Mizuguna 01

Iot4Aquaculture

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Introduction

Application for IoT infrastructure for inland fresh water fish farming

A network of Sensor Nodes spread across fish farms, which continuously monitor the water parameters and concentration of toxic substances and report to the farms on time to take the required action to improve productivity, improve the health of fish. Also to detect or avoid water poisoning, fish mortality like activities.

Motivation

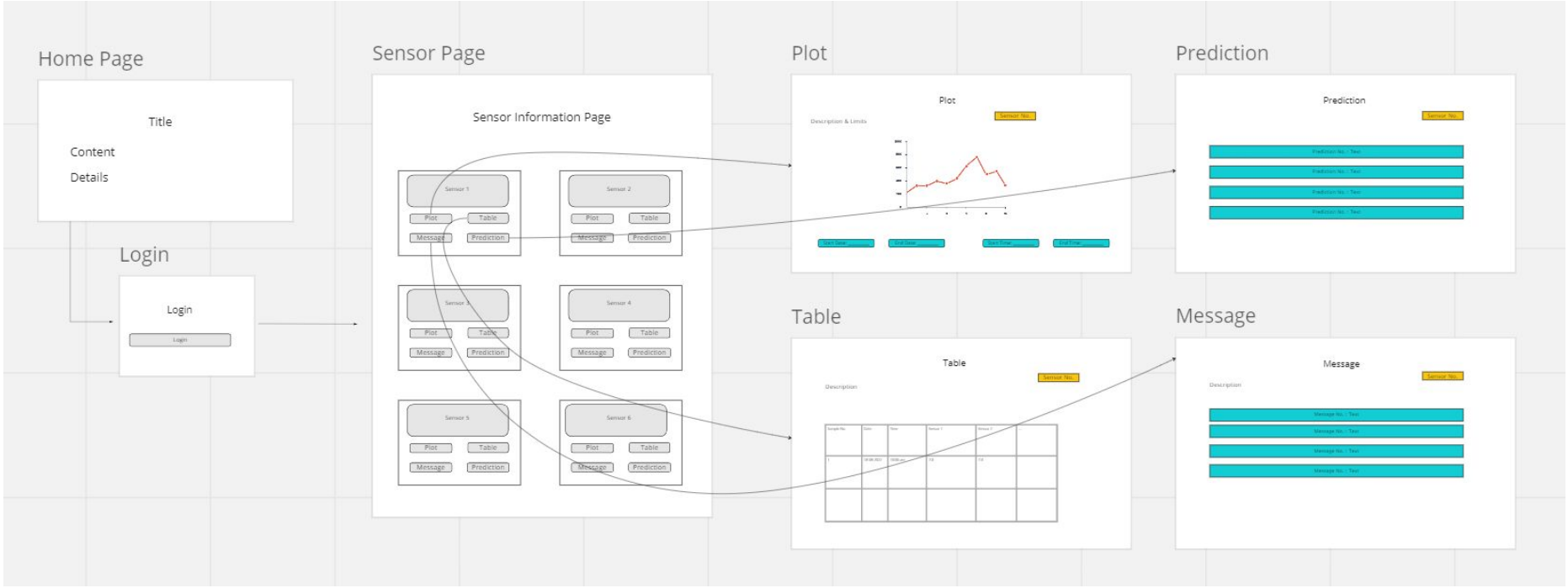
This project is developed under the Rural Development Center at IIT Hyderabad.
RDC was established with a vision to support rural development initiatives of the Government of India through innovative technologies being developed at IIT Hyderabad. One of the objective of RDC is to improve the productivity of Fish farmers by providing technology to monitor water quality and and scientific knowledge on fish farming to avoid fish mortality.
This project aims to develop an efficient web interface for visualization of the data. The user can very easily access the data of the sensor at particular timestamp to observe the changes in the sensor values.

Market Study

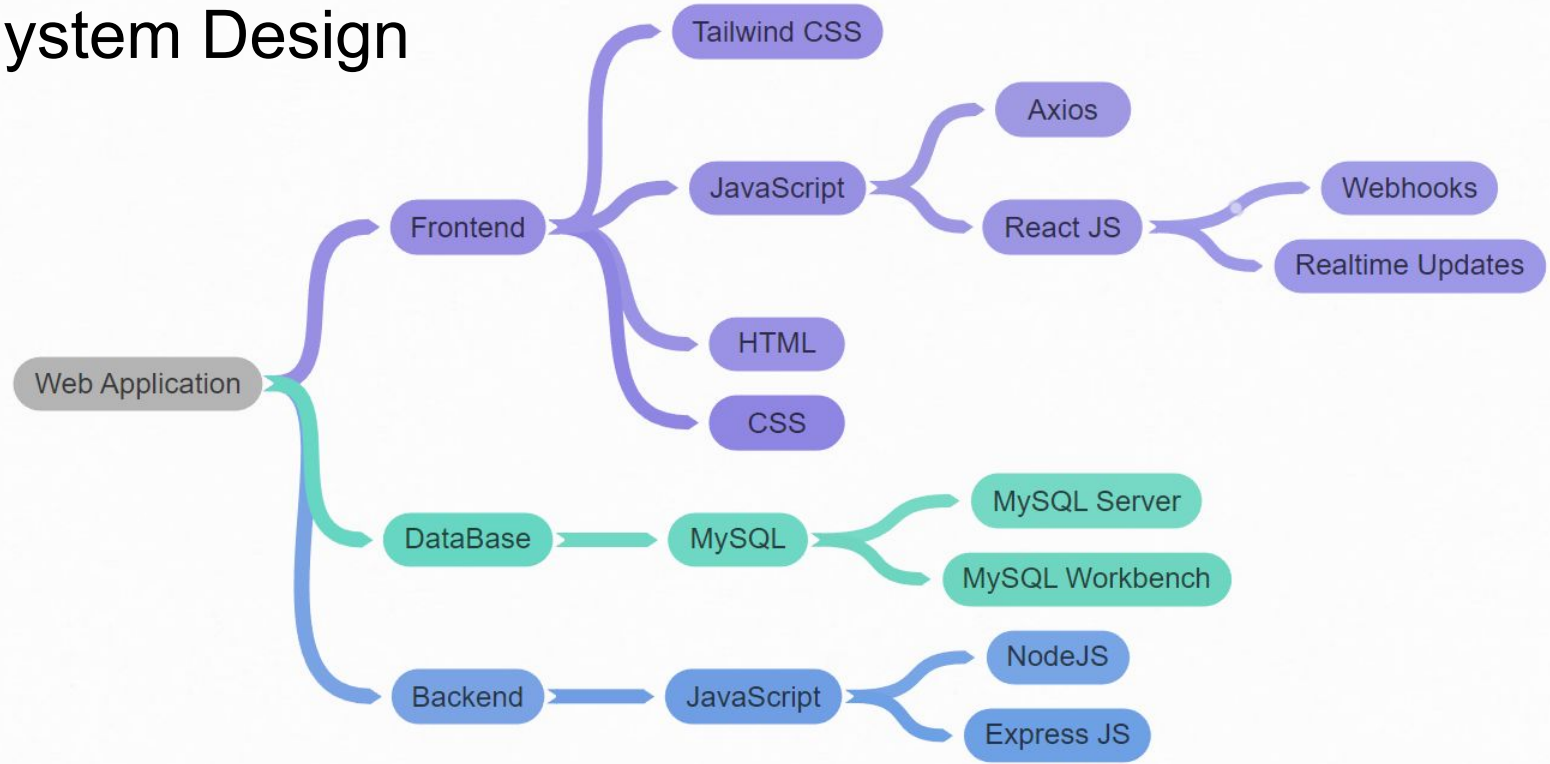
Sl No	Product Name	Country	Aim of Product	Product Type	Targeted Fish	Water quality Parameters
1	Future EU Aqua	Norway	Organic and conventional aquaculture of major fish species and low trophic level organisms in Europe	Hand held device with manual entry (WP5)	Salmon, Seabass, Sea Bream, Rainbow trout	Temperature, Oxygen level
2	AQUADAPT	Thailand, Cambodia, Myanmar, Vietnam	How the aquaculture sector, could adapt to climate change and at the same time be sustainable.	IoT system for DO, Tempt, PH, Ammonia, Turbidity measured and monitored in mobile app, Farmer can mange aerator & feed	Tilapia	Oxygen level,
3	Quadlink Technology	Taiwan	Smart Water Quality Monitoring System, environmental monitoring of aquaculture waters. Aquaculture feeding system. Remote monitoring of disease control. Monitoring of aquatic breeding. Feeding aquatic fingerlings. Automation and wisdom breeding facilities. High-density culture and history of big data.	Aquadlink: Smart Aquaculture Application System, Farmer can mange aerator, pump & feed	NA	Temp, DO(0~20 mg/L(water)), PH, ORP(- 1000 mV ~ + 1000 mV), Salinity(O~ 50 ppt)

Project Objectives

The project objective is to develop an efficient and scalable application which store and visualize the data send by the sensors in the google sheet. The application should be easily accessible and will be used to visualize the data in the form of the plots and tables.
The application should also show the suggestions and message given by the AI in order to improve the water quality if it’s getting polluted.


Home Page
Title
Content
Details
Login
Login
Login
Sensor Page
Sensor Information Page
Sensor 1
Plot
Table
Message
Prediction
Sensor 2
Plot
Table
Message
Prediction
Sensor 3
Plot
Table
Message
Prediction
Sensor 4
Plot
Table
Message
Prediction
Sensor 5
Plot
Table
Message
Prediction
Sensor 6
Plot
Table
Message
Prediction
Plot
Plot
Description & Limits
Sensor No.
Start Date
End Date
Start Time
End Time
Table
Table
Sensor No.
Description
Prediction
Prediction
Sensor No.
Message
Message
Description
Sensor No.

System Design



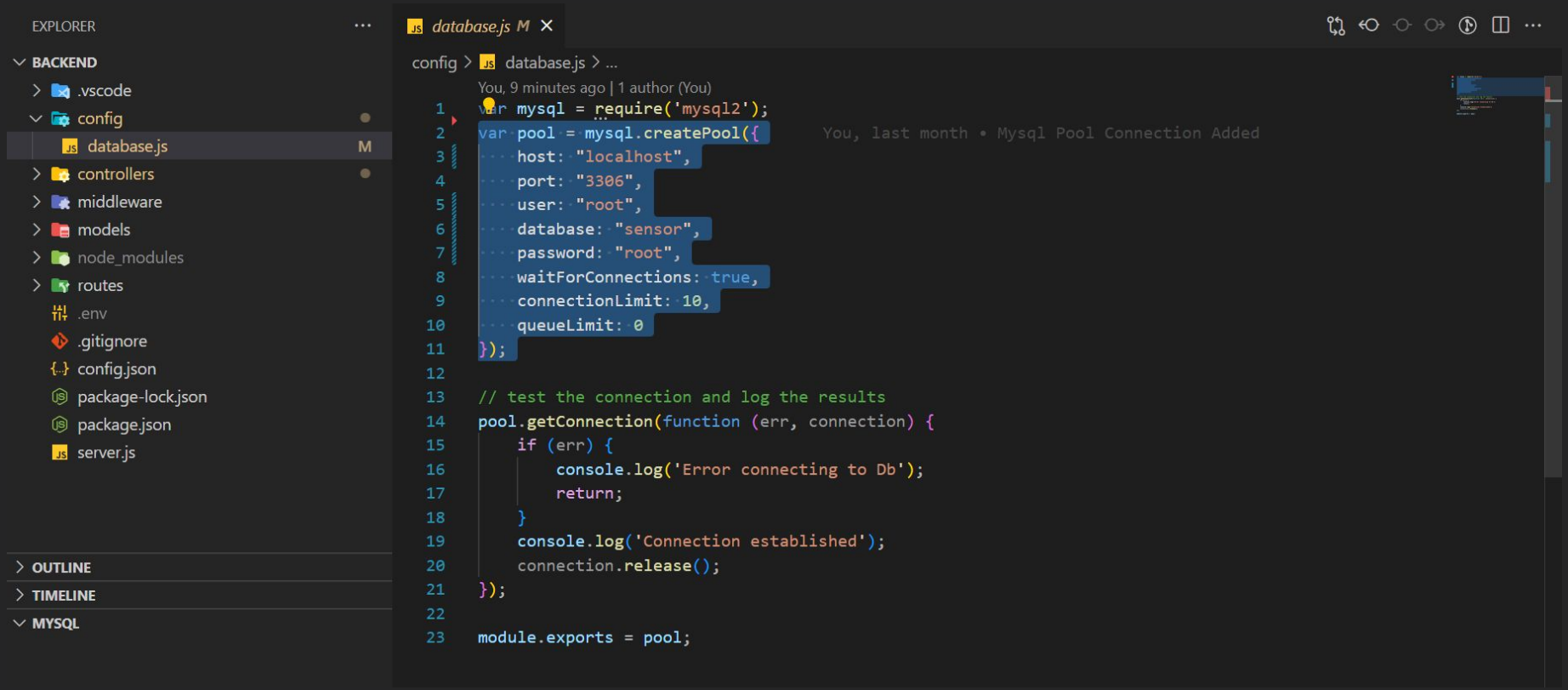
Frontend Application

Database Architecture - MySQL

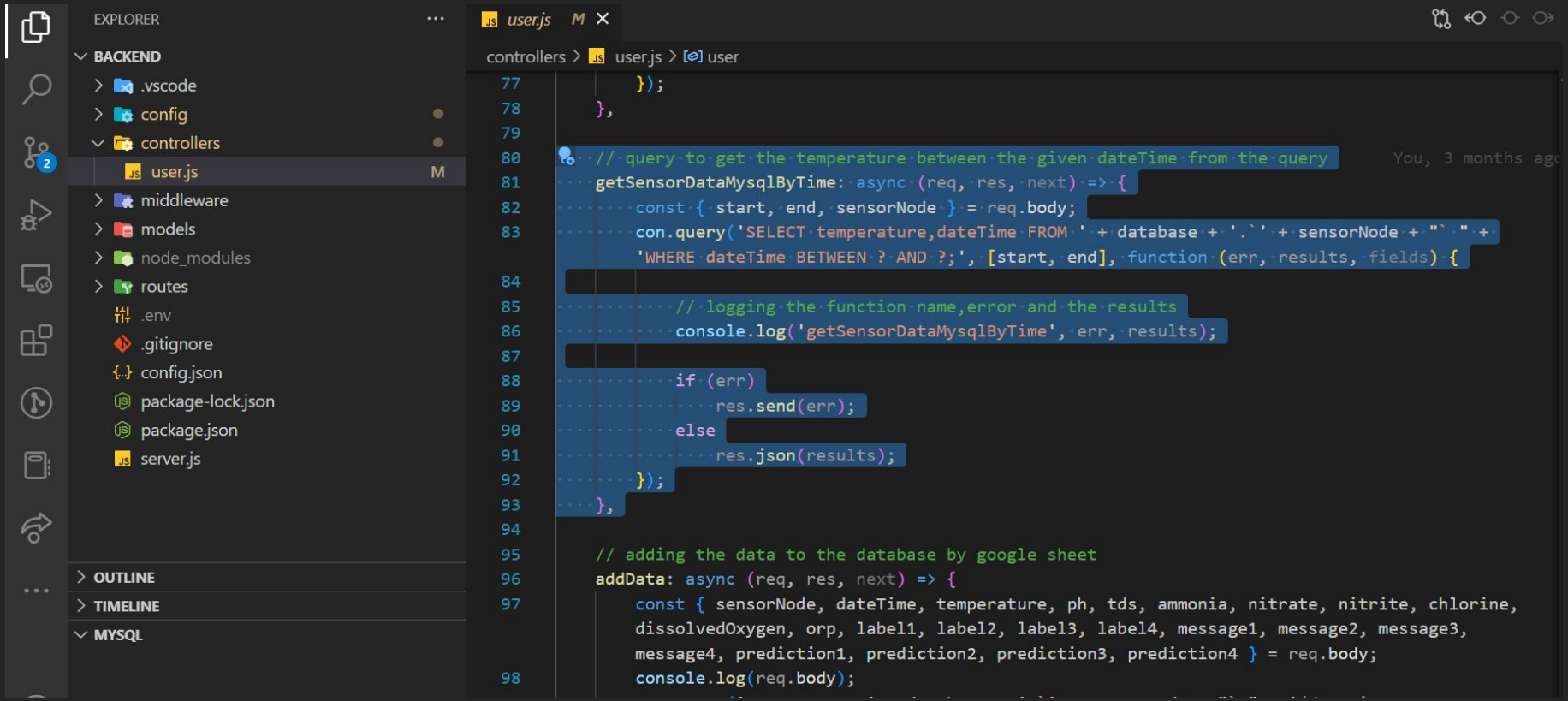
```
CREATE DATABASE sensor;
CREATE TABLE `sensor`.`1` (
  `dateTime` DATETIME NULL,
  `temperature` DECIMAL(5,2) NULL,
  `ph` DECIMAL(5,2) NULL,
  `tds` DECIMAL(5,2) NULL,
  `ammonia` DECIMAL(5,2) NULL,
  `nitrate` DECIMAL(5,2) NULL,
  `nitrite` DECIMAL(5,2) NULL,
  `chlorine` DECIMAL(5,2) NULL,
  `dissolvedOxygen` DECIMAL(5,2) NULL,
  `orp` DECIMAL(5,2) NULL,
  `label1` VARCHAR(255),`label2` VARCHAR(255), `label3` VARCHAR(255),`label4` VARCHAR(255),
  `message1` VARCHAR(255), `message2` VARCHAR(255), `message3` VARCHAR(255), `message4` VARCHAR(255),
  `prediction1` VARCHAR(255),`prediction2` VARCHAR(255),`prediction3` VARCHAR(255),`prediction4` VARCHAR(255))
```

Backend Architecture

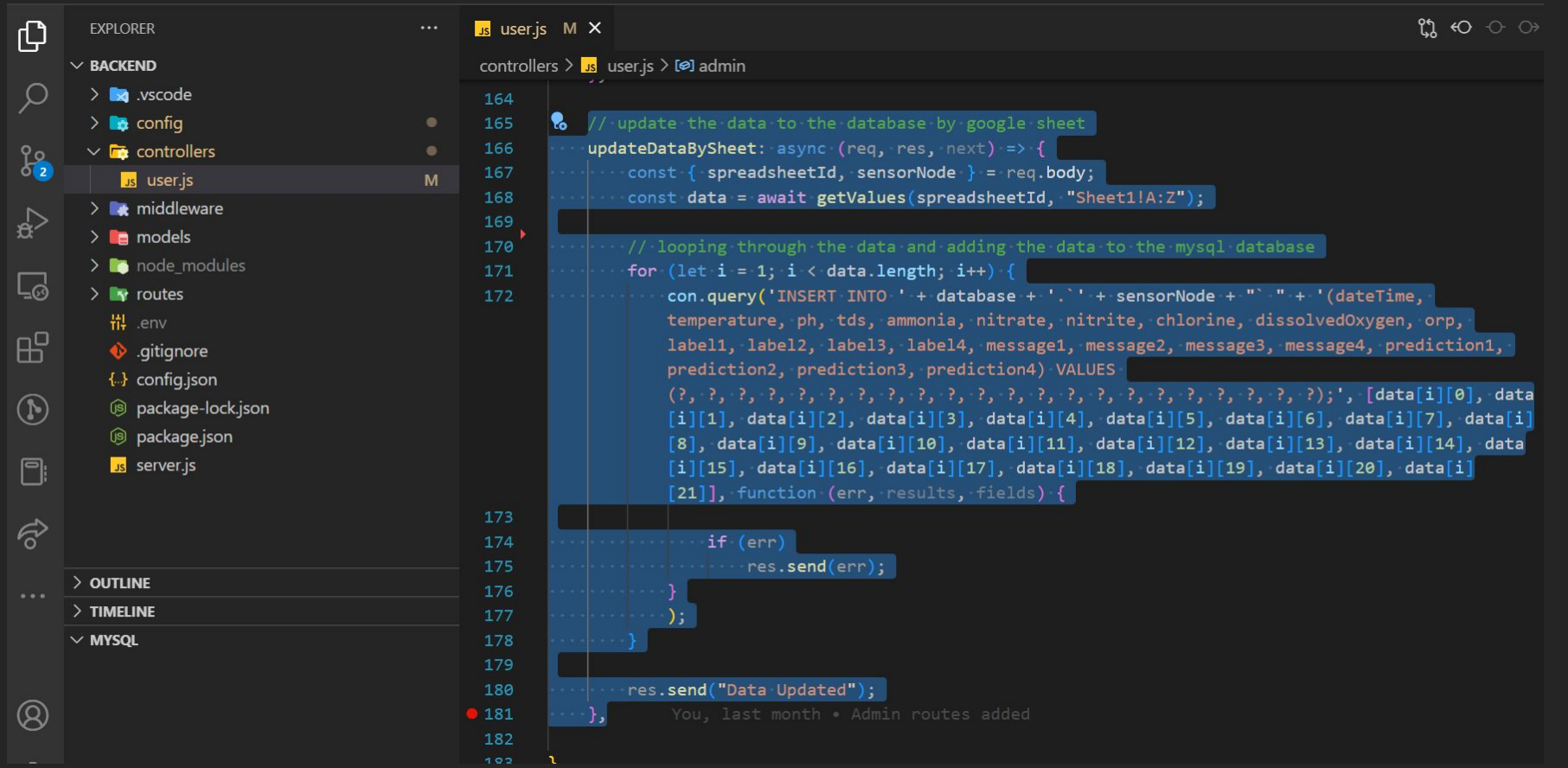
Connecting with database



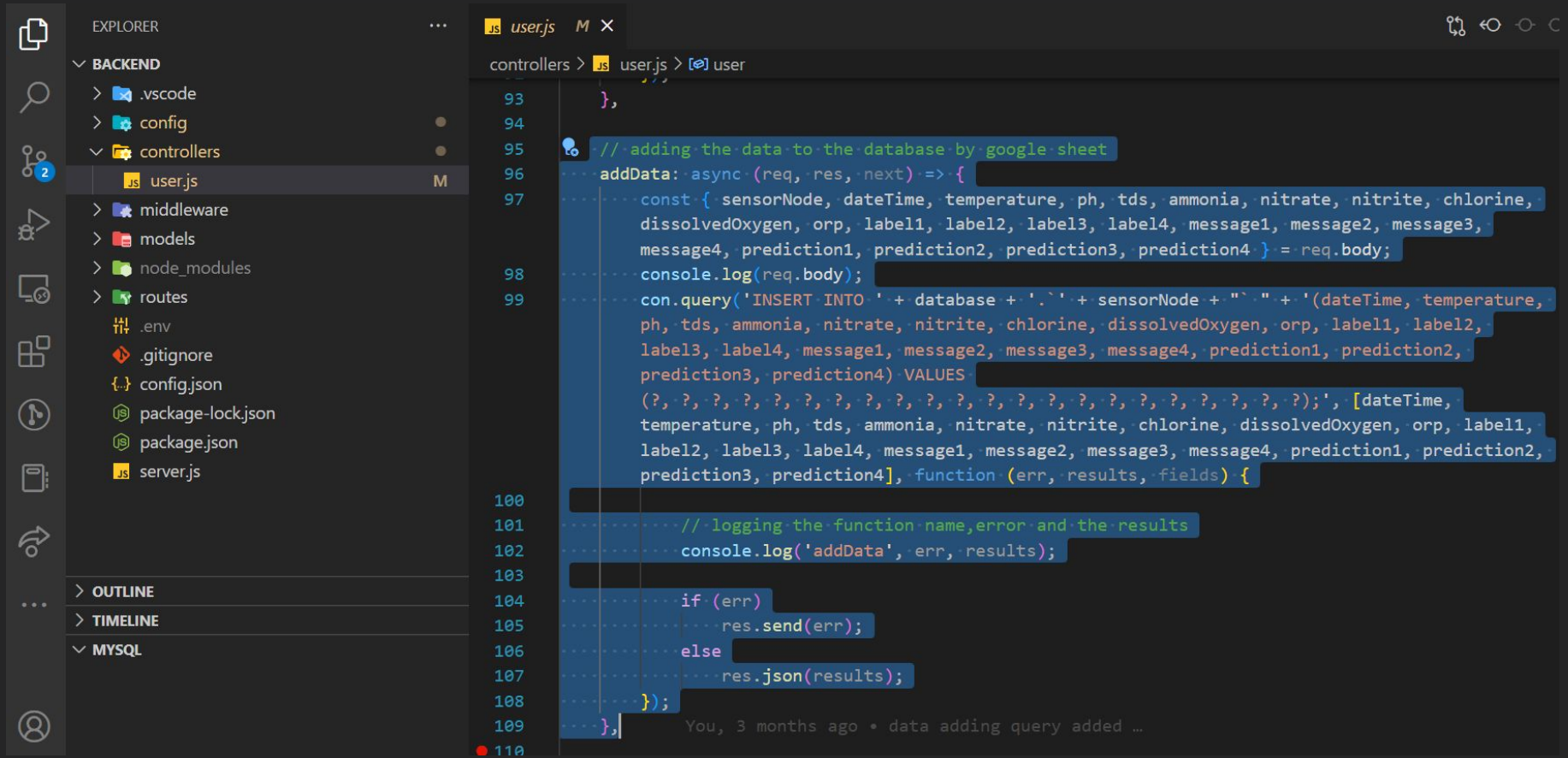
Getting data between given start and end time



Updating the data by Google sheet to MySQL



Adding the data to MySQL



Conclusion

The web-application is developed which contains all the necessary information and feature along with the scalable backend and MySQL database.

Future Scope

The application can be deployed on highly scalable platforms using the different parallel processing algorithms. A good and efficient AI model can be used for the data analytics and predictive modeling.