VR Headset Protector

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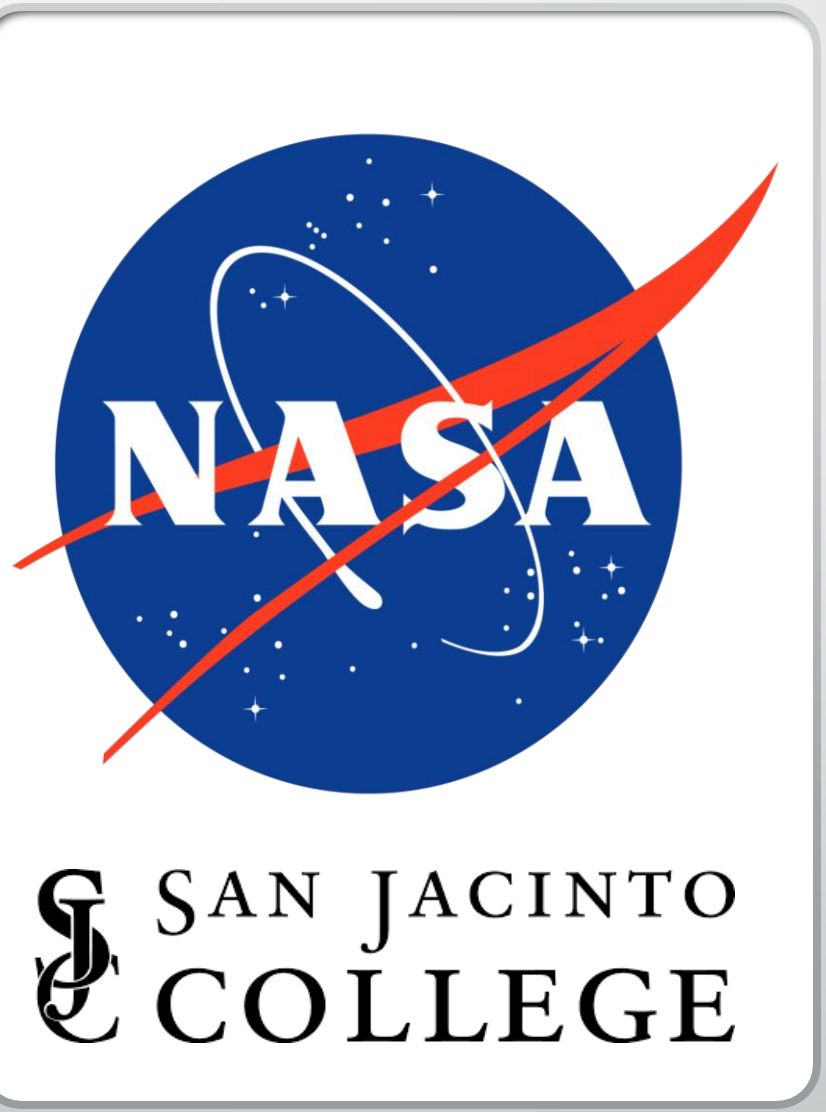

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Nathanial Wiggins – Mathematics professor, San Jacinto College. Principal Investigator of Artificial Intelligence Technology Labs.

Problem Statement

- Augmented reality (AR) is implemented in the training regime for astronauts to prepare for the environmental conditions of space.
- A culprit in the malfunction of the internal components of the virtual reality headsets is sweat.
- The VR Wearable technology team aims to create a cost-effective design implementing Arduino sensors and certain fabrics surrounding the headset to mitigate sweat secretion while not sacrificing mobility, comfort, or time.
- Sweat will be detected as it reaches a critical level where the internal components can be potentially compromised.

Design Requirements

- Inexpensive and Reusable
- Must not limit Mobility
- Materials used must not release more than the acceptable levels of outgases
- Easy to Sanitize

Technology & Hardware

- Parts Used:
- FC-37 Rain Sensor- Detects Water
- KY-016 3-color LED module- Light
- Buzzer
- DHT11 Humidity and Temperature Sensor
- Arduino Nano- Intelligence Chip
- Breadboard
- 3 AAA Battery Compartment
- Cooling Mask

Software

```
28
29 //Declare the variables, set them to their appropriate pins
30 dht DHT; //For interpreting DHT sensor
31 int DHTPin = 13; //Digital pin for DHT sensor, set pin to D13
32 int DHTRead; //Reads input from DHT sensor
33
34 int LEDPin = 2; //Digital pin for LED light, set pin to D2
35 int buzzerPin = 3; //Digital pin for buzzer, set pin to D3
36
37 const int SENS_MIN = 0; //Limits for reading sweat sensor
38 const int SENS_MAX = 1024;
39 int sweatPin = A0; //Analog pin for sweat sensor, set pin to A0
40 int sweatRead; //Reads input from sweat sensor
41
42 void setup()
43 {
44   //Set LED pin for output
45   pinMode(LEDPin, OUTPUT);
46   Serial.begin(9600);
47   Serial.println("Starting up sensors...");
48 }//End of setup function
49
50 void loop()
51 {
52   //Read in the sweat and DHT sensor for their inputs
53   DHTRead = DHT.read11(DHTPin);
54   sweatRead = analogRead(sweatPin);
55
56   //If temperature too low, continue loop
57   //Create sweatRead restriction for sweat sensor to limit itself
```

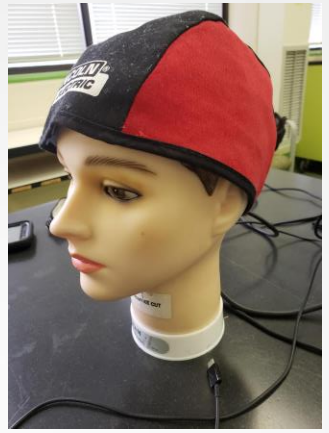
```
55
56   //If temperature too low, continue loop
57   //Create sweatRead restriction for sweat sensor to limit itself
58   //TODO: Find percentage that is considered "too sweaty", default: 100
59   sweatRead = 99-map(sweatRead, SENS_MIN, SENS_MAX, 0, 100);
60
61   //Output temperature and sweat level to serial monitor
62   Serial.print("Temperature: ");
63   Serial.println(DHT.temperature);
64   Serial.print("Sweat level: ");
65   Serial.print(sweatRead);
66
67   //Reduce the sweatRead to 4 cases: drenched in sweat, warning of being drenched,
68   //normal amount of sweat, and no sweating
69   if (sweatRead > 75)
70     sweatRead = 3;
71   else if (sweatRead > 50)
72     sweatRead = 2;
73   else if (sweatRead > 0)
74     sweatRead = 1;
75
76   //If both temperature and sweat levels are high, flash the light
77   //Temperature evaluation
78   if(DHT.temperature > 30)
79   {
80     //Sweat evaluation
81     switch(sweatRead)
82     {
83       //Drenched case
84       case 3:
```

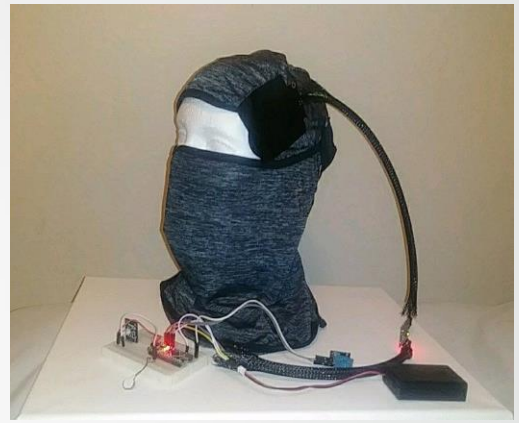
Continued…

```
75
76  //If both temperature and sweat levels are high, flash the light
77  //Temperature evaluation
78  if(DHT.temperature > 30)
79  {
80    //Sweat evaluation
81    switch(sweatRead)
82    {
83      //Drenched case
84      case 3:
85        Serial.println(" - Very High");
86        digitalWrite(LEDPin, HIGH);
87        tone(buzzerPin, 1000);
88        delay(1000);
89        break;
90      //Warning case
91      case 2:
92        Serial.println(" - High");
93        digitalWrite(LEDPin, HIGH);
94        tone(buzzerPin, 500);
95        delay(300);
96        digitalWrite(LEDPin, LOW);
97        noTone(buzzerPin);
98        delay(700);
99        break;
100     //Normal case
101     case 1:
102       Serial.println(" - Normal");
103       delay(1000);
104       break;
```

```
93        digitalWrite(LEDPin, HIGH);
94        tone(buzzerPin, 500);
95        delay(300);
96        digitalWrite(LEDPin, LOW);
97        noTone(buzzerPin);
98        delay(700);
99        break;
100     //Normal case
101     case 1:
102       Serial.println(" - Normal");
103       delay(1000);
104       break;
105     //No sweat case
106     case 0:
107       Serial.println(" - Not Sweating");
108       delay(1000);
109       break;
110   }//End of switch statement
111 }//End of if human temperature statement
112
113 //Turn LED and buzzer off
114 digitalWrite(LEDPin, LOW);
115 noTone(buzzerPin);
116
117 //Add 2 new line statements to prepare the monitor written for the next prompt
118 Serial.print("\n \n");
119
120 //Delay 1 second
121 delay(1000);
122 }//End of loop function
```

Analysis





REQUIREMENTS	OUR HEADSET	SWEAT GLADIATOR (Previous Team)	Just with VR Headset
Inexpensive & Reusable	2	2	0
Must Not Limit Mobility	2	1	2
Does Not Cause Outgassing	2	2	2
Kills 95% of Bacteria	1	1	0

numbers	Requirements
2	Exceed the requirements
1	Pass the requirements
0	Failed the requirements

Conclusion

- A Cooling Mask that can hold sweat with sensors that can warn the user when they are in danger of breaking the VR system is an incredible breakthrough. The device can let astronauts train longer without fear of damaging the technology. The device can also test the body. This can help in the medical field to learn more about the body while training, along with in space to learn about the effect of long periods of time in space on the human body. As more studies occur, there will be more research on better materials to use at a cheaper price. Continued testing will also allow the device to be as efficient in collecting sweat and cooling the user as possible.

Acknowledgments

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Shane Martin(Vynckier Intern)- offered a place to work at, gave feedback, and gave points on how to present.

Previous Team: Josue Zuniga- VR teams' leader, Shane Martin- VR teams 2nd in Command/lead designer/Researcher, Osvaldo Rodriguez- Hardware/Software researcher, Arnold Garcia- Hardware researcher, Diana Thomas- Technical Writer

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