**THIS DOCUMENT WILL BE EDITITED**

**Project 2 – Elderly Wearables Project – Technical Documentation – Alex Cojocariu**

**Hardware Details:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Components:** | **Image:** | **Qty:** | **Description:** | **Specs:** |
| Arduino Nano 33 IOT |  | 1 | Development Board | * Microcontroller: SAMD21 Cortex®-M0+ 32bit low power ARM MCU * Radio module: u-blox NINA-W102 * Secure Element: ATECC608A * Operating Voltage: 3.3V * Input Voltage (limit): 21V * DC Current per I/O Pin: 7 mA * Clock Speed: 48MHz * CPU Flash Memory: 256KB * SRAM: 32KB * EEPROM: none * Digital Input / Output Pins: 14 * PWM Pins: 1 (2, 3, 5, 6, 9, 10, 11, 12, 16 / A2, 17 / A3, 19 / A5) * UART: 1 * SPI: 1 * I2C: 1 * Analog Input Pins: 8 (ADC 8/10/12 bit) * Analog Output Pins: 1 (DAC 10 bit) * External Interrupts: All digital pins (all analog pins can also be used as interrput pins, but will have duplicated interrupt numbers) * LED\_BUILTIN: 13 * USB: Native in the SAMD21 Processor * IMU: LSM6DS3 * Length: 45mm * Width: 18 mm * Weight: 5 gr (with headers) |
| PCB |  | 1 | Mounting Board | NA |
| DHT22 |  | 1 | Temp and humidity Sensor | * Type:AM2302 * Accuracy resolution:0.1 * Humidity range:0-100%RH * Temperature range:-40~80º * Humidity measurement precision:±2%RH * Temperature measurement precision:±0.5? * 4-pin package * Ultra-low power * No additional components * Excellent long-term stability * All calibration, digital output * Completely interchangeable * Long distance signal transmission * Relative humidity and temperature measurement |
| Lm35DZ |  | 1 | Body temp sensor | * IC Output Type: Voltage * Sensing Accuracy Range: ± 0.4°C * Temperature Sensing Range: +2°C to +100°C * Output Voltage per °C: 10mV/°C * Supply Current: 91.5µA * Supply Voltage Range: 4V to 30V * Sensor Case Style: TO-92 * No. of Pins: 3 * Accuracy: ±0.4°C |
| White I2C OLED display |  | 1 | Led display to see the data from the sensors | * 0.96-inch screen, 64x128 pixels * Protocol: I2C, (SCK = Clock, SDA = Data) * Supply Voltage (Vcc): 3.3V * IO voltage: 3.3 V |
| MAX30102 |  | 1 | Heart rate sensor | * Power Supply: 3.3V~5V * Working Current: <5mA * RED/IR LED Driving Current: 0-50mA * Communication: I2C * I2C Address: 0x57 * Operating Temperature: -40℃~85℃ * Dimension: 18×14mm/0.71×0.55” |
| Buzzer |  | 1 | Make noise if issue arises | * Wide voltage range from 3.3V to 5V. * Digital |
| Gas Sensor V2 |  | 1 | Check the air quality,  Carbon Monoxide Detection.  It can detect CO-gas concentrations anywhere from 20 to 2000ppm. The sensitivity can be adjusted by the potentiometer. | * Power supply needs: 5V * Interface type: Analog * Pin Definition: 1-Output 2-VCC 3-GND * High sensitivity to carbon monoxide * Fast response * Stable and long life * Size: 40x20mm |
| Green LED |  | 1 | On / Off Status | * 3mm Green LED * Drop Voltage 1.8V |
| 470 ohms  resistor |  | 1 | Resistor for Status LED | * 470 Ohm resistor, 0.25 Watts |
| SPDT Micro Slide Switch |  | 1 | On / Off Power Switch | * 2.5mm by 10mm by 11.5mm * Switch Type: slide * Pole throw Type: SPDT * Poles: 3 * Switch Function: Locking on/off * Switch Connection: PCB Pins * Mounting Method: PCB * DC Voltage: 24V * DC Current 0.5A |
| 4x AAA battery mount |  | 1 | To hold the batteries | * 4x AAA battery holder * Length: 54mm * Width: 50mm * Height: 13mm |
| Resettable fuse |  | 1 | A resettable fuse so no need to reset the circuit | * SMD Type fuse, 1206 Series * Hold current: 500mA * VMAX: 6V ~ 60V * IMAX: 10A ~ 40V * nanoSMD |
| Touch Sensor V2 |  | 1 | Scroll through OLED display | * Supply Voltage: 3.3V to 5V * Interface: Digital * Size:22x30mm |
| Digital Tilt Sensor V2 |  | 1 | Checks wearers’ arm tilt, CONTAINS MERCURY | * Digital mercury-based tilt switch * Can be used as a simple tilt sensor |
| Flame Sensor V2 |  | 1 | Mobile Fire Alarm | * Supply Voltage: 3.3V to 5V * Detection range: 20cm (4.8V) ~ 100cm (1V) * Rang of Spectral Bandwidth : 760nm to 1100nm * Responsive time : 15us * Interface: Analog * Size:22x30mm * Operating Temp: -25 to 85 degrees C |
| Analog Ambient Light Sensor V2.1 |  | 1 | For OLED display brightness | * Supply Voltage: 3.3V to 5V * Illumination range : 1 Lux to 6000 Lux * Responsive time : 15us * Interface: Analog * Size:22x30mm |
| Digital Vibration Sensor V2 |  | 1 | Check for seizures | * Wide voltage range from 3.3V to 5V * Standard assembling structure (two 3mm diameter holes with multiple of 5mm as distance from center) * Easily recognitive interfaces of sensors ("A" for analog and "D" for digital) * Icons to simplely illustrate sensor function * High quality connector * Immersion gold surface * IO Type: Digital * Switch life: up to 10 million seconds * Open circuit resistance: 10Mohm * Supply Voltage: 3.3V to 5V * Interface: Digital * Size:22x30mm |

**Hardware Pinouts:**

|  |  |
| --- | --- |
| **Components:** | **Components Pinout:** |
| Arduino Nano 33 IOT |  |
| DHT22 |  |
| Lm35DZ |  |
| White I2C OLED display |  |
| MAX30102 |  |
| Buzzer |  |
| Gas Sensor V2 | Analog Sensor Pin Definition |
| Touch Sensor V2 |  |
| Digital Tilt Sensor V2 |  |
| Flame Sensor V2 |  |
| Analog Ambient Light Sensor V2.1 |  |
| Digital Vibration Sensor V2 |  |

**Components Details:**

|  |  |
| --- | --- |
| **Components:** | **PIN Connections in the System:** |
| Arduino Nano 33 IOT | NA |
| DHT22 | Vcc: 3.3V  GND  Data: Input D5 PWM |
| Lm35DZ | Vcc: 5V  GND  Data: Input A6 |
| White I2C OLED display | Vcc: 3.3V  GND  SDA: Input / Output A5  SCL: Output A4 |
| MAX30102 | Vcc: 3.3V  GND  SDA: Input / Output A5  SCL: Output A4 |
| Buzzer | Vcc: 3.3V  GND  Data: Output D2 PWM |
| Gas Sensor V2 | Vcc: 5V  GND  Data: Input A0 |
| Touch Sensor V2 | Vcc: 3.3V  GND  Data: Input D11 PWM ? |
| Digital Tilt Sensor V2 | Vcc: 3.3V  GND  Data: Input D12 PWM ? |
| Flame Sensor V2 | Vcc: 5V  GND  Data: Input A1 |
| Analog Ambient Light Sensor V2.1 | Vcc: 3.3V  GND  Data: Input A7 |
| Digital Vibration Sensor V2 | Vcc: 3.3V  GND  Data: Input D3 PWM |

**Battery Calculations:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sensor** | **Voltage ( V )** | **Current ( mA )** |  |
| Arduino Nano 33 IOT | 3.3 | 365 |  |
| DHT22 | 3.3 | 1 |  |
| Lm35DZ | 5 | 0.06 |  |
| White I2C OLED display | 3.3 | 20 |  |
| MAX30102 | 3.3 | 50 |  |
| Buzzer | 3.3 | 25 |  |
| Gas Sensor V2 | 5 |  |  |
| Touch Sensor V2 | 3.3 | 10 |  |
| Digital Tilt Sensor V2 | 3.3 |  |  |
| Flame Sensor V2 |  |  |  |
| Analog Ambient Light Sensor V2.1 | 3.3 |  |  |
| Digital Vibration Sensor V2 | 3.3 |  |  |
|  |  | Total Current:  471mA |  |

4x AAA PCB Mount

<https://www.jaycar.com.au/4-x-aaa-pcb-mount/p/PH9270?pos=6&queryId=4eea875660fb9b3544730b9a416b279b&sort=relevance&searchText=AAA%20battery%20holder>

Slide Switch

https://www.jaycar.com.au/spdt-micro-slide-switch/p/SS0834

|  |
| --- |
| **SYSTEM PINOUT:** |
|  |

**Arduino Nano 33 IOT Power Tree:**

A diagram of a computer

Description automatically generated

**Materials List:**

|  |  |
| --- | --- |
| **Parts:** | **Specs:** |
| PCB |  |
| Screws |  |
| Standoffs |  |
|  |  |

**Complete PCB Circuit Diagram:** This is theCircuit Design for the PCB ( image of complete PCB further down in this documentation)

**Total Cost of all Materials/Parts: ?**

|  |  |
| --- | --- |
| **Components** | **Purchase Links: ( Core Electronics )** |
| Arduino Nano 33 IOT | |  | | --- | | <https://core-electronics.com.au/arduino-nano-33-iot.html> | |
| DHT22 | <https://core-electronics.com.au/dht22-temperature-and-relative-humidity-sensor-module.html> |
| Lm35DZ | <https://core-electronics.com.au/lm35dz-temperature-sensor.html> |
| White I2C OLED display | <https://core-electronics.com.au/white-i2c-oled-display-ssd1306.html> |
| MAX30102 | |  | | --- | | <https://core-electronics.com.au/dfrobot-max30102-heart-rate-and-oximeter-sensor.html> | |
| Buzzer | <https://core-electronics.com.au/digital-buzzer-module.html> |
| Gas Sensor V2 |  |
| Touch Sensor V2 |  |
| Digital Tilt Sensor V2 |  |
| Flame Sensor V2 |  |
| Analog Ambient Light Sensor V2.1 |  |
| Digital Vibration Sensor V2 |  |

**CAD Drawings:**

**System Functionality:**