

United Nations
Educational, Scientific and
Cultural Organization



Junior Academy of Sciences
of Ukraine

THE DEVELOPMENT OF A
MICROPROCESSOR SYSTEM TO MONITOR
THE CONFINED-SPACE STATE BASED ON
COMPUTER NETWORKS AND INTERNET
PROTOCOLS TO PREVENT EMERGENCIES

UKRAINE TEAM

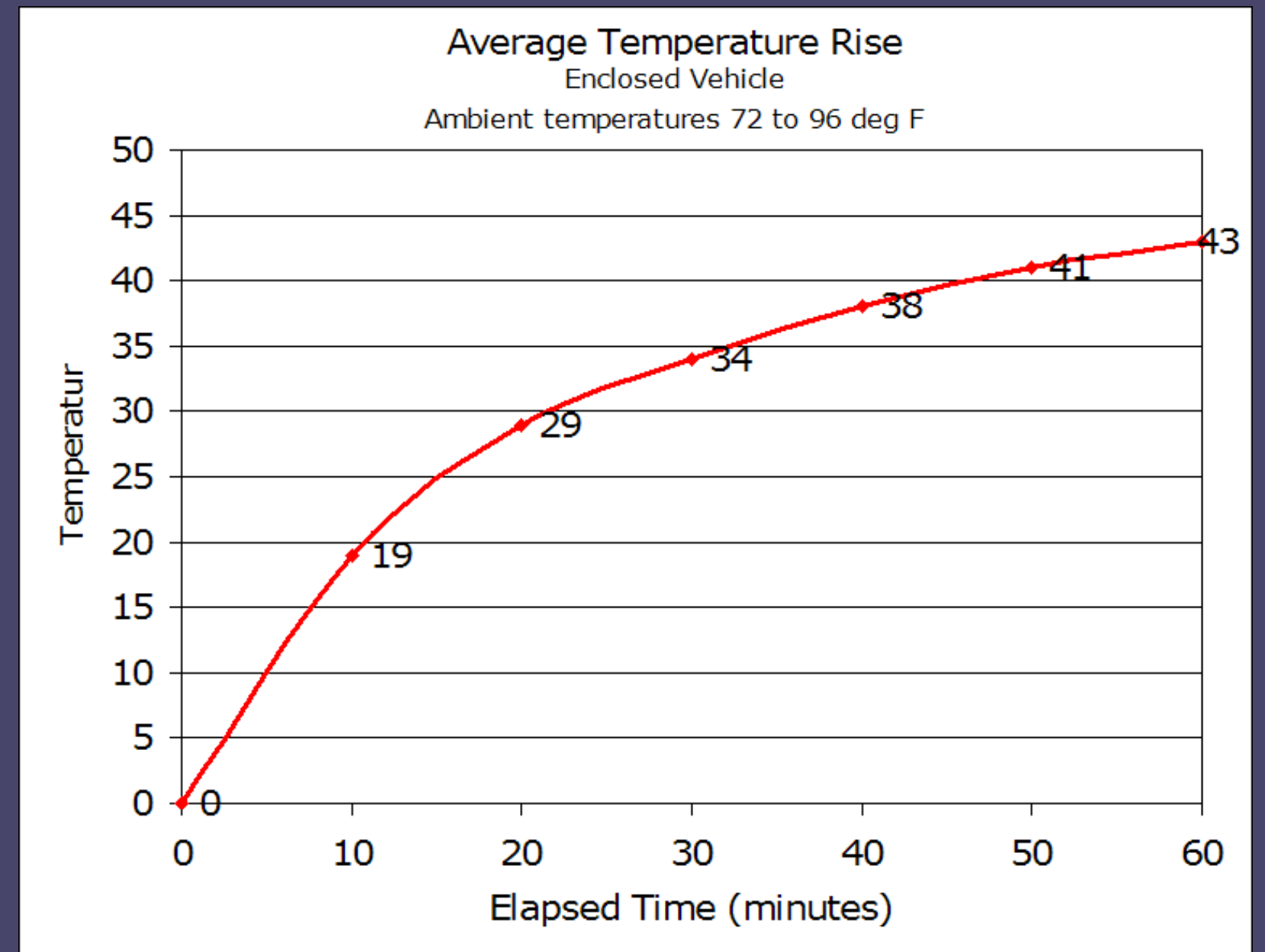
Iliia Riabko





INTRODUCTION

It is quite common to observe a situation when a driver leaves his vehicle in the parking lot with children or pets while driving. As a rule, the driver closes the doors and windows of the car in order to ensure safety and protection against thieves. However, these actions lead to the fact that in hot weather the temperature in the car interior rises rapidly. This leads to overheating of the bodies of the passengers remaining in the car cabin, and deterioration of their health.



TASKS



The purpose of this work is:

– research and substantiate the parameters for selecting the necessary sensors and their placement in the car interior for monitoring the state of the environment in the car interior;

– to develop project documentation and create a working experimental sample of the electronic system for monitoring the state of the environment in the car interior and alerting.

The object of research of this work is the processes that occur during the operation of the car.

The subject of research is the state of a closed environment.

Research methods – selection of parameters of electronic devices

The problem to be solved is the prevention of thermal shock in closed vehicles.

SOLUTION

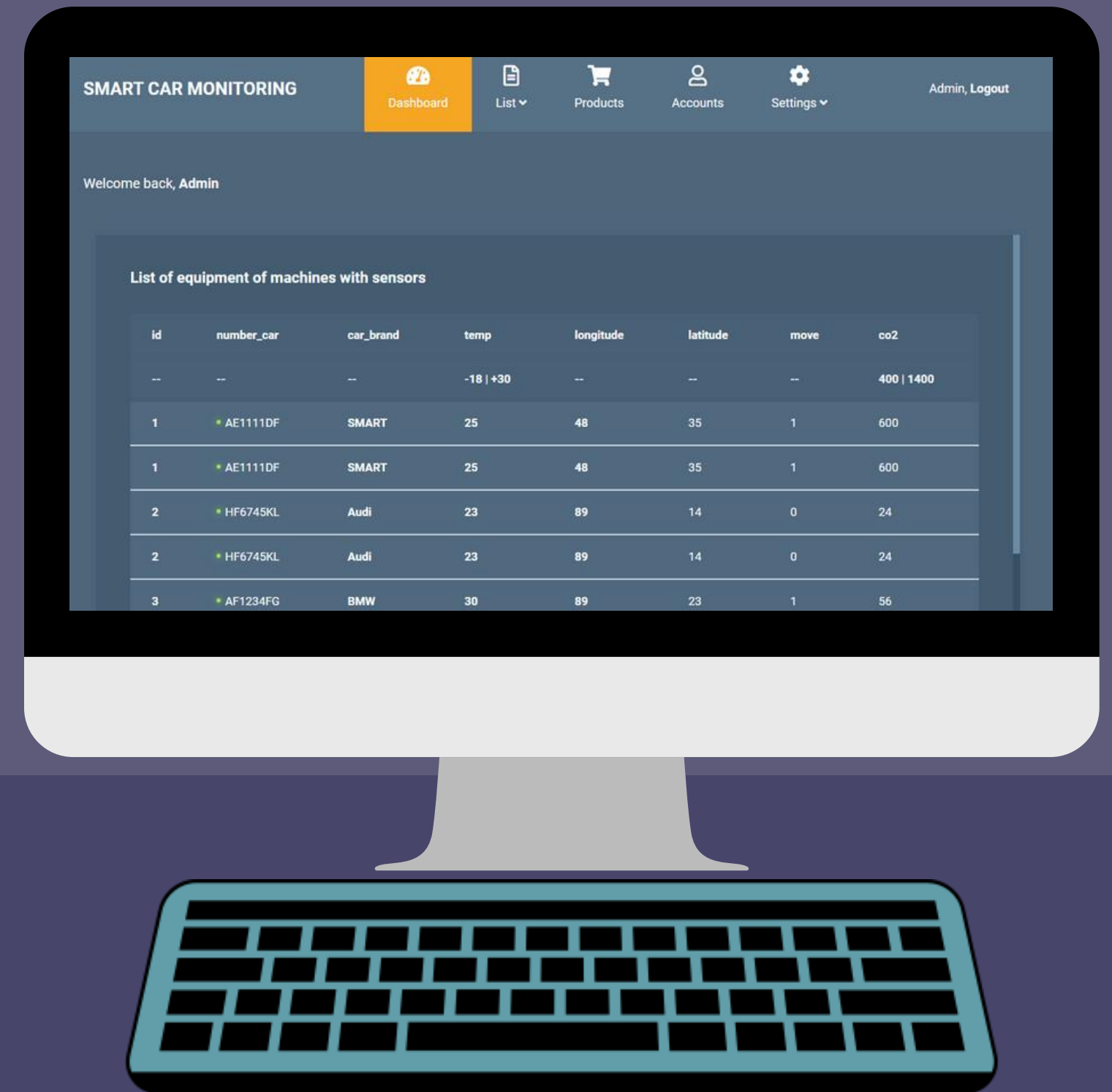


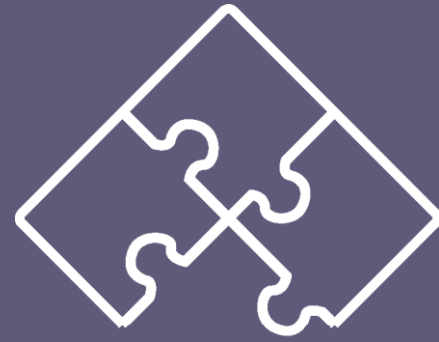
THE PHYSICAL STATE OF THE ENVIRONMENT IN THE CABIN OF A CLOSED CAR IS MONITORED USING TEMPERATURE, MOVEMENT AND CARBON DIOXIDE GAS ANALYZERS BUILT INTO THE MICROPROCESSOR CONTROLLER. In case of emergency situations in the car interior, its location can be determined using the GPS navigation module built into the microprocessor controller – NEO-6M.

Testing the operation of the microprocessor controller is carried out using the unit for indicating the modes of operation of the modules and errors by visual observation of the state of the LEDs installed on the front panel of the housing of the microprocessor controller.

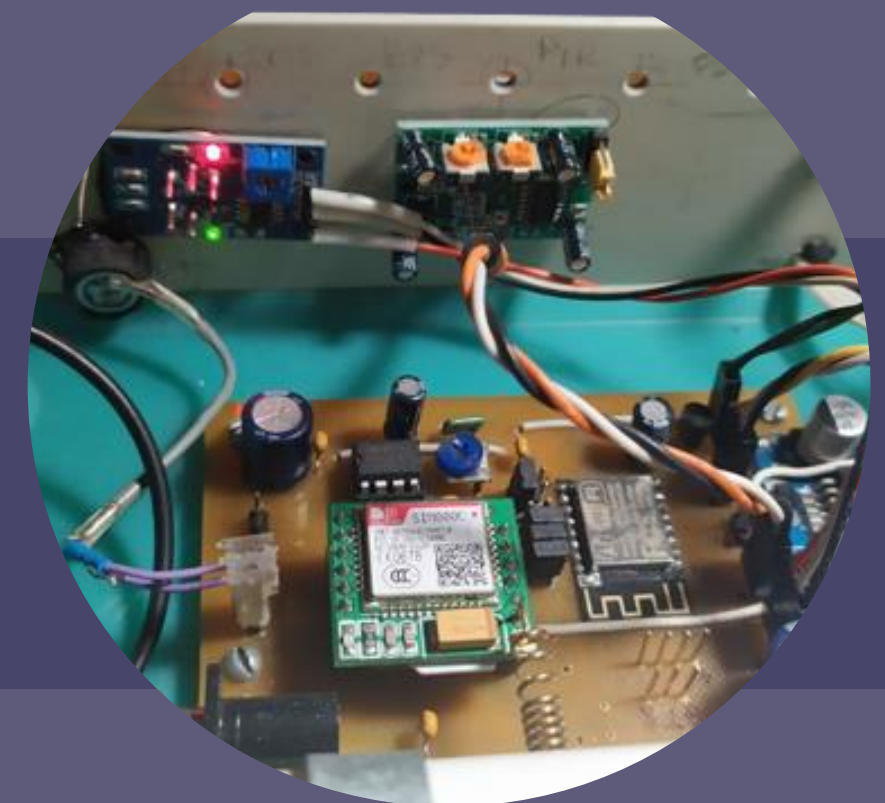
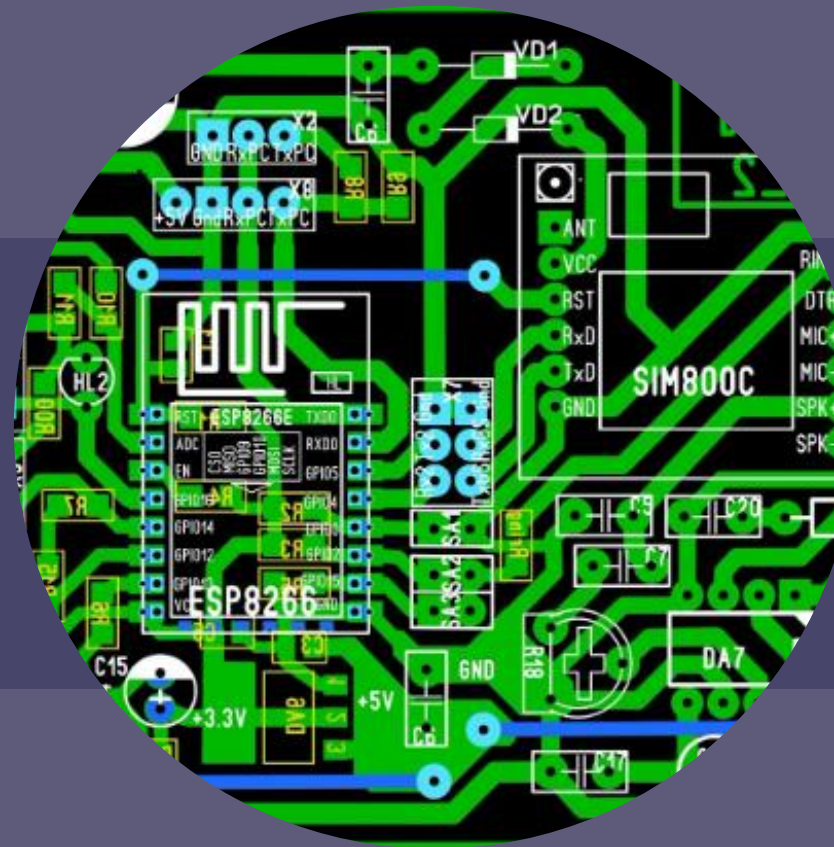
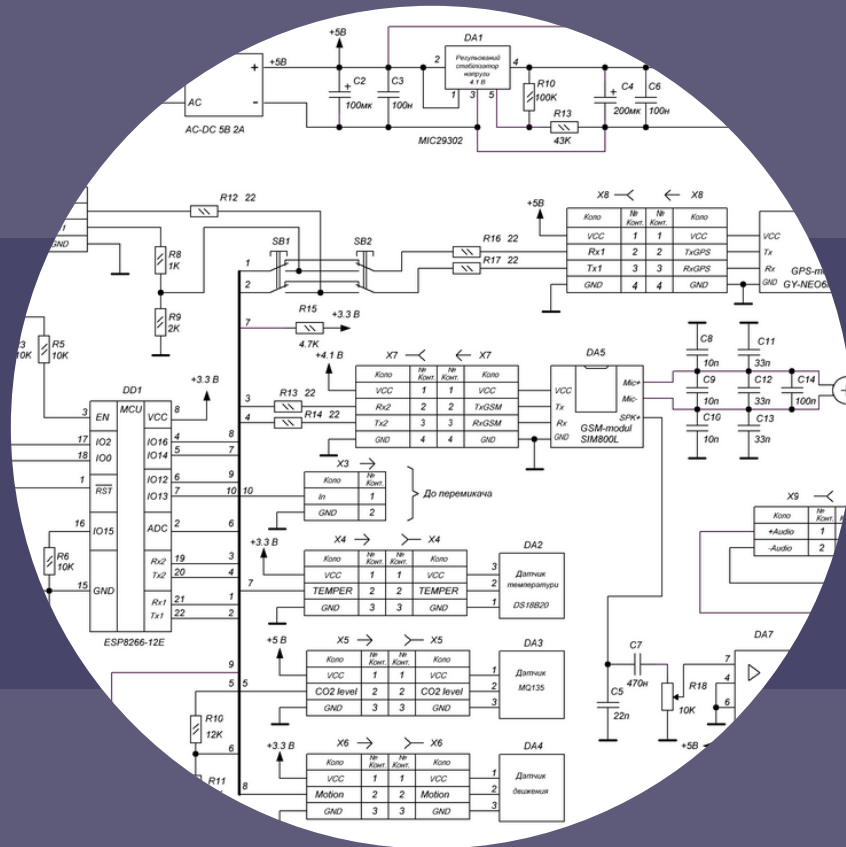
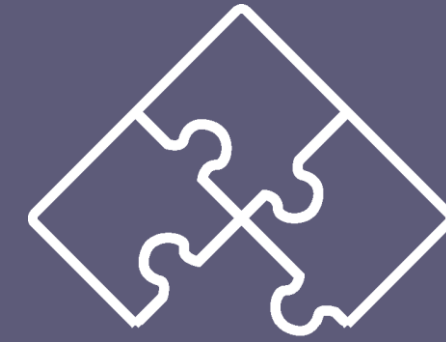
The car interior microclimate monitoring system is an easily scalable system. Therefore, it can be used in two ways:

- a system for monitoring the cabin of one car;
- a monitoring system for several salons





SOLUTION



**Electrical schematic
diagram**

**Circuit board
drawing**

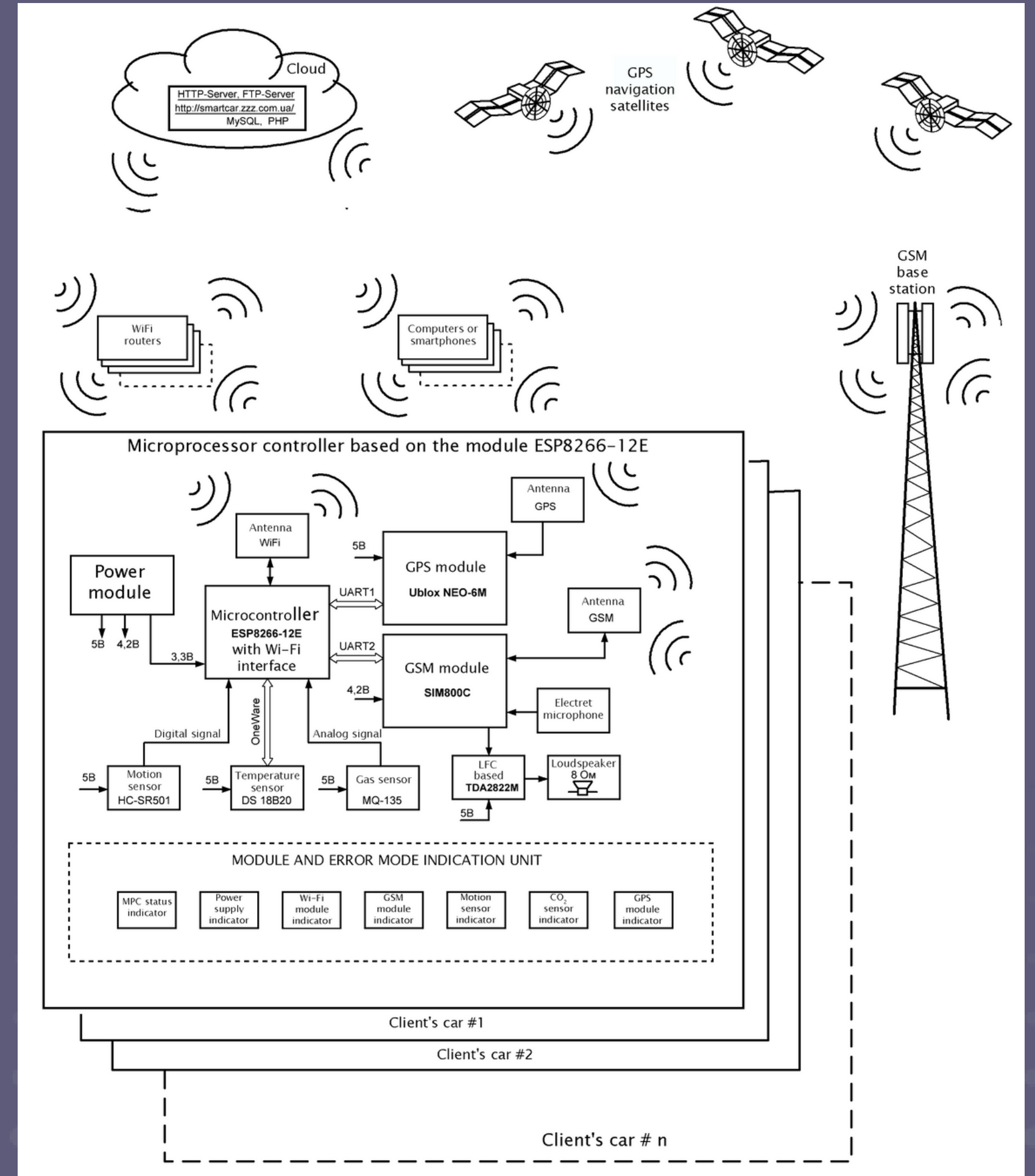
**Working
prototype**



SOLUTION

The microprocessor controller was designed and manufactured on the basis of the ESP8266-E12 module. This module has a built-in WiFi interface, which allows you to use it as a WiFi router client (not included in the microprocessor controller) to access the global Internet. With the help of GET requests, information about the physical state of the environment in the interior of a closed car is transferred to the site.

If there is no possibility to connect to the Internet through the WiFi interface, the microprocessor controller provides for the use of an alternative method of transmitting GET requests to the website hosted on the HTTP server using GSM communication. For this, a GSM module - SIM800C - is built into the microprocessor controller. This module additionally allows you to send text messages about the situation in the closed interior to the owner of the car, and to ensure the possibility of making calls from the owner to the car using the SIM card number inserted in the GSM module and listening to the situation, or conducting negotiations with people in the car.





CONCLUSIONS

THE CAR INTERIOR ENVIRONMENT MONITORING SYSTEM HAS BEEN CREATED, TESTED AND CHECKED FOR PERFORMANCE. IT CONSISTS OF SEVERAL MAIN COMPONENTS. IN PARTICULAR:

- A SET OF SENSORS THAT PROVIDE FULL CONTROL OF THE ENVIRONMENT INSIDE THE CAR;
- A MICROPROCESSOR CONTROLLER THAT USES THE INTERNET, GSM COMMUNICATION AND GPS NAVIGATION IN ITS WORK;
- WIFI ROUTER;
- HTTP SERVER;
- FTP SERVER;
- PERSONAL COMPUTER OR SMARTPHONE OF THE SYSTEM USER.
- AN ONLINE RESOURCE FOR INFORMATION AND ANALYSIS OF THE RECEIVED PARAMETERS OF THE CAR INTERIOR ENVIRONMENT;
- TO SUM UP, THE ENTIRE SYSTEM IS VERY FLEXIBLE AND FULLY CUSTOMIZABLE, WHICH MAKES IT SUITABLE FOR USERS OF ANY TYPE.