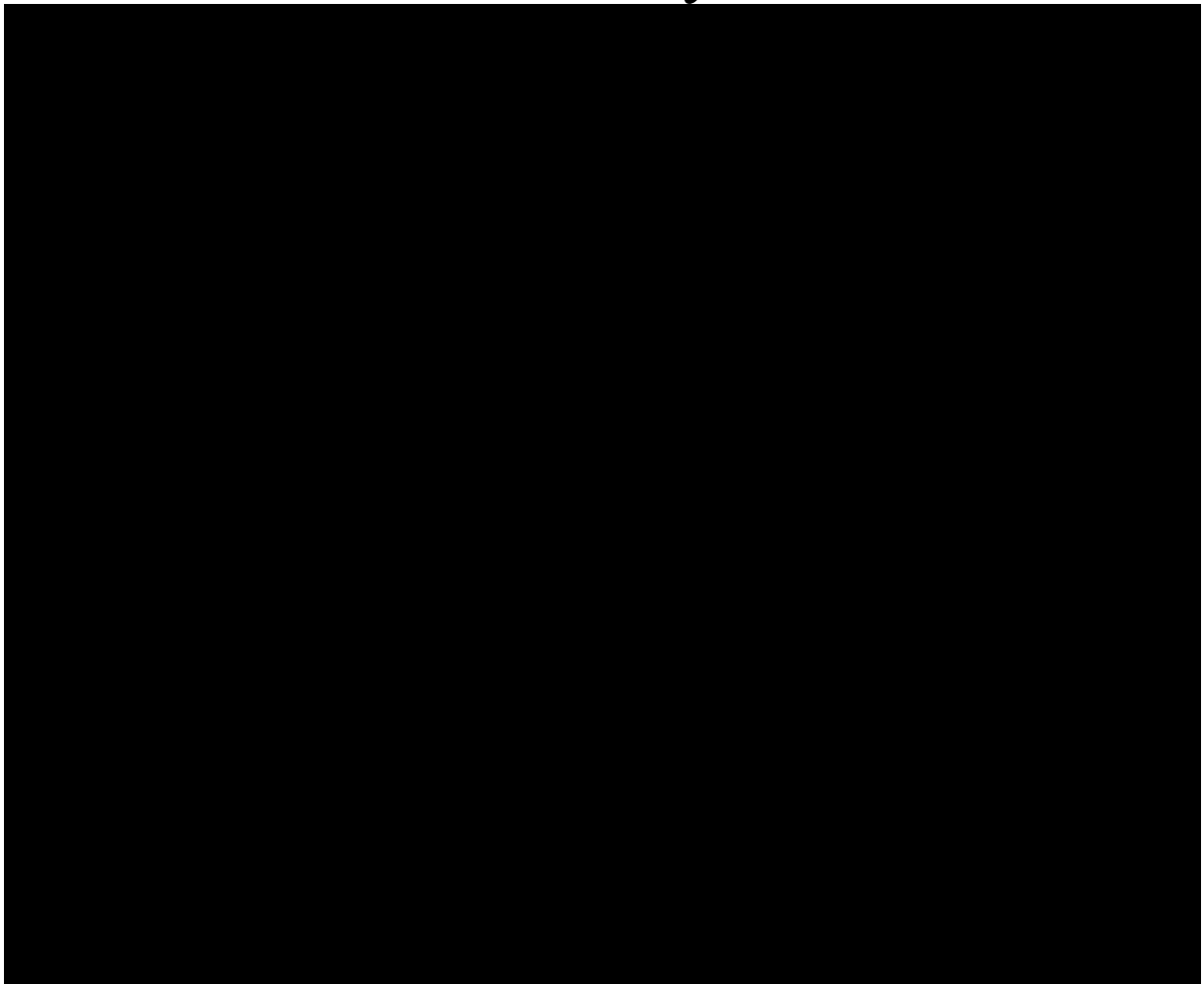


Posture Detection System Artifact



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Overview

Background

This system aims to provide posture information using a flex sensor. Once equipped, the system will notify the user via LCD display and buzzer to fix the posture. Designed to be used with multiple exercises, indoors and outdoors.

Problem Statement

Incorrect posture is one of the major causes of injuries when participating in sports activities or exercise. This device equipped with a flex sensor will allow to fix the posture in order to reduce injuries.

Requirements

- An Arduino Uno
- A flex sensor
- LED or Buzzer
- An LCD display compatible with Arduino Uno
- Potentiometer
- Jumper Wires
- Resistors
- USB power source or battery
- Breadboard

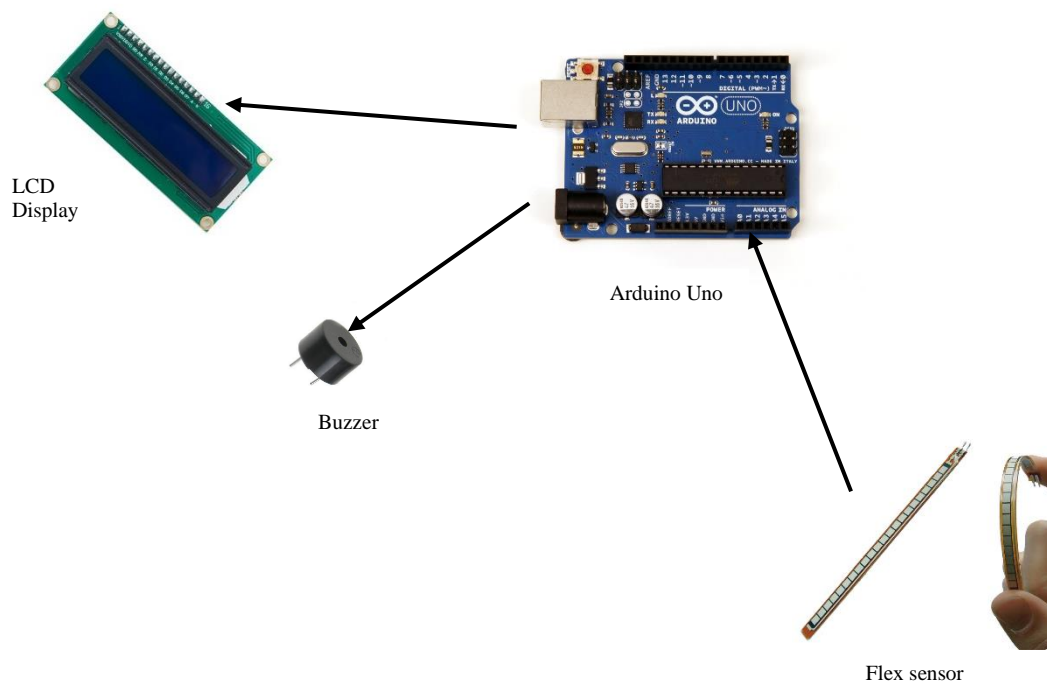
Design Principles

The system designed to be used to identify posture is equipped with an LCD display and an LED or a buzzer to notify the user of incorrect or correct posture. In the final system, this would include multiple flex sensors in order to provide accurate notifications to the user. However, this prototype is not connected to internet and works solely from the program in the system. Adding an ESP32 board will solve this issue. However, it will minimize the number of flex sensors that can be attached. Switching to another Particle device or an Arduino with built in Wi-Fi would be the best solution. Due to being disconnected from the internet, this prototype does not target data collection. Providing accurate notifications has been the main focus.

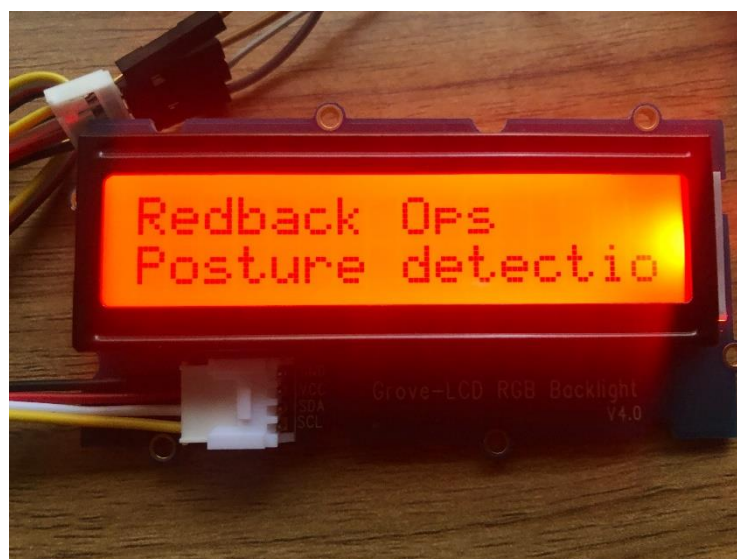
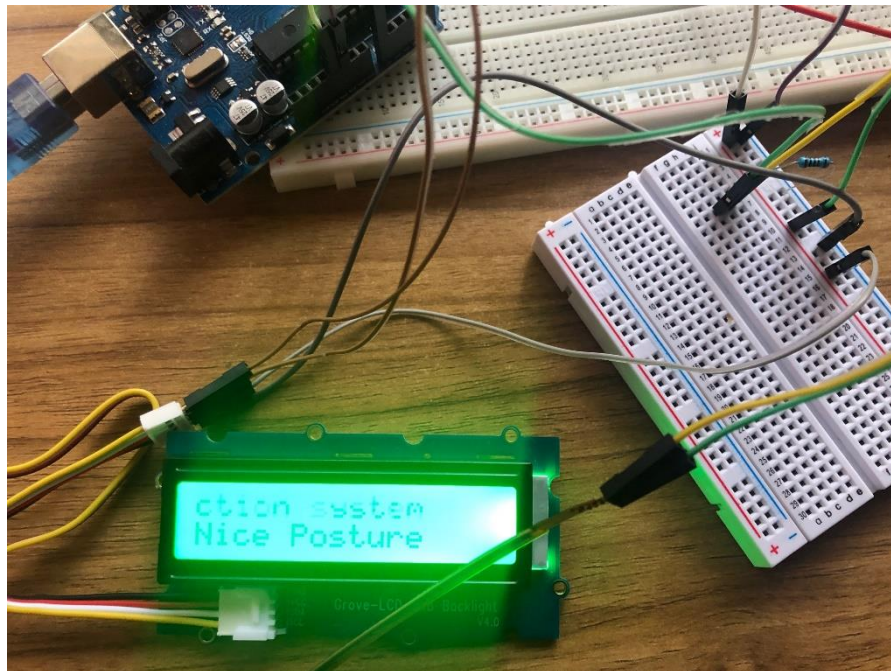
Even though notifications are accurate, the threshold values that trigger the notification will be vary from person to person. To solve that, including a setup stage in the final system that will ask the user to perform the exercises to decide the threshold to trigger the notification would be a better system design choice.

There are few wearable posture detection systems in the market and it has been identified as a less dominated area by large tech companies such as Apple, Samsung and Garmin. Creating a functional device to tap into this market will provide valuable data that can be used in research or marketing.

Project Architecture



This is the early prototype system in testing. Flex sensor, LCD display and the buzzer is connected to the Arduino Uno and powered via USB.



Link to codes

(copy paste in browser to work) (flexarduino.ino)

<https://github.com/ghubk/Redback-IOT.git>

Testing Approach

Due to lack of resources such as Lithium Ion Polymer (LiPo) batteries, the prototype has only been tested on desk. Flex sensor is bended in order mimic incorrect posture to trigger the notification. The buzzer will sound an alert sound and the display will show a message saying "Fix posture"

Conclusion

Completion of this posture detection system was a success. However, identifying the main target of creating this device remains to be observed. The main targets would be data collection or user notification or both. The equipment needed will differ on the target. This system has been designed with the user notifications as main focus. Two major points has been identified with a system like this that will affect the user interest. The size of the system and how to create the system as a wearable device are the two major points identified and they will need to be looked into in the next stage of development.