Weichao Liang

Tejaswi Gowda

Safety Monitoring System for the Elderly

05 December 2023

Safety Monitoring System for the Elderly

With the acceleration of social aging, the safety of the elderly has become an issue that cannot be ignored. In this paper, we introduce a safety monitoring system for the elderly based on infrared sensors, microcontrollers, and cloud platforms to monitor their activity status in real time and notify their family members or caregivers when danger occurs, as well as to trigger an alarm when there is no activity for a long period of time, in order to ensure their safety and health.

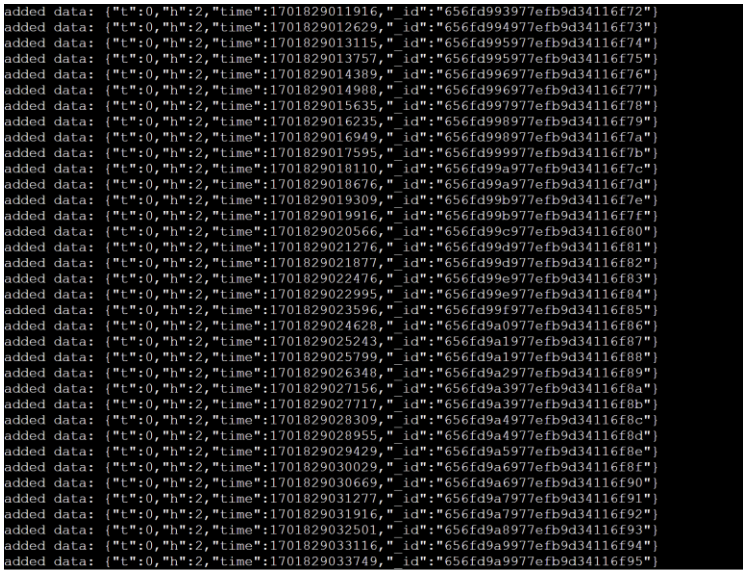
The core of this system is an infrared sensor which is installed at key locations in the elderly living environment such as living room, rooms to monitor any possible movement or activity. Once activity is detected, the sensor sends the data to a microcontroller, which in turn uploads the data to a cloud platform. The cloud platform is responsible for analyzing the data to determine if there is a prolonged period of inactivity. If so, the system will trigger an alarm to notify the relevant personnel.

Step1 Arduino uploading data to the cloud platform

mC.ino

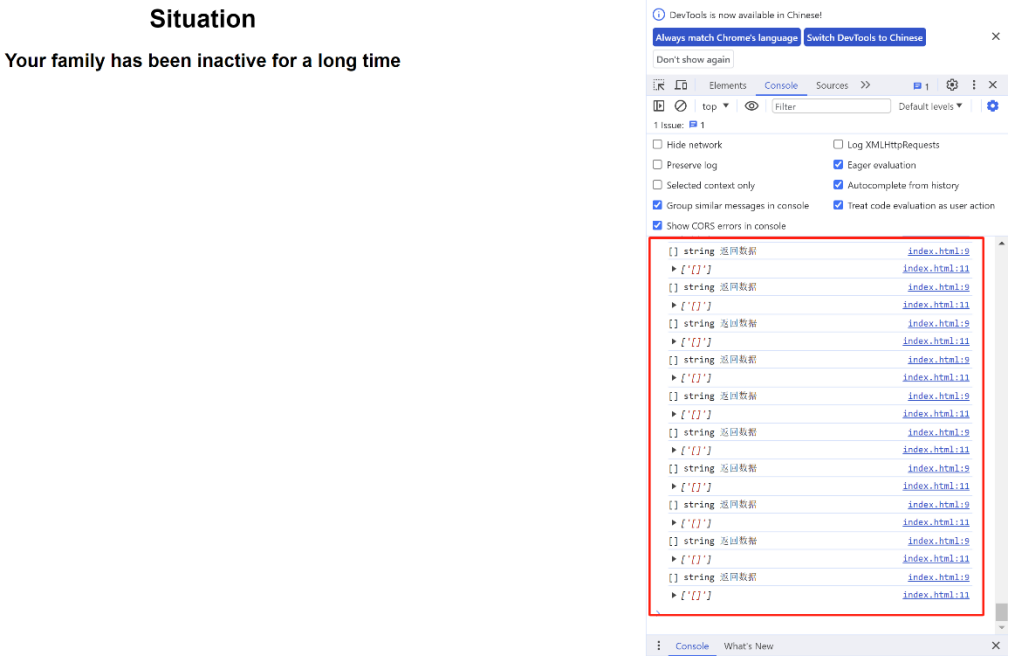
```
}

void loop() {
  // 检测活动
  int h = 0;
  if (detectActivity()) {
    lastActivityTime = millis();
    displayMessage("alive");
    h=1;
  }

  // 检查自上次活动以来是否已过10秒钟
  if (millis() - lastActivityTime > 10000) {
    displayMessage("Your family has been inactive for a long time");
    h = 2;
  }
  int t = 0;
  String url = String(serverName) + "?t=" + t + "&h=" + h;
  Serial.println(url);
  response = httpGETRequest(url.c_str());
}

bool detectActivity() {
  int sensorValue = digitalRead(pinPIR);
  Serial.print("Sensor Value: ");
  Serial.println(sensorValue);
  if (sensorValue == HIGH) {
    return true;
  }
  return false;
}
```

Step2 The cloud server receives the data and accordingly.



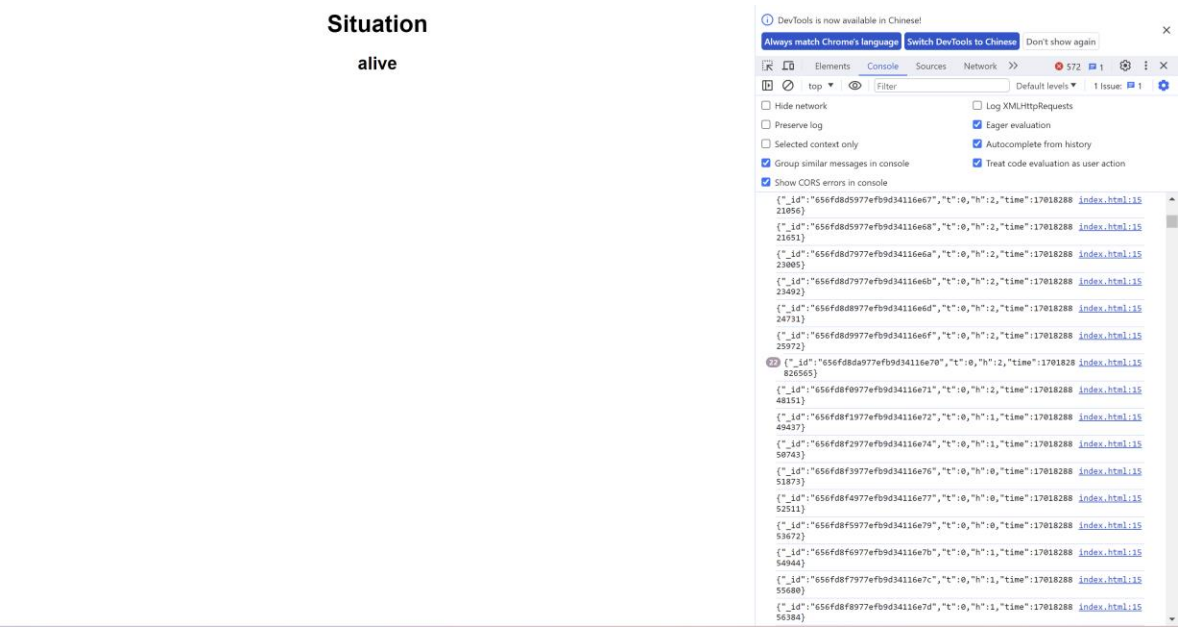
Step3 Open html in cloud server with server.js

In the process of practicing, I encountered a key technical challenge is that although the cloud server can receive and read the data sent from the Arduino, when the html file is opened through server.js in the cloud server, the page can't receive the data recorded in the cloud server, so it can't display the transformation of the data in real time.



The web page is unable to fetch data.

After checking, we found that the problem is due to an error in the data interaction between the server and the front-end. Originally the HTML was used for asyncReq.js to make an asynchronous request (server.js) to the server, and the server responded using the data displayed in that file, but the error in the code designation prevented the html from obtaining the information in the database. My solution was to go get mongo's database when the microcontroller sends data to the cloud server and make sure the time field is in a format that matches what is on the html. So that the data request from the front-end is correctly processed and responded to.



The page fetched the data correctly.

Overall, The design gaps were pretty much what I envisioned, and modifying on the original WeatherStation project gave me great help with the code. Similarly, the readings and workshops in class have given me multiple solutions and new ideas, as well as help from more

people. In future research I would like to focus on improving the user interface and interaction design, such as the ability to get information sent from a cloud server on a watch or cell phone. This way the family can visualize the situation of the elderly at home.