

Appendix A

Table A Arm Exoskeleton for Passive Rehabilitation of the Elbow Programming – Partial Code.

STARTUP, ECG, AND RELAY DECLARATION	<pre>const int EMG_signal = A0; const int relayPin = 8; const int numReadings = 15; // Number of readings for the moving average const int EMG_peak = 500;</pre>
GLOBAL DEFINITIONS	<pre>int readings[numReadings]; // Array to store sensor readings int readIndex = 0; // Index of the current reading int total = 0; // Sum of all readings int average = 0; // Average of the readings void setup() { Serial.begin(115200); // Start serial communication pinMode(EMG_signal, INPUT); // Set the sensor pin as input pinMode(relayPin, OUTPUT); // Set the relay pin as output</pre>
PIN DEFINITIONS AND INITIAL READINGS	<pre>// Initialize the readings array for (int i = 0; i < numReadings; i++) { readings[i] = 0; } void loop() { // Subtract the oldest reading from the total total = total - readings[readIndex]; // Read the sensor value readings[readIndex] = analogRead(EMG_signal); // Add the new reading to the total total = total + readings[readIndex];</pre>
SAMPLE TAKING AND READING OF THE ECG SIGNAL	<pre>// Move to the next index readIndex = readIndex + 1; // If we reach the end of the array, reset the index if (readIndex >= numReadings) { readIndex = 0; } // Calculate the average average = total / numReadings;</pre>
ACTIVATION OF THE RELAY BASED ON THE ECG SIGNAL	<pre>Serial.print("EMG Average: "); Serial.println(average); // Print the average for monitoring // Control the relay based on the smoothed average if (average < EMG_peak) { digitalWrite(relayPin, LOW); // Deactivate the relay Serial.println("Relay deactivated"); } else if (average > EMG_peak) { digitalWrite(relayPin, HIGH); // Activate the relay Serial.println("Relay activated"); } delay(100); // Wait 100 milliseconds }</pre>