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Smart Textiles Tracking Safety Kit On Gloves

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Abstract:

Textiles have been at the heart of human technological progress for thousands of years, with textile developments closely tied to key inventions that have shaped societies.. The aim of this review is to provide an overview of the key innovative pathways in the development of electronic textiles to date using sources available in the public domain regarding SMART textiles; this includes academic literature, commercialized products, and published patents,Attaching the electronics onto the surface of a textile, electronics are added at the textile manufacturing stage, or electronics are incorporated at the yarn stage. Methods of integration can have an influence on the textiles properties such as the drapability of the textile

The need for health tracking safety kits and gloves using IoT, Node MCU, temperature sensor, heart rate sensor, and SpO2 sensor has become increasingly important in recent times. With the COVID-19 pandemic, people have become more aware of the importance of maintaining good hygiene and taking necessary precautions to avoid the spread of the virus. Health tracking safety kits and gloves using It can help individuals monitor their vital signs and other health parameters such as body temperature, heart rate, and blood oxygen saturation level. health tracking safety kits and gloves using IoT, Node MCU, temperature sensor, heart rate sensor, and SpO2 sensor can provide an effective way to monitor vital signs and other health parameters, helping individuals stay healthy and safe. This technology can play a critical role in preventing the spread of infectious diseases such as COVID-19 and improving the overall health of individuals.

Key words: Health tracking;Safety kit;Gloves;IoT;Node MCU;Temperature sensor;Heart rate sensor;SpO2 sensor;Real-time monitoring;Wearable technology

I. Introduction

Smart textiles with its vast range of possibilities provide a considerable opportunity for societal sustainability for the waste-oriented fashion industry.

IOT

The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.
Sensors :

Sensors are the components that transform one type of signal into another type of signal. There are already systems in the textiles that measure heart, breath rate, temperature, movement, and moisture, but these systems work with the installation of traditional sensors in textiles

At the present stage of intelligent textiles, the sensors are produced from real textile material, and the heart, breath, and movement sensitive sensors are already produced with satisfactory results.

Wearable smart electronic textiles; temperature change, light, moisture, such as environmental stimuli can detect, react to these stimuli, can change itself according to external conditions, store data, these data are used to produce information and communication purposes.

SENSOR GLOVES:

- Data gloves with various sensor units have been introduced as an essential wearable platform for applications in virtual/augmented reality interfaces (Health monitoring, including of physical rehabilitation for post-stroke patients .

NODE MCU ESP82266

- The ESP8266 itself is a self-contained WiFi networking solution offering as a bridge from existing micro controller to WiFi and is also capable of running self-contained applications.

NODE MCU V3

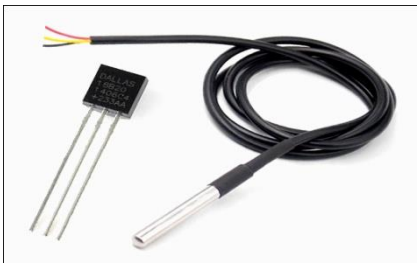
- NodeMCU V3 is an open-source firmware and development kit that plays a vital role in designing your own IoT product using a few Lua script lines.Multiple GPIO pins on the board allow you to connect the board with other peripherals and are capable of generating PWM, I2C, SPI, and UART serial communications

HEART BEAT SENSOR(LCUP)

- Heart beat sensor is designed to give digital output of heat beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse

DS18B20 SENSOR:

The **DS18B20** is a 1-wire programmable Temperature sensor from maxim integrated. It is widely used to measure temperature in hard environments like in chemical solutions, mines or soil etc. The constriction of the sensor is rugged and also can be purchased with a waterproof option making the mounting process easy.

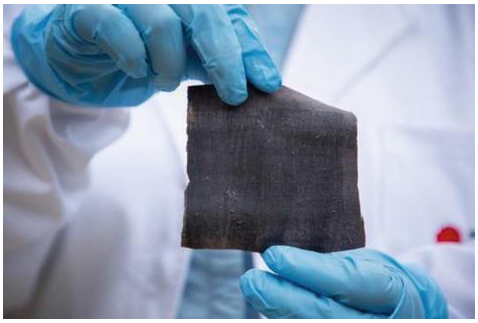


SPO2

MAX30100 is an integrated pulse oximeter and heart-rate monitor sensor solution. It's an optical sensor that derives its readings from emitting two wavelengths of light from two LEDs – a red and an infrared.

GLOVE FABRIC:

COTTON: Cotton is a soft, fluffy staple fiber that grows in a boll or protective case, around the seeds of the cotton plant of the plant family.



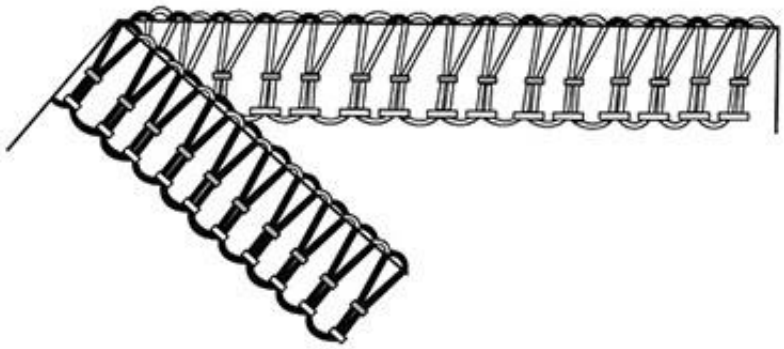
STITCH TYPE :

Lock Stitch

This type of stitch is constructed by using two threads with the help of interlacing. One thread is coming from needle so it is called needle threads and the others is coming from bobbin so it is called bobbin threads. The other name of this stitch is stitch class – 100. This stitch is done by plain m/c.

Overlock

Two or more superimposed plies of material, aligned along their edges, are joined together, edge-trimmed and oversewn in one operation, with overedge stitches having two or more threads.



CODING

SOFTWARE REQUIRED

Sample code for measuring temperature using a temperature sensor:

```
#include <Wire.h>
#include <Adafruit_MLX90614.h>
Adafruit_MLX90614 mlx = Adafruit_MLX90614();
void setup() {
  Serial.begin(9600);
  mlx.begin();
}
void loop() {
  Serial.print("Ambient = "); Serial.print(mlx.readAmbientTempC());
  Serial.print("*C\tObject = "); Serial.print(mlx.readObjectTempC());
  Serial.println("*C");
  delay(1000);
}
```

Sample code for measuring heart rate using a heart rate sensor:

```
#include <Wire.h>
#include <SparkFun_MAX3010x_Sensor_Library.h>
#define MAX30105_ADDRESS 0x57
MAX30105 particleSensor;
void setup()
{
  Serial.begin(9600);
  particleSensor.begin(Wire, I2C_SPEED_FAST, MAX30105_ADDRESS);
  particleSensor.setup();
}
void loop()
{
  if (particleSensor.available())
  {
    float bpm = particleSensor.getHeartRate();
    Serial.print("Heart rate: ");
```

```
    Serial.println(bpm);
  }
}
```

Sample code for measuring SpO2 using a SpO2 sensor:

```
void onBeatDetected()
{
  float bpm = pox.getHeartRate();
  float spo2 = pox.getSpO2();
  Serial.print("Heart rate: ");
  Serial.println(bpm);
  Serial.print("SpO2: ");
  Serial.println(spo2);
}
void setup()
{
  Serial.begin(115200);
  if (!pox.begin())
  {
    Serial.println("Failed to initialize pulse oximeter");
    while (1);
  }
  pox.setOnBeatDetectedCallback(onBeatDetected);
}
void loop()
{
  pox.check();
}
```

IOT CODING

```
#include <WiFi.h>
#include <PubSubClient.h>
#include <Wire.h>
#include <Adafruit_MLX90614.h>
#include <MAX30100_PulseOximeter.h>
#include <SparkFun_MAX3010x_Sensor_Library.h>
const char* ssid = "your_SSID";
const char* password = "your_PASSWORD";
const char* mqtt_server = "your_MQTT_broker_IP";
const char* mqtt_user = "your_MQTT_username";
const char* mqtt_password = "your_MQTT_password";

WiFiClient espClient;
```

```
PubSubClient client(espClient);
Adafruit_MLX90614 mlx = Adafruit_MLX90614();
#define MAX30105_ADDRESS 0x57
MAX30105 particleSensor;
MAX30100_PulseOximeter pox;
void setup_wifi() {
  delay(10);
  Serial.println();
  Serial.print("Connecting to ");
  Serial.println(ssid);
  WiFi.begin(ssid, password);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}
void callback(char* topic, byte* message, unsigned int length) {
}
void reconnect() {
  while (!client.connected()) {
    Serial.print("Attempting MQTT connection...");
    if (client.connect("ESP32Client", mqtt_user, mqtt_password)) {
      Serial.println("connected");
      client.subscribe("health/temperature");
      client.subscribe("health/heart_rate");
      client.subscribe("health/spo2");
    } else {
      Serial.print("failed, rc=");
      Serial.print(client.state());
      Serial.println(" try again in 5 seconds");
      delay(5000);
    }
  }
}
void setup() {
  Serial.begin(115200);
  setup_wifi();
  client.setServer(mqtt_server, 1883);
  client.setCallback(callback);
```

```
 mlx.begin();
 particleSensor.begin(Wire, I2C_SPEED_FAST, MAX30105_ADDRESS);
 particleSensor.setup();
 if (!pox.begin())
 {
  Serial.println("Failed to initialize pulse oximeter");
  while (1);
 }
 pox.setOnBeatDetectedCallback([](){
  float bpm = pox.getHeartRate();
  float spo2 = pox.getSpO2();
  Serial.print("Heart rate: ");
  Serial.println(bpm);
  Serial.print("SpO2: ");
  Serial.println(spo2);
  client.publish("health/spo2", String(spo2).c_str(), true);
 });
}
void loop() {
 if (!client.connected()) {
  reconnect();
 }
 client.loop();
```

APPLICATIONS:

Wearable Motherboard

- Georgia Tech was the pioneering institute for the development of SFIT that integrates electronics. During a project funded by the US Naval Department in 1996, they have developed a "Wearable Motherboard" (GTWM)

Smart Running Shoes

- Adidas's smart shoes commenced to the market in 2004 and it was the first smart shoe. It consists of a microprocessor, electric motor and sensor into the actual material. The shoe allows the wearer in the running methodology. It adjusts its cushioning dependent on what surface the wearers are travelling for an appropriate style of the runner's, etc.

Biosensor Underwear

- The University of California San Diego's Laboratory [24] for Nanobioelectronics has demonstrated a method ,By printing the sensors on the elastic bands in men's underwear, the researchers ensure the sensors maintain tight contact with the skin. The sensing electrodes detect hydrogen peroxide and enzyme NADH

Smart Bra

- One of the best examples for improving comfort thanks to electronics is an Australian invention: the Smart Bra. Wallace et. al at the University of Wollongong, have developed a bra that will change its properties in response to breast movement.

The Sensory Baby Vest

- The researchers has been developing a special vest for babies.
- The sensory baby vest is equipped with sensors that enable the constant monitoring of vital functions such as heart, lungs, skin and body temperature which can be used in the early detection and monitoring of heart and circulatory illness.

Conclusion

Smart textiles are the most exciting innovation in the field of textile engineering. The development of smart textiles reaches far beyond imagination; some stories may seem science fiction. The economic value and impact of smart textiles is gigantic. The advent of smart textiles makes it possible to being the traditional textile sector to a level of high-technological industry.

Reference

1. Guido Ehrmann 1 and Andrea Ehrmann 2 Electronic Textiles, 3619 Bielefeld, Germany Correspondence: andrea.ehrmann@fh-bielefeld.de
2. Jacek Kusznier *, Wojciech Wojtkowski * ANALYSIS OF POSSIBILITIES OF THE OPTICAL FIBERS USAGE IN THE MICROPROCESSOR PULSE - OXIMETER * IFAC PapersOnLine 52-27 (2019) 556–561
3. Muhammad Dawood Husain1, Richard Kennon2 and Tilak Dias3 ! "Design and fabrication of Temperature Sensing Fabric "The Author(s) 2013 Reprints and permissions :sagepub.co.uk/journalsPermissions.nav DOI: 10.1177/1528083713495249
4. T.P rajendran" Cotton research towards sufficiency to Indian textile industry"Central Institute for Cotton Research Regional Station, Coirnbatore, Tamil Nudu 641 003 Recieved : 10 October 2005
5. Mr. Ved Prakasha, Mr. Manoj Kumar Pandeyb "HEART RATE MONITORING SYSTEM"2018 JETIR May 2018, Volume 5, Issue 5 www.jetir.org (ISSN-2349-5162)
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