORT ANSWERS

QUESTION NO 2 PART

Question no 1:

What is the role of BLYNK Template ID in ESP 32 IOT Project? Why must it match the cloud template?

Answer:

BLYNK Template ID:

- BLYNK Template ID plays an important role as it act as a unique identifier for each user .Through this user can connect its ESP 32 with the cloud template and design the template in its own way by using widgets ,pins and other options defined in the template

Match:

- The BLYNK Template ID must match with the cloud template if not so the user wont be able to access the specific cloud template and its functionalities.

Question no 2:

Differentiate between BLYNK Template ID and AUTH Token?

Answer:

BLYNK Template ID:

- It is used to as it act as a unique identifier and provide each user account a unique id .Moreover , it is specially requires as it connects your ESP -32 project with your required cloud template and providing you the access of its widgets pins and other seetings which you can design according to your project requirements

BLYNK AUTH TOKEN:

- It is used for authentication and verification of the user. It check whether the ESP 32 device belongs to the right user or not and also ensure no other user uses another user ID by some other means .

Question no 3:

Why does using DHT 22 code with DHT 11 sensor produces incorrect readings ?Mention one key difference between the two sensors ?

Answer:

Reason:

- The reason we get incorrect readings using DHT 22 code with DHT11 sensor basically lies in their measurement range and data format. The DHT 22 sensor is designed to provide more accurate and precise readings as compared to the DHT 11 sensor .This can be seen by comparing both sensor ranges

DIFFERENCE TABLE:

DHT 11	***DHT 22***
Temperature: 0 to 50 ℃ with accuracy -2 to +2 ℃	***Temperature :*** -40 to 80 ℃ with accuracy of -0.5 to + 0.5
Humidity:20 to 90 % with accuracy of -5 to +5 % RH	***Humidity :*** 0 to 100% with accuracy of + /- 2 to +/- 5 % RH

- So , we can see that DHT 22 Provide more precise and accurate measurement than DHT 11 . When we use DHT 22 Code with DHT 11 sensor so we get incorrect reading like for temperature it was 1017.5 like way out of range as our temperature was set upto 100 but when we change the sensor to DHT 11 so it provide correct reading like 45.6℃.

Question no 4:

What are the Virtual Pins in the BLYNK ? Why are they preferred over physical GPIO pins for cloud communication?

Answer:

Virtual Pins:

- Basically the Virtual pins are the software pins they are present on the software and are used in order to channel and transmit data directly from the ESP-32 to the BLYNK CLOUD
- So, basically they are used for cloud communication

Preferred Over:

- They are preferred over the GPIO Pins because GPIO pins are actually the physical pins which are present on the Hardware ESP -32 .They are not present in the software .It is the Virtual pins which are present in the software so we use them .Moreover the Virtual pins make it easier to make connection between ESP 32 and BLYNK CLOUD.

Question no 5:

What is the purpose of using BLYNK Timer instead of Delay() in ESP 32 IOT application?

Answer:

Purpose:

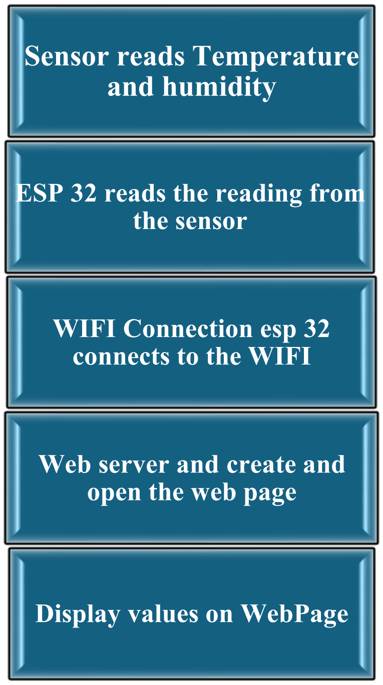
- The purpose of using BLYNK Timer instead of Delay() is that when the Delay function is called or activated so it causes an interrupt and stops the working of the whole program until it reaches it required value .As a result, this may cause issue in connecting the ESP-32 IOT based project with our BLYNK CLOUD

- Where as , if we use blynk timer so the timer will continue to run in the background and occurs at specific interval thus not stopping the main program .As a result, there will be no issue in connecting the ESP-32 IOT base project with the BLYNK CLOUD.

LONG QUESTION 1

PART B

FLOW CHART :


Sensor reads Temperature and humidity
ESP 32 reads the reading from the sensor
WIFI Connection esp 32 connects to the WIFI
Web server and create and open the web page
Display values on WebPage

ESP 32 WIFI CONNECTION PROCESS AND IP ASSGINMENT:

- The ESP 32 Connects with WIFI with the help of the function wifi.begin() and two variables inside it ssid and password the ***wifi.begin()*** functions contains ssid and password where ssid represent Wi-Fi name and password the of Wi-Fi with which it is to be connected like I have the ssid of Wi-Fi as NUST and its password is 0987234 so I will pass these two parameters in the WIFI. Begin function so my ESP-32will connect with it

- For the IP ADDRESS assignment we use the function ***WIFI.LOCALIP()*** which helps in getting the IP Address from the router to the ESP -32 after making connection with the specific WIFI

WEB SERVER INTIALIZATION AND REQUEST HANDLING :

- The web server is initialized with the help of the function ***webserver.server(80)*** which tells as port is 80 so it is HTTP type protocol so web page is required

- The request of client is handled with the help of function ***server.handleclient()*** which continuously handles the requests which came from the clients and according to that requests provide appropriate web pages to the clients

BUTTON BASED SENSOR READING AND OLED UPDATE MECHANISM

- In it ,by pressing the button it triggers the ESP-32 device to take/read the readings from the sensor and then display them on the OLED using ***display.display()*** function as a result whenever button is pressed so ESP 32 takes readings f4om the sensor and have the OLED updated according to those readings

DYNAMIC HTML WEB PAGE GENERATION:

- The Dynamic HTML Web Page is generated with the help of Handle root function which takes the current readings from the sensor with the help of ESP 32 and then create a web page of it and then display it to the client

PURPOSE OF META REFRESH IN THE WEB PAGE

- The Meta Refresh in the Web page is for the purpose that it automatically refreshes the web page so that the web page can show the current readings of the sensor after specific time

COMMON ISSUES IN ESP 32 WEB SERVER AND THEIR SOLUTION

ISSUES

- WIFI Connection Issue
- Sensor showing incorrect readings
- Button pressed not detected or false triggers

SOLUTIONS:

- The Wi-Fi connection can be handled if look at ssid or password may be in providing the required varaibles there was a single word mistake in the ssid or password so therefore it was unable to connect it or can be due to network speed slow so connect to other network

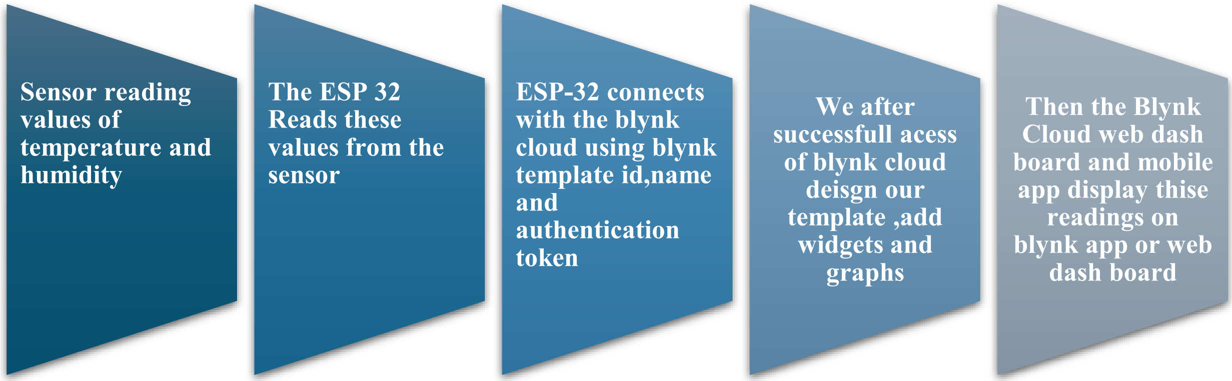
- The sensor issue can be if in code using DHT22and taking readings from DHT11so adjust the code according to DHT 11 sensor or check wiring if you had done correct wiring

- The button pressed issue can be handled by checking the code logic and if any mistake in that logic so change it also false triggers can also be prevented by using debouncing

LONG QUESTION 2

PART B

FLOW CHART



Sensor reading values of temperature and humidity

The ESP 32 Reads these values from the sensor

ESP-32 connects with the blynk cloud using blynk template id,name and authentication token

We after successfull acess of blynk cloud deisgn our template ,add widgets and graphs

Then the Blynk Cloud web dash board and mobile app display thise readings on blynk app or web dash board

CREATION OF BLYNK TEMPLATE AND DATA STREAMS

- After successful login and getting access of Blynk cloud we got to developer zone there we got to template and click **create new template** so we get options like create new device and data streams we select create new device and name it for the device we want to use and then after that we get our template id ,name and auth token which help us in connecting to that specific template
- After that we create **data streams** for each type of data like for temperature and humidity setting their range or default values and units

- Now we add widgets in our template which are connected to the virtual pins and will display our readings

ROLE OF TEMPLATE ID ,NAME AND AUTH TOKEN

- The **template id** act as unique identifier and provides unique blynk Id to each user
- The **template name** we use to give a nae to our project in blynk cloud which we can understand latter
- The **template authentication token** is to authenticate and verify whether the ESP-32 device belongs to the right user or not

SENSOR CONFIGURATION ISSUE (DHT11 VS DHT22)

- We get sensor configurations issues if we use **DHT 22** in code but take readings from **DHT 11** so It provides incorrect readings as there is a difference in **measurement range** of the both the sensors. Moreover both sensors have different data formats so it provides NAN or incorrect readings to avoid this we have to use the required sensor in the code with which we are taking the readings

Sending data using blynk virtual write ()

- With he help of this function Blynk.virtualWrite () we send that readings taken from the sensor though the help of the ESP 32 towards the Virtual Pins in the Blynk Cloud
- **Blynk.VirtualWrite(v0,tmp);**
- **Blynk.VirtualWrite(v1.hum);**
- So it send both the temperature and humidity readings across the virtual pins on the Blynk cloud which updates the readings in its widgets according to the latest sensor readings and displays it to the user

COMMON PROBLEM FACED DURING CONFIURATION AND THEIR SOLUTION

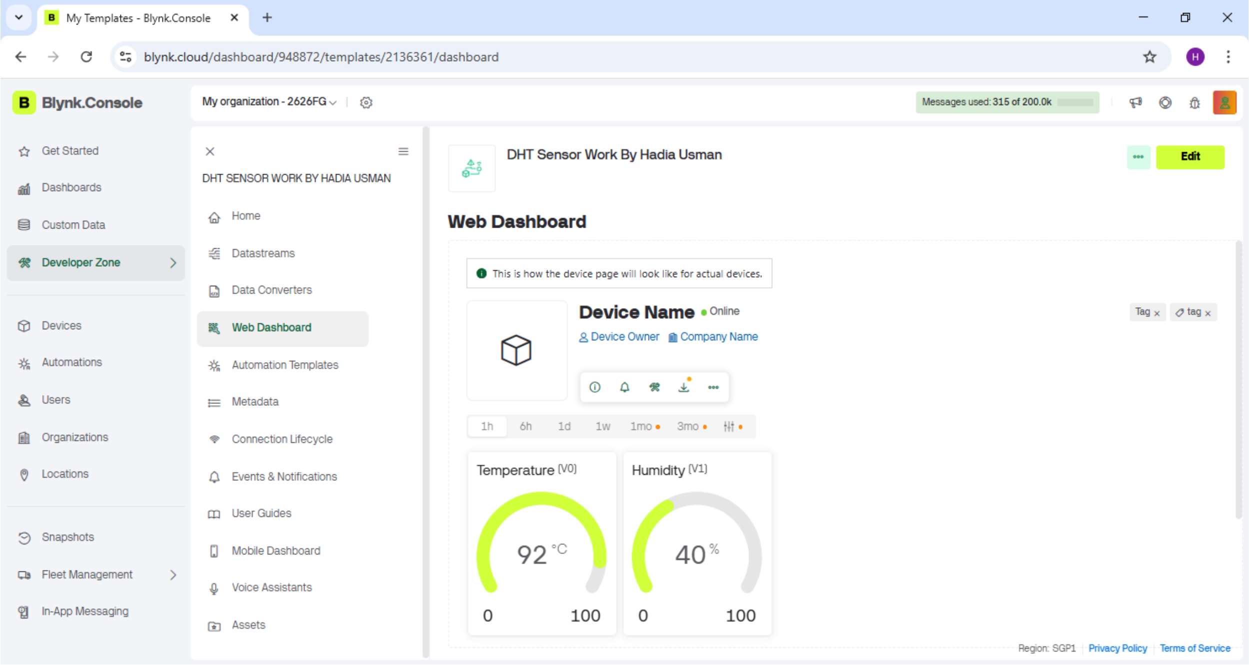
COMMON PROBLEM

- Wi-Fi credentials issue
- Sensor incorrect reading
- Having incorrect Template ID, Name and Auth Token

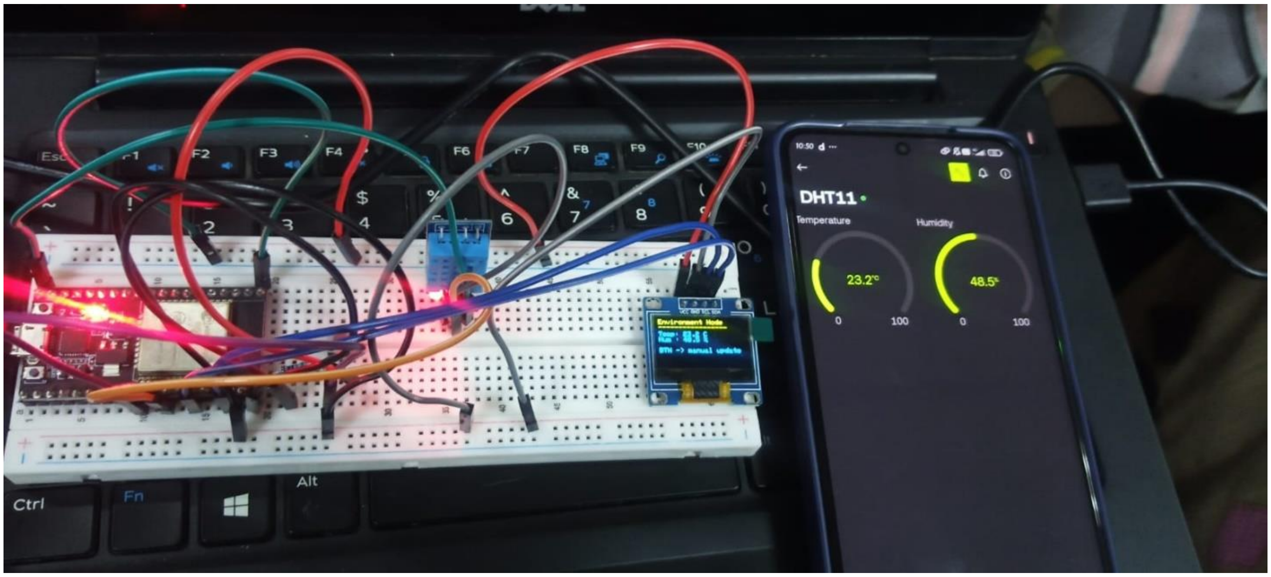
Solutions :

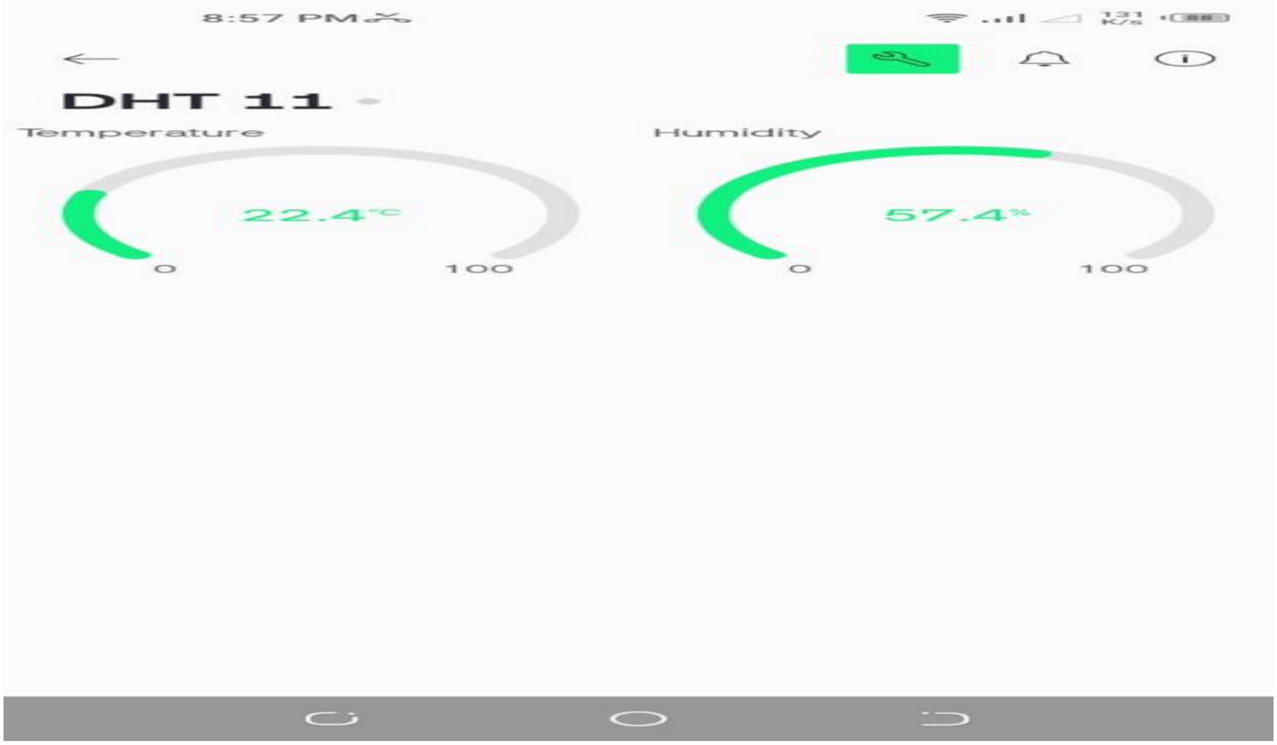
- For First we add our Wi-Fi name and password so we connect it with our Wi-Fi and resolved that issue
- For second as in code it used DHT 22 but physically we were using DHT 11 so incorrect readings that why we then changed our code according to DHT 11 sensor so we got correct readings
- As the Above three things provided were different and belong to other user so we get our own these three things and replaced the previous ones with our new ones so it connected with our own device and account

SCREEN SHORTS WEB DASHBORAD:



FROM BLYNK APP:





8:57 PM

DHT 11

Temperature

22.4°C

0 100

Humidity

57.4%

0 100