ASSUMPTION COLLEGE

IoT Thermo Guard

Submitted by

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IoT Thermo Guard

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Abstract

Global warming is intensifying, resulting in elevated global temperatures and subsequent phenomena. The research shows that more than 5 million people die from heatstroke each year globally. It also shows that heat strokes can cause death within 10 minutes. In addition, El Niño is triggering water shortages and perilous heatwaves, thereby escalating the risk of heatstroke and potential fatalities. To address this issue, we have developed an **IoT Thermo Guard**, with the aim of reducing the incidence of heatstroke cases. By promptly notifying individuals about high-risk conditions via line with an IoT system. We can calculate the risk of heatstroke in that area by using a heat index formula ($HI=c_1+c_2T+c_3R+c_4TR+c_5T_2+c_6R_2+c_7T_2R+c_9TR_2+c_9T_2R_2$). We can enhance awareness and promote preventive measures. By amalgamating climate change awareness and technology, our innovation endeavors to alleviate the repercussions of heatstroke and contribute to a safer and healthier future for everyone.

Chapter 1

Introduction

1.1 Background

Heatstroke is a condition caused by the body overheating. It is usually caused by working, doing heavy labor or exercising. Usually occurs when body temperature reaches 40 degrees Celsius or more. And often occurs in areas with high heat and humidity. It can cause harm to vital organs such as the brain, heart, kidneys, lungs, and muscles. if not treated promptly.

In one year, heatstroke kills an average of 5 million peoples per year. Which is a very large amount of loss. And it is a nearby problem that should not be overlooked. Our group therefore came up with an innovation that helps prevent and reduce the risk of heatstroke. which is the origin of **IoT Thermo Guard.**

1.2 Purpose of the Project

1.2.1 To make gadget available to measure factors cause heatstroke and other dust accurately. And use to calculate risk level with heat index and find an air quality with the air-quality index.

1.2.2 Reduce the losses from heatstroke by warning users when heatstroke has a chance to occur via line with IoT system.

1.3. Benefits Derived from the Project

1.3.1 Alert people who are at risk of heatstroke before reach a critical level.

1.3.2 IoT Thermo Guard can measure pm2.5 and UV.

1.3.3 IoT Thermo Guard is accessible since IoT system is common nowadays. The internet accessible to everyone.

Chapter 2

Related Concept

2.1 Propositions

IoT Thermo Guard help reduce losses heatstroke by using heat index calculate and measure heatstroke risk level. If too risk, will be sent in the LINE application to warn in area should be avoided. And we can also see the real-time value of various details.

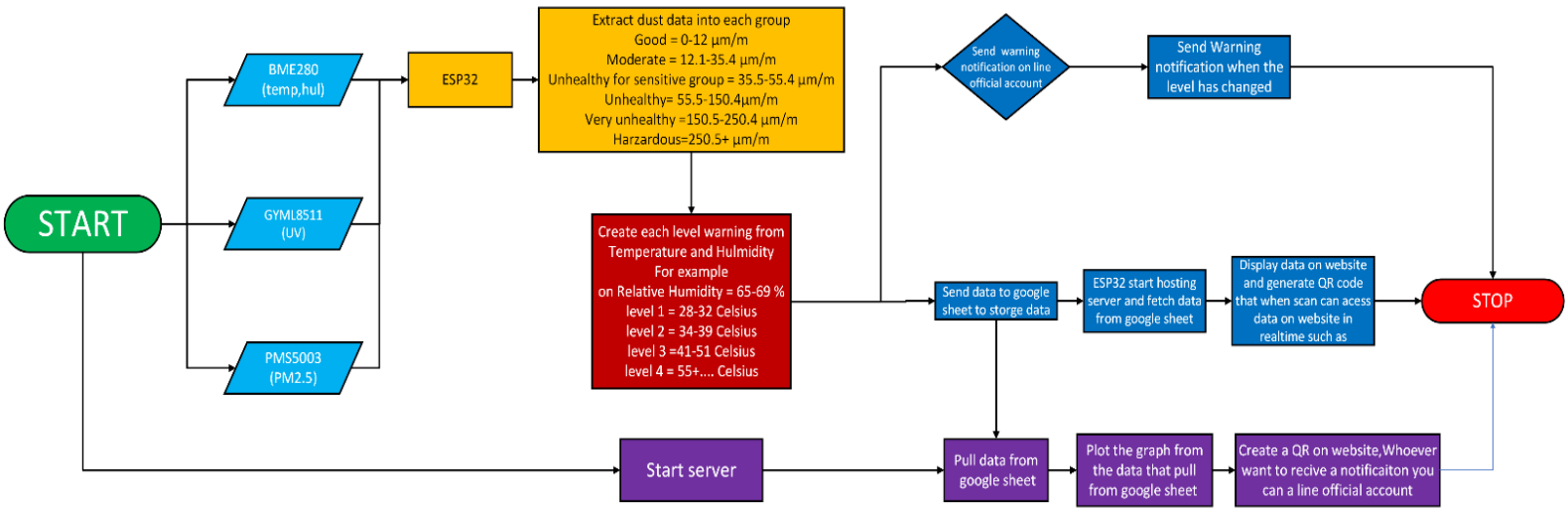
2.2 Related Theories

Heatstroke is one of dangerous diseases, happen when stay up on hot area cause an unusual body temperature. Heatstroke happen after body temperature exceeds 40 degrees Celsius, wearing stuffy bulky clothes, and has low fluid in body.

IoT devices transmit the collected data to cloud-based platforms for storage and processing. And one of the significant advantages of IoT and big data is the ability to monitor and analyze data in real-time. IoT devices continuously collect and transmit data, allowing for immediate analysis using big data analytics. So we apply IoT to store and send the data to our website. After that, the real-time data will show on the website by using IoT system.

2.3 Framework

Device measure temperature, humidity, UV, pm2.5 process into ESP32 enter the risk screening process affects health expressed as danger level, convert data into google sheet, and extract data present by plot graph together and generate QR code accessible to data and notify via line when the danger level is reached.



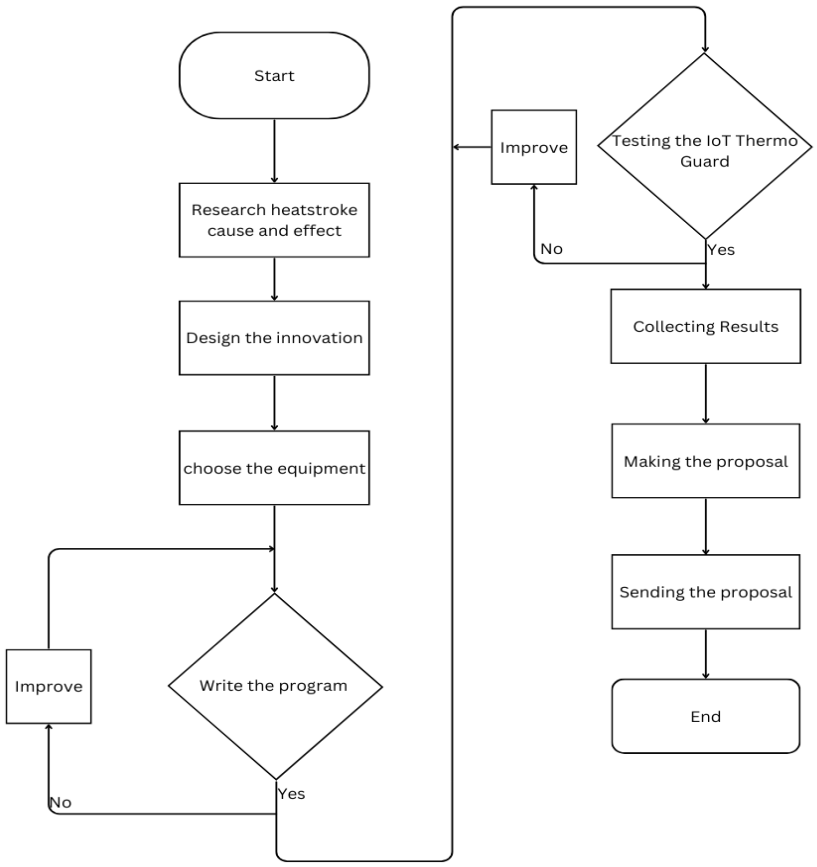
2.4 Power Management

Equipment	Voltage	Current	Watt	Work cycle	Reference
LoRa E-Byte	3.7	130 mA	0.481	100%	Datasheet
ESP32	3.7	240 mA	0.888	100%	Datasheet
BME280	3.7	0.0036 mA	0.0118	100%	Datasheet
OLED LCD	3,7	20 mA	0.074	100%	Datasheet
PMS5003	3,7	100 mA	0.37	100%	Datasheet
GYML-8511	3.7	0.15 mA	0.000495	100%	Datasheet
Fan	3.7	100 mA	0.37	100%	Datasheet
Buzzer	3.7	20 mA	0.0074	100%	Datasheet
Total		610.1536 mA	2.202695 Watt		

Chapter 3

Methodology

3.1 Methodology Step



3.1.1 Researching causes and effects of heatstroke.

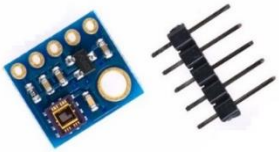
3.1.2 Design innovation and pick equipment.

3.1.3 Write program of innovation. If not working fix program.

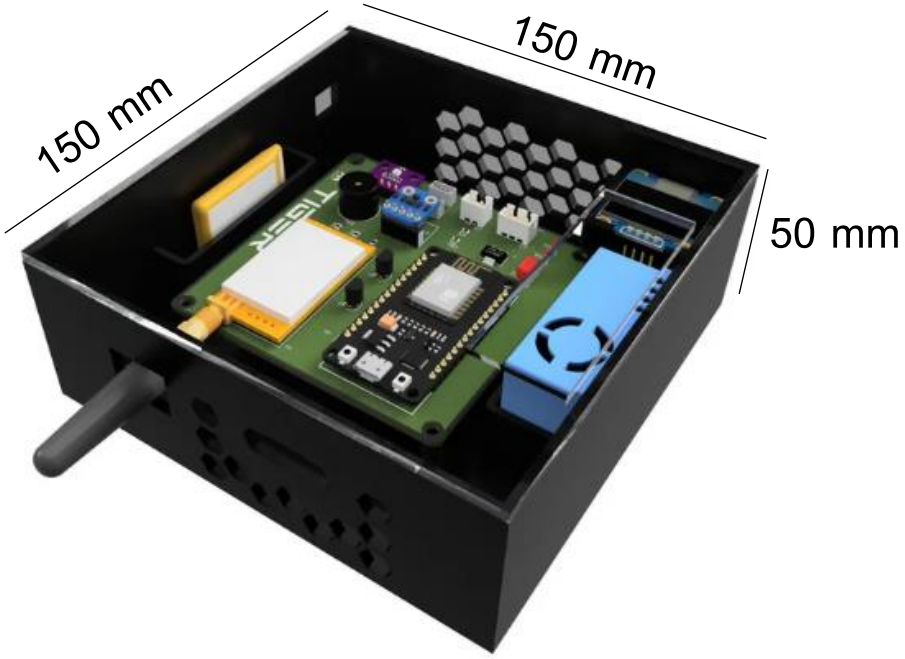
3.1.4 Test innovation. If it has a problem, we will improve it.

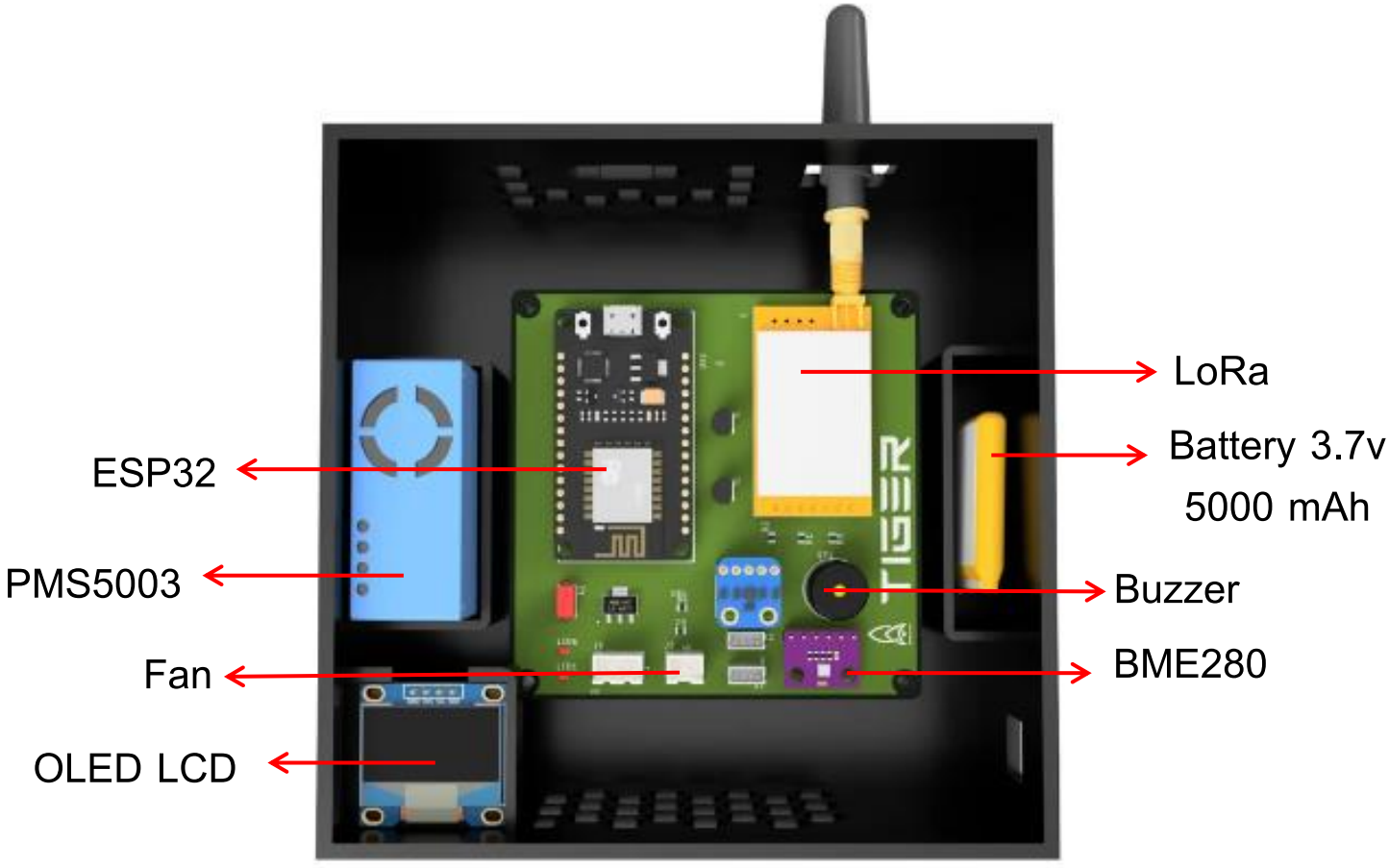
3.1.5 Write proposal and send it.

3.2 Equipment

List	Image	Function
PMS5003		Dust, PM2.5 measuring device.
BME280		Humidity, temperature, and pressure measuring device.
ESP32		NodeMCU ESP32 Wi-Fi and Bluetooth Dual Core
OLED LCD 128*64		A monitor display QR code. Enter the website used to display the data.
DC Fan		A fan to cool the area down.
GY-ML8511		A UV measuring device.

3.3 Preliminary Innovation





3.4 Evaluation

We can evaluate the risk that heatstroke will occur using the heat index.

The heat index formula is:

$(HI=c_1+c_2T+c_3R+c_4TR+c_5T_2+c_6R_2+c_7T_2R+c_9TR_2+c_9T_2R_2)$

In this formula,

HI = heat index in degrees Fahrenheit

R = Relative humidity

T = Temperature in °F

C_1 = -42.379

C_2 = -2.04901523

C_3 = -10.14333127

C_4 = -0.22475541

C_5 = -6.83783×10^{-3}

C_6 = -5.481717×10^{-2}

C_7 = -1.22874×10^{-3}

C_8 = 8.5282×10^{-4}

C_9 = -1.99×10^{-6}

HEAT INDEX °F (°C)

The heat index is an accurate measure of how hot it really feels when the affects of humidity are added to high temperature.

	RELATIVE HUMIDITY (%)												
Temp.	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**
110 (**47**)	136 (58)												
108 (**43**)	130 (54)	137 (58)											
106 (**41**)	124 (51)	130 (54)	137 (58)										
104 (**40**)	119 (48)	124 (51)	131 (55)	137 (58)									
102 (**39**)	114 (46)	119 (48)	124 (51)	130 (54)	137 (58)								
100 (**38**)	109 (43)	114 (46)	118 (48)	124 (51)	129 (54)	136 (58)							
98 (**37**)	105 (41)	109 (43)	113 (45)	117 (47)	123 (51)	128 (53)	134 (57)						
96 (**36**)	101 (38)	104 (40)	108 (42)	112 (44)	116 (47)	121 (49)	126 (52)	132 (56)					
94 (**34**)	97 (36)	100 (38)	103 (39)	106 (41)	110 (43)	114 (46)	119 (48)	124 (51)	129 (54)	135 (57)			
92 (**33**)	94 (34)	96 (36)	99 (37)	101 (38)	105 (41)	108 (42)	112 (44)	116 (47)	121 (49)	126 (52)	131 (55)		
90 (**32**)	91 (33)	93 (34)	95 (35)	97 (36)	100 (38)	103 (39)	106 (41)	109 (43)	113 (45)	117 (47)	122 (50)	127 (53)	132 (56)
88 (**31**)	88 (31)	89 (32)	91 (33)	93 (34)	95 (35)	98 (37)	100 (38)	103 (39)	106 (41)	110 (43)	113 (45)	117 (47)	121 (49)
86 (**30**)	85 (29)	87 (31)	88 (31)	89 (32)	91 (33)	93 (34)	95 (35)	97 (36)	100 (38)	102 (39)	105 (41)	108 (42)	112 (44)
84 (**29**)	83 (28)	84 (29)	85 (29)	86 (30)	88 (31)	89 (32)	90 (32)	92 (33)	94 (34)	96 (36)	98 (37)	100 (38)	103 (39)
82 (**28**)	81 (27)	82 (28)	83 (28)	84 (29)	84 (29)	85 (29)	86 (30)	88 (31)	89 (32)	90 (32)	91 (33)	93 (34)	95 (35)
80 (**27**)	80 (27)	80 (27)	81 (27)	81 (27)	82 (28)	82 (28)	83 (28)	84 (29)	84 (29)	85 (29)	86 (30)	86 (30)	87 (31)

Chapter 4

Results

As the results, IoT Thermo Guard can show real-time data of main factors cause heatstroke. Also alert users in area immediately when heatstroke has a chance to occur. Everyone is accessible to IoT Thermo Guard by internet.

Chapter 5

Conclusion and Suggestions

5.1 Conclusion

IoT Thermo Guard is an innovation help reduce losses from heatstroke and other heat-related problems.

The device consists of several measurements including temperature, humidity, PM2.5, dust, and UV sensor.

In conclusion, when the weather is too hot appear chance of heatstroke, **IoT Thermo Guard** send real time data to our website display. This information is presented as text and numerical data that exceed specified hazard level. So that your life is secured with **IoT Thermo Guard.**

5.2 Problem

Without internet or unstable connection, it is difficult to sight the data or be alert when heatstroke has a chance to occur.

5.3 Suggestion

Due to the problems that occurred. We therefore thought of modifying and developing it by using a more detailed display to be able to see the information displayed on the "**IoT Thermo Guard**" device.

5.4 Future Improvement

This IoT Thermo Guard provides life protection as well as asset protection. The limitation of this project is that it always requires an internet connection. This problem can be solved by using a GSM modem with a Simcard come up with good network connection. Several systems are installed in area. More accurate location has high chance to cause heatstroke. And plan to deal with different levels of heatstroke from different locations.

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