Water Quality Monitoring

Group-6

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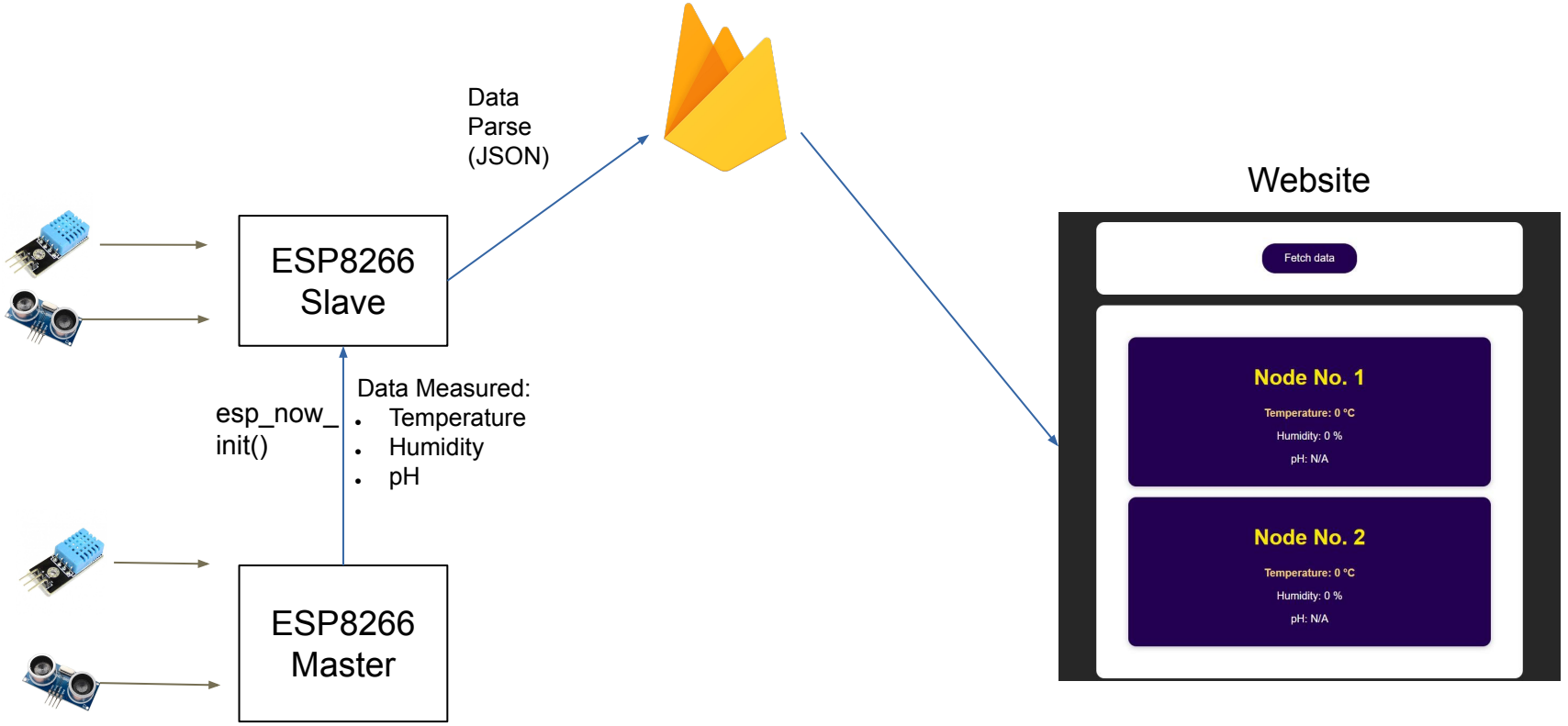
System Workflow

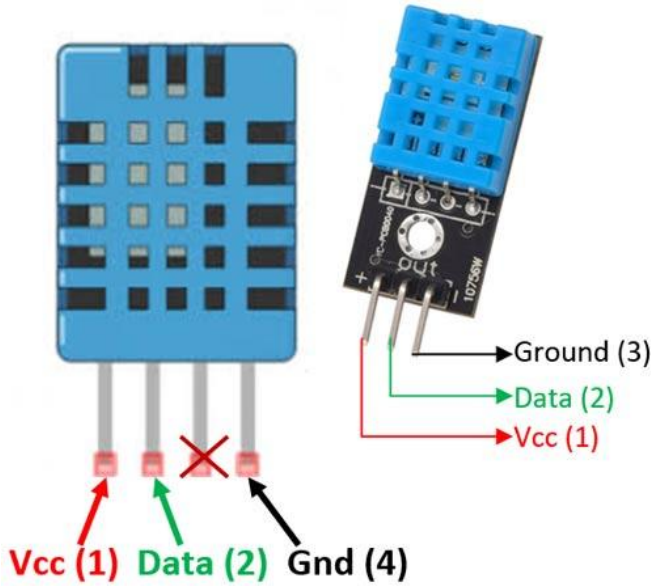


Inter-node communication (MAC)

ESP-NOW is a protocol developed by Espressif, which enables multiple devices to communicate with one another without using Wi-Fi. The protocol is similar to the low-power 2.4GHz wireless connectivity. The pairing between devices is needed prior to their communication. After the pairing is done, the connection is safe and peer-to-peer, with no handshake required. We are using it to communicate from the Master to the Slave.

- The two NodeMCUs communicate with each other using esp_now Protocol
- Mac address of the receiver is fed to the transmitter
- It then broadcasts the data to the receiver using the MAC address
  uint8_t broadcastAddress[] = { 0x5C, 0xCF, 0x7F, 0x3D, 0x03, 0xD2 };

DHT 11 sensor



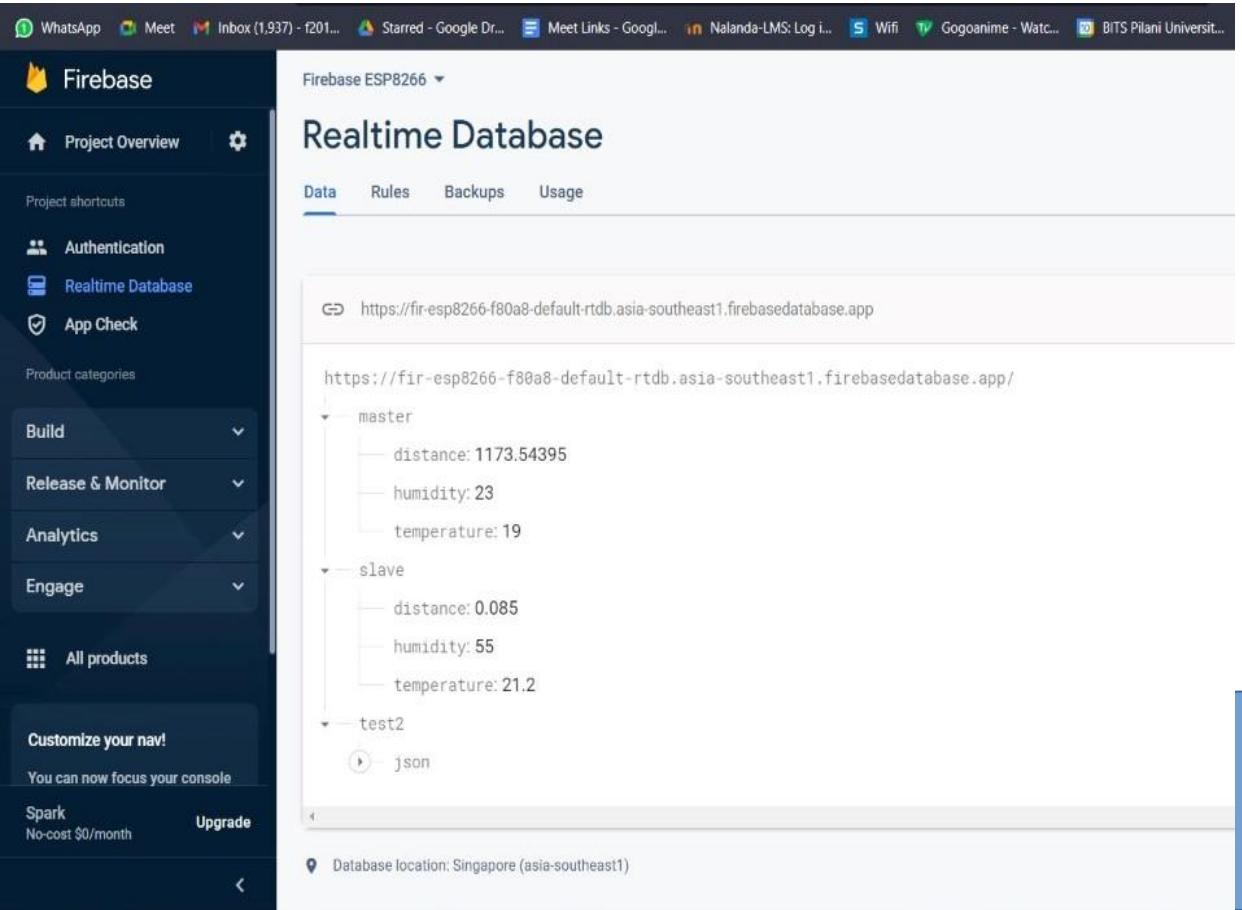
- Operating Voltage: 3.5V to 5.5V
- Temperature Range: 0°C to 50°C
- Humidity Range: 20% to 90%
- The protocol for using DHT sensor is taken care of by standard dht libraries.

DHT 11 Libraries and functions

- DHT.h library is used to communicate with the DHT sensor.
- Functions that are used are –
- DHT dht(dht_dpin, DHTTYPE); // declaration and initialization of DHT object
- dht.begin();   // begins the communication with dht sensor
- float h = dht.readHumidity();

  float t = dht.readTemperature(); //for reading the humidity and temp.

Realtime Database



- Firebase Realtime database is based on NoSQL.
- It updates the changed values instantaneously and is used in variety of applications
- Data base here is in form of key pair and hence json format Is followed in updating values

FireBAse Libraries and functions

Follwing are the libarays used in firebase data sync:

- `<Firebase_ESP_Client.h>`
- `#include <addons/TokenHelper.h>`
- `#include <addons/RTDBHelper.h>`

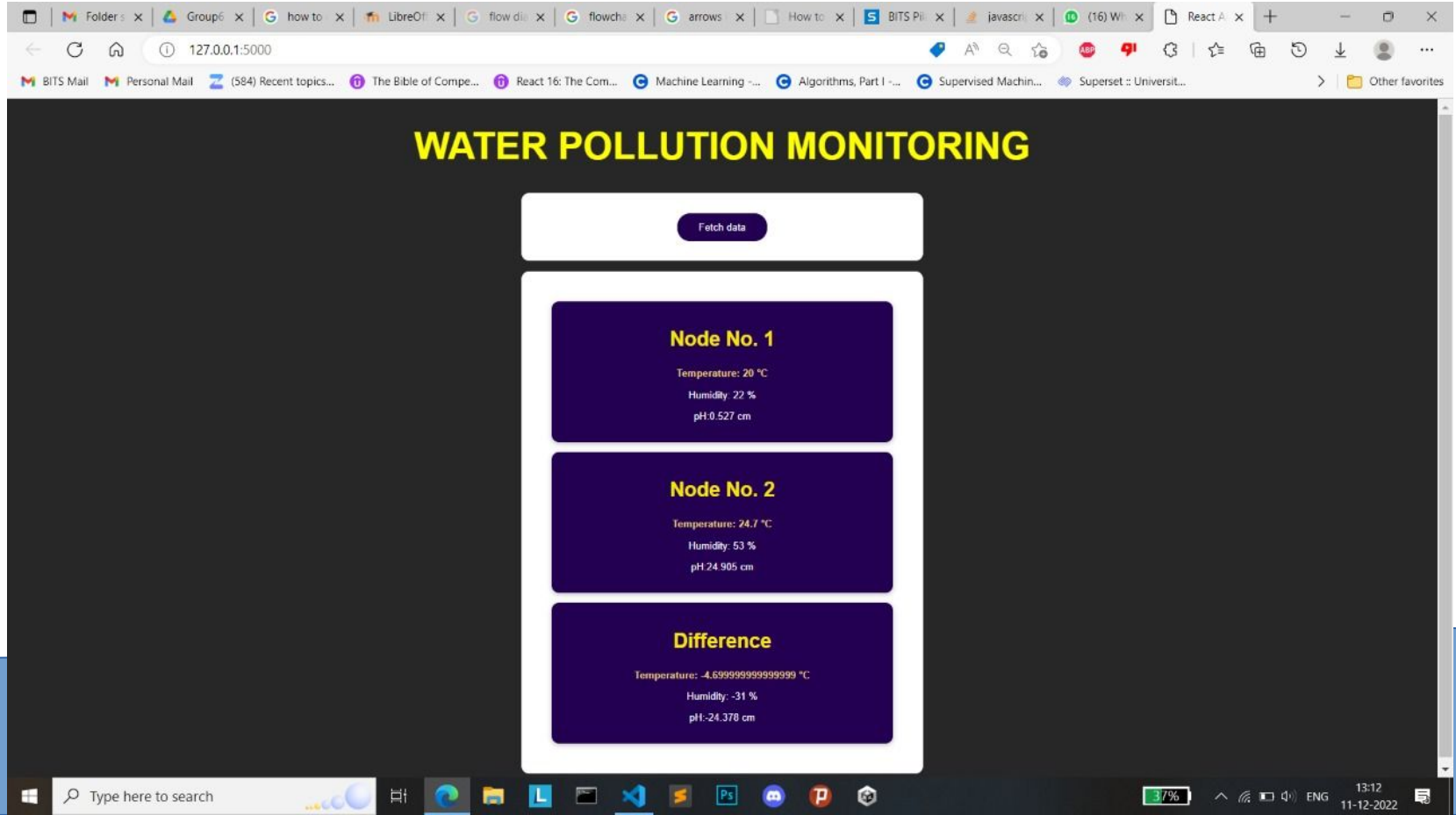
Important information about the firebase database to be used in the libraries:

```
#define API_KEY "AIzaSyBp8igUa_ubZr4H6lif3rTkB-rWMaglmgE" // Firebase API Key

// DATABASE_URLS
"http://fir-esp8266-f80a8-default-rtdb.asia-southeast1.firebasedatabase.app/slave.json"

"http://fir-esp8266-f80a8-default-rtdb.asia-southeast1.firebasedatabase.app/master.json"
```

Website design



Website design

- The website is built using ReactJS and hosted on a flask development server
- It fetches the sensor data from firebase and displays it on the screen.
- The data is fetched and updated every 10 seconds in real time.
- It also displays the difference between the readings of 2 consecutive nodes.
- This difference can be used to conclude whether a contamination has occurred or not.

Thank You