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An Elderly Care System

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Introduction

A. Elderly Care System use sensors in wearable devices to monitor health status and connect smart homes with the device. It integrates GPS to prevent the elderly from getting lost, and allows emergency call.

B. Besides, relatives can remotely understand the status of the elderly through the app. It can enable the elderly to maintain an independent life and get better attention and care.

Methods

The entire system is divided into three parts, including housing security, anti-lost, and health monitoring.

① Use the sensors which install at home to detect the safety of the home, and give reminders through the buzzer and application at the same time when a dangerous situation occurs.

② GPS Positioning Sensor will provide real-time location data on the app.

③ The Blood oxygen transducer and Heart rate monitor sensor will be worn by the elderly as a bracelet, and give real-time data on the application, and will give an alarm on the software program when abnormal data occurs.

SMART HOME:

- **Water Sensor**

Detect whether there is water attached to the power supply to prevent the possibility of electric shock

- **Photosensitive Sensor**

Provide reference data on the sleep of the elderly and whether someone has illegally invaded

- **Infrared Sensor**

Will be installed in doors and windows and other locations, together with the photosensitive sensor, used to determine whether someone has entered illegally.

- **Flame Detection Sensor**

Prevent the emergence of fire.

- **Temperature Sensor Module**

Provide reference data on whether there is a fire, and prevent the danger caused by low temperature.

ANTI-LOST SYSTEM:

- **GPS Positioning Sensor**

Provide more accurate location information for positioning.

HEALTH CHECK:

- **Blood Oxygen Transducer**
- **Heart Rate Monitor Sensor**
- **Accelerometer Sensor And Gyro Sensor**

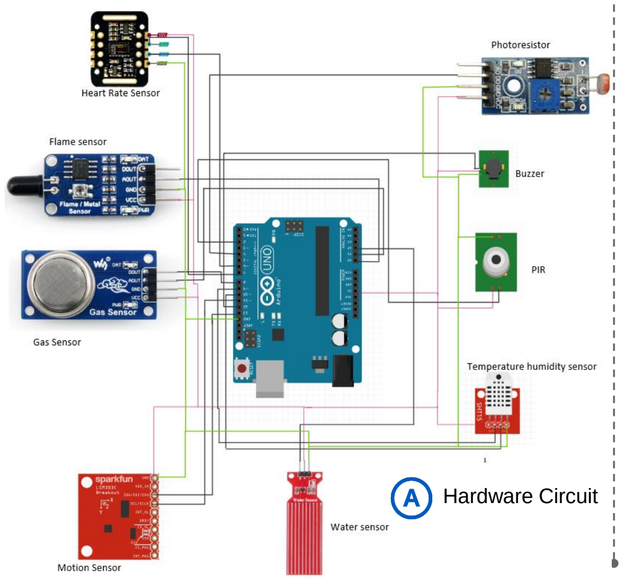
Provides heart rate oxygen and motion information for health status and fall detection.

APP:

- **Gesture Calculation**
- **Sensor data display**
- **Smart home control**

Use Quaternions to calculate the elderly's dynamic gesture and monitor the occurrence of accidental falls

Hardware Analysis



A Hardware Circuit

WEARABLE SENSORS

Heart Rate Sensor Module MAX30105

MPU 6050 Gyroscope Acceleration Magnetic Sensor

- **Working with another OLED**
- **Heart rate, blood oxygen and motions detection**

Combining two sensors achieves three functions.

SMART HOME SENSORS

- **Gas sensors:**

MQ2 Smoke Sensor Module

MQ7 Carbon monoxide Sensor

- **Photoresistor**
- **Water sensor**

Temperature humidity sensor: DS18B20 and DHT11

Infrared sensor: HC-SR501

Flame sensor: IR sensor, potentiometer, OP-Amp LM393

Table 1 - Hardware

Working voltage	Interface	Bus	Data analysis
3.3V	7 Digital	One-Wire	APP
3.7V	2 Analog	I2C	LED indicator
5.0V		SPI	OLED display

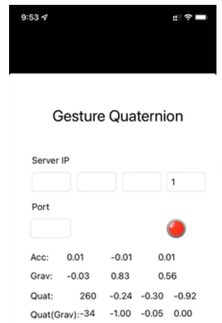
At least 8 types of sensors achieving a secure smart home.

Results

① The elderly can avoid potential safety hazards, find dangers as early as possible and seek help by using smart home monitoring and health detection systems.

② Through the application, relatives can remotely get to know whether there is danger in the elderly's home, or whether there is a serious physical condition that requires rescue. This allows the elderly quickly seek help when they are unable to complete the call for help by themselves or in any other unexpected situations.

③ At the same time, the elderly themselves can also use the APP to know whether their home is safe when they are away from home. The relatives can use the positioning system in the event that the elderly is lost, which helps to quickly find the elderly and prevent accidents.



B Quaternion APP

Conclusion

A. Use multiple sensors to monitor possible dangers including electric shock, fire, and illegal intrusion, and give reminders when there is a danger. Real-time understanding of the elderly's heart rate, blood oxygen and dynamics through wearable sensors, and detect whether the elderly has sudden illness or trauma.

B. Through the application program, the guardian or family member can remotely understand the health status of the elderly in real time, and the application program will give an alert when there is a danger, so that the guardian or family member can quickly discover the occurrence of the danger.

C. GPS allows guardians or family members to find lost elderly faster, preventing the dangers caused by long-term loss such as long-term loss of temperature, heatstroke, and sudden illnesses.

References

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5. How Does DS18B20 Temperature Sensor Work?

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