Design of Wearable Health Monitoring System Integrating Wireless Technology Based on 3D Graphene Foam Sensor

ICEICT2021

PAPER ID: 6546

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Abstract

In this paper, a wearable health monitoring system based on wireless data transmission technology is designed for heart and blood health monitoring. In this system, new three-dimensional (3D) graphene foam sensors are used to capture heart rate signals in real time, and a microprocessor STM32 is used as the main control chip for sending the collected data to the mobile device through low-power Bluetooth. Meanwhile, the blood oxygen and blood pres-sure data are collected by the mobile device, and then, the acquired physical health data and location information are packaged, stored and sent to the cloud server through 4G communication circuit, so the remote monitoring of the physical health of the subject in real time by the cloud server can be realized.

System Design Scheme

The system design can be divided into three parts: monitoring device, bracelet device and cloud server. As shown in the picture below.
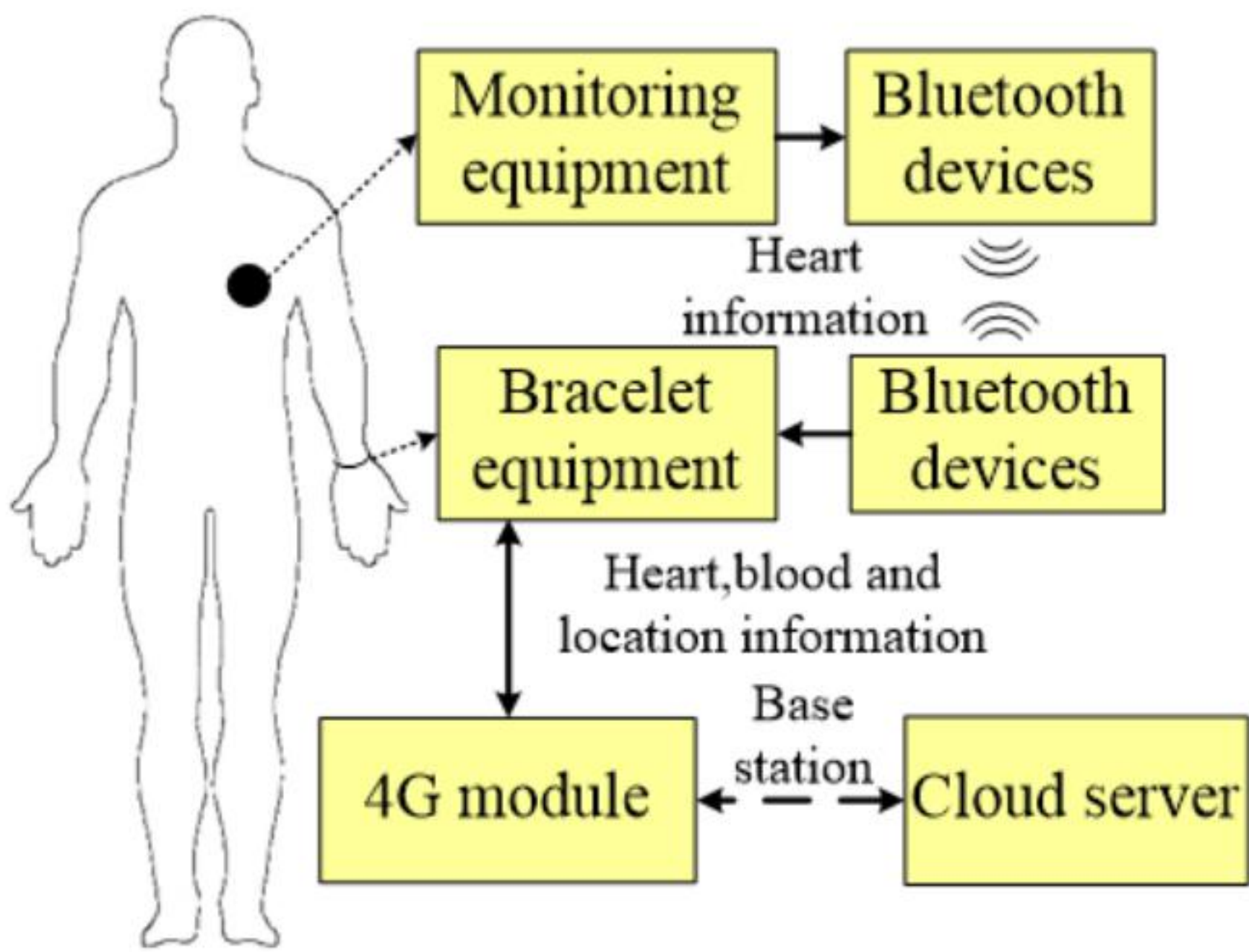
System Hardware Design

The hardware block diagram of the monitoring device and bracelet module can be divided into several parts such as battery management circuit, biomedical sensor circuit, USB serial port and Bluetooth circuit, et al, as is shown in picture below.
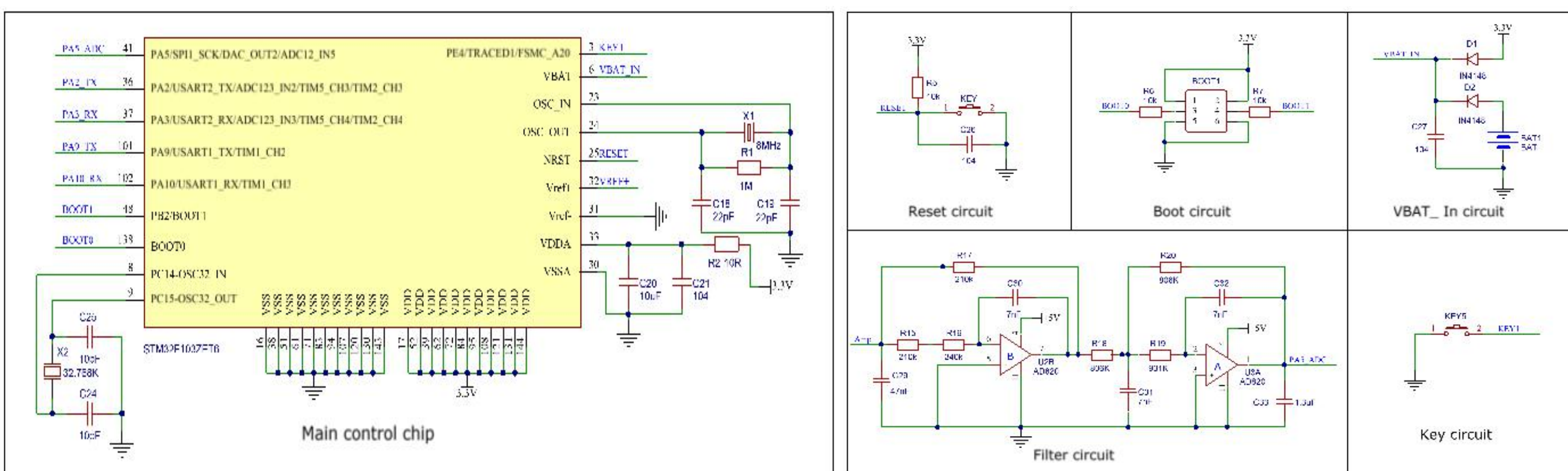

3D Graphene Foam Sensors

3D graphene foam can be obtained by dep-ositing 2D graphene onto 3D polymer foam. Flexible polym-er foams such as polyimide (PI) and polyurethane (PU) have good pore struct-ure. Then, the foam is placed in graphene oxi-de solution, and finally, the graphene oxide foam is obtained.

System Software Design

The microprocessor without operating system is used for reducing resource/power consumption and ensure the real-time requirements of data acquisition. The system program flow chart is shown in the picture below.
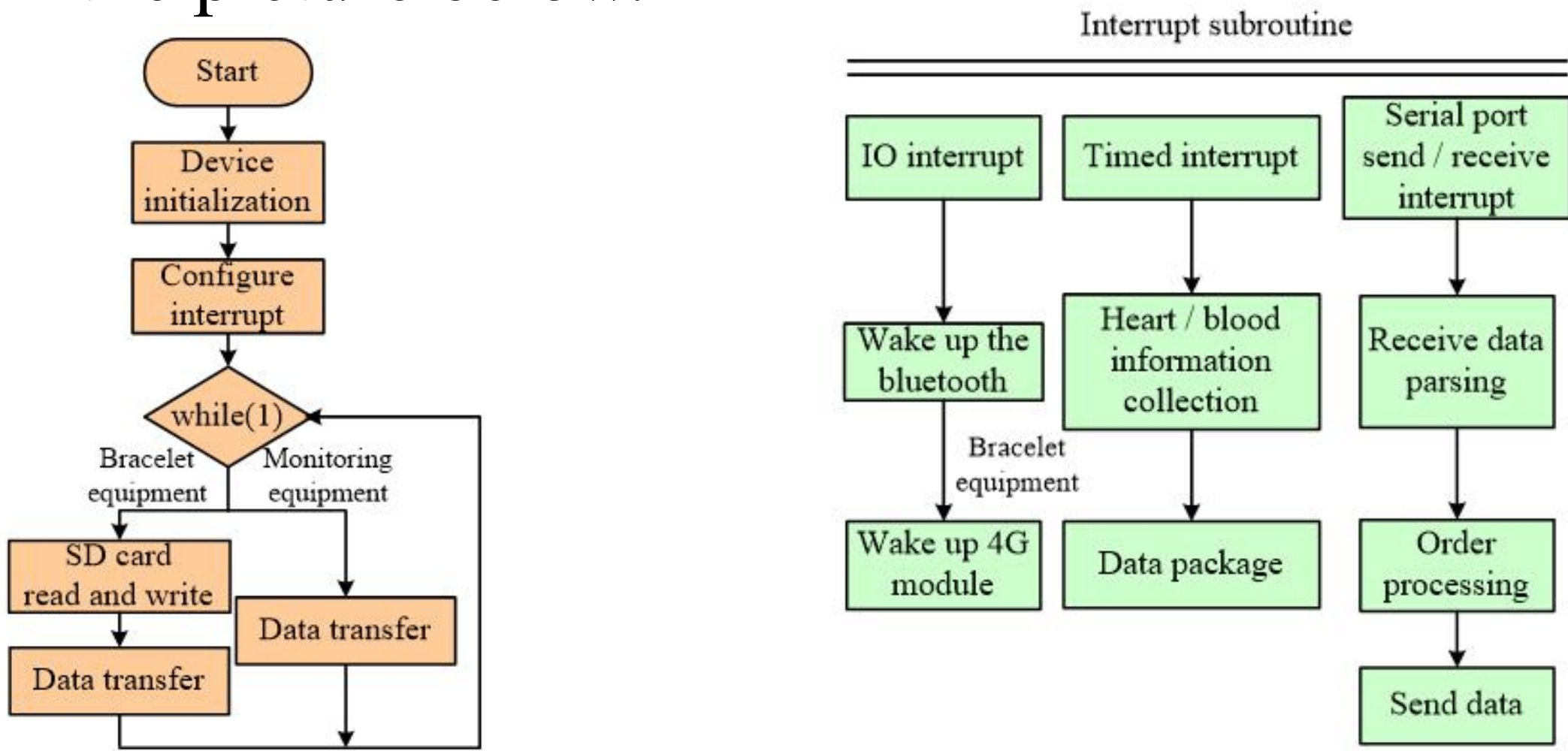
Conclusion

The design purpose is to obtain the desired data and the position information of the subjects through STM32 microproce-ssor, and then upload the information to the server through Bluetooth and 4G communication circuit. The heart rate, blood oxy-gen and blood pressure signals monitoring of the subjects from the remote terminal can be realized, so the potential diseases and the changes of the health of the subjects can be detected in advance.