FACE SHIELD WITH BODY TEMPERATURE SCANNER AND RECORDING SYSTEM

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INTRODUCTION

This new respiratory virus called the Novel Corona- virus 2019 or COVID-19 is making news because it is creating a worldwide outbreak of respiratory disease. This virus started in Wuhan, Hubei Province, China, rapidly spread through Southeast Asia and worldwide. According to the World Health Organization, COVID-19 came from the virus caused by SARS-CoV-2, which passed on from person to person, primarily through close contact. The government is looking for various ways to defend and protect itself from this pandemic, looking to the most frequent symptoms of COVID-19 such as fever, dry cough, and fatigue. How will it improve the detection, tracking, and controlling the spread of this virus within the country?

The use of a facial mask and face shields is mandatory to prevent the transmission of the infection. Going to any establishment obliges you to submit by check your

temperature because fever is the most common symptom of COVID-19. Based on the research of the proponents under the study of CN111182470, which relates to a wearable body temperature detection device. The wearable body temperature detection device comprises a temperature sensor module, a wireless communication module, and a processor module. The temperature sensor module can continuously obtain the core temperature of the human body from the auditory meatus. The wireless communication module sends the body temperature information to an intelligent terminal and a remote terminal to continuously monitor the body temperature of a measured person. The invention further provides another wearable body temperature detection device to record people close to the user.

Checking temperature upon entering the premises alone is not enough to prevent the virus, especially using temperature assessment devices, such as oral thermometers, requiring physical contact, increasing the risk of spreading infection. A manual process in filling up a paper-based contact tracing form took so much time for the person and administration to organize and store the records daily. This sort of manual process has the potential to spread the infection.

In this project, the proponents came up with contact- less body temperature scanning and monitoring to prevent the spread of the virus. The proponent also came up with a web- based system that can store data such as personal information with a self-assessment form for contact tracing to lessen the human effort and manual operation of managing and organizing the data entry daily. Every time the user entered an establishment, the user needs to show their registered identification

system for the daily record.

GENERAL OBJECTIVES

This study aims to design and develop a face shield with a body temperature scanner and recording system using a system of identification that allows the user to instantly access information for tracking, collecting, and securing data that can use during this pandemic.

SPECIFIC OBJECTIVES

The Specific objectives of this project are:

To design and develop a Face shield build with an Infrared Temperature Sensor that can scan and monitor the human body temperature.

To develop a mobile application that can display and passed the body temperature data to the self-assessment web-page.

Develop a website for registration and COVID-19 self-assessment to generate a Quick Response (QR) code after registration and completing the self- assessment.

STATEMENT OF THE PROBLEM

This project aims to build a proposed Face-shield with a Body Temperature scanner and Recording System. It seeks to answer the

following research questions:

1. What are the device's characteristics in terms of scanning a body temperature that is currently in use?

2. What improvement can be made out of the existing device?

3. What new device can be derived with improvement?

4. What is the level of assessment of the groups of respondents on the developed device with the following criteria? Is there any significant difference?

4.1. Functionality;

4.2. Usability;

4.3. Reliability;

4.4. Efficiency; and

4.5. Maintainability.

5. What claims made from the developed invention or innovation project?

METHODOLOGY

This chapter presents the research methodology, statistical treatment, supplies and materials cost, tools and equipment used, installation and construction procedure, testing and revision, and the cost analysis of the proposed project entitled Face-shield with Body Temperature Monitoring scanner with Recording System.

Research Methodology and Sampling

The research used the developmental type of research, which is defined as in contrast to simple instructional development. Developmental research has been described as the systematic study of designing, creating, and evaluating instructional programs, processes, and products that must meet internal consistency and effectiveness criteria. In the field of instructional technology, developmental research is especially significant. The most

popular forms of developmental research are those in which the product development process is studied and explained, and the final product is assessed (Richey, 1994). In the field of instructional technology, as it currently exists, developmental research is described as a research methodology used by a researcher to create an empirical basis for the creation of instructional and non-instructional products and tools, and new or improved models regulate growth. In other words, developmental research is regarded as one of the most fundamental research methodologies used when creating instructional materials to aid instruction (Ibrahim, 2016).

The method of sampling is purposively in nature. Purposive sampling (also known as judgment, selective or subjective sampling) is a sampling method in which the researcher chooses members of the population to participate in the sample based on their judgment. It is a nonrandom technique that does not need underlying theories or a set number of informants. Simply put, the researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by knowledge or experience (Bernard 2002, Lewis & Sheppard 2006). A study may be started with a survey, and then purposive sampling is done based on the survey (Brown 2005).

The proponents used the single-stage cluster sampling:

a simple random sample of clusters is selected, namely: (1) Professionals, (2) Students, and (3) Community. The data are collected from every unit in the sampled clusters.

Evaluation Method

The project was evaluated on the following criteria, namely: Functionality, Usability, Reliability, Efficiency, and Maintainability.

A. Statistical Treatment

The mean was used as the tool for evaluating the project.

The Formula is:

chi = (Sigma*X)/N

Where:

∑, represents the summation

X represents scores

N represents number of scores

The Likert scale was used for descriptive ratings.

Table 1: Likert Scale for descriptive ratings.

Numerical Scale	Average Response	Adjective Rating	Verbal interpretation
5	4.50-5.00	Exellent	E
4	3.50-4.49	Very Satisfactory	VS
3	2.50-3.49	Satisfactory	S
2	1.50-2.49	Fair	F
1	1.00-1.49	Poor	P

Analysis of variance (ANOVA)

Analysis of variance (ANOVA) is a set of statistical models and estimate processes for analyzing variations between means. Ronald Fisher, a statistician, invented ANOVA.

F = (MST)/(MSE)

Where:

E = ANOVA

MST = Mean sum of squares due to treatment

MSE = Mean sum of squares due to error

DATA GATHERING PROCEDURE

1. Determine the goal of the project and the variables that we want to measure

2. Selecting Online surveys as a mode of collecting the

data that we will use

3. Selecting sample, we will gather data from Students, Professionals, and community

4. Preparing video presentations for the people who will answer the questionnaires

5. Creating Questionnaire

6. Ask permission from the Research adviser to conduct the survey

7. Running the survey by sending the questionnaires via e- mail or a private message using the social media platform

8. Send the collected data to the statistician to compute and analyze the data.

Summary of Findings

The findings of this study are presented in this chapter.

SOP 1. What are the device's characteristics in terms of scanning a body temperature that is currently in use?

One of the existing body temperature scanners is Digital Thermometers, and Digital thermometers function by employing heat sensors to measure body temperature. Digital thermometers give accurate readings in around 1 minute or less. There is also a Forehead (temporal) thermometer which is widely used nowadays. Forehead thermometers monitor temperature using infrared sensors: some are referred to as non-contact Infrared thermometers.

Forehead thermometers that do not require physical touch have grown in popularity for usage in places like airports, shops, and stadiums. The downside of using a forehead thermometer is that it must be positioned precisely and according to the manufacturer's recommendations, or it will not produce the correct reading.

SOP 2. What improvement can be made out of the existing

device?

Because existing body temperature scanner devices are often hand-held and do not need physical contact, they must be precisely positioned because readings might be influenced by environmental variables such as drafts, wind, interior heating, and direct sunshine. It may be developed

and enhanced by making it a wearable gadget for personal usage.

SOP 3. What new device can be derived with improvement?

The proponent came up with a wearable body temperature scanner in the form of a face shield, helpful during the pandemic. We also accompanied the device with a mobile application for displaying the data from the device itself and a Web-based recording system for registration and contact tracing assessment of the users.

SOP 4. What is the level of assessment of the groups of respondents the developed device with the following on criteria? Is there any significant difference?

4.1. Functionality;

4.2. Usability:

4.3. Reliability;

4.4. Efficiency; and

4.5. Maintainability.

A. SUMMARY OF THE ASSESSMENT

TABLE 2: ASSESSMENT OF THREE GROUPS OF RESPONDENT

Criteria	Student	Professor	Community	Composite Mean	VI	Rank
Functionability	3.97	4.07	4.07	4.03	VS	2
Usability	4.35	4.05	3.90	4.10	VS	1
Reliability	3.95	4.05	4.05	4.02	VS	3
Efficiency	4.00	4.03	3.77	3.93	VS	4
Maintainability	3.93	4.00	3.57	3.83	VS	%
OVERALL COMPOSITE				4.0	VS	

Table 2 shows the result of the overall assessment of the three groups of respondents, namely: Students, Professionals and Community. The over all composite mean - has a numerical value of 4.0 interpreted as "Very Satisfactory

Rank 1 is "Usability "with a composite mean of 4.10 and interpreted as "Excellent.

Rank 5 is "Maintainability "with a composite mean of 3.83 and interpreted as "Very Satisfactory.

Rank 2 is "Functionality "with a composite mean of 4.03 and interpreted as "Very Satisfactory.

Rank 3 is "Reliability "with a composite mean of 4.02 and interpreted as "Very Satisfactory.

Rank 4 is "Efficiency "with a composite mean of 3.93 and interpreted as "Very Satisfactory.

The data shows that the Face shield with body temperature scanner and Recording system in terms of its functionality, usability, reliability, efficiency, and maintainability is viewed as a Very Satisfactory device by the group of Students and Professors, and Community

SUMMARY

GROUPS	COUNT	SUM	AVERAGE	VARIANCE
Student	5	20.2	4.04	0.0306
Professionals	5	20.2	4.04	0.0006
Community	5	19.35	3.87	0.0436

TABLE 3: SUMMARY ON THE SIGNIFICANT DIFFERENCE ON THE RESPONDENT'S ASSESSMENT

ANOVA: Single Factor

ANOVA

Source of Variation	SS	Df	MS	F	P-value	F critic
Between Group	0.0963	2	0.0482	1.928	0.188	3.885
Within Group	0.2997	12	0.02498			
TOTAL	0.396	14				

All of the indicators exceeded their critical F value of 3.885294 and are verbally interpreted as significant. These values lead to rejecting the null hypothesis that there is no significant difference in assessing the three groups of respondents on the Face shield with body temperature scanner and Recording system.

Additionally, in terms of usability, reliability, efficiency, and maintainability, a statistically significant difference at the level of $p<0.05$ was found in the assessment of the practitioners.

This means that the Students, Professors, and Practitioners have different views on the Face shield with body temperature scanner and recording system as to all its indicators.

SOP 5. What claims made from the developed invention or innovation project?

1. A Face shield with body temperature scanner and recording system comprising:

an infrared temperature sensor and hard plastic for face protection;

an adjustable strap support for customized

an on and off button, component casing, charging light indicator and USB port for charging of the face shield device:

a QR scanner that can read a QR code of the registered user;

a Bluetooth module for the connection of face

shield device and mobile phones;

a mobile application for viewing temperature data from the face shield device;

of

a registration interface of the recording system to create an account for employees, students, and visitor and generate QR code for the specific registered user;

a log-in interface for admin to access the recording system;

a button for generating report of activities in excel and pdf format;

a button for viewing of the list of registered employees, students and visitors;

a button for maintenance of the recording system;

a web-based contact tracing form for COVID- 19 pandemic response;

2. A Face shield with body temperature scanner and recording system as in claim 1, wherein said a face shield device would act as a body temperature scanner and pass the temperature data to a mobile application via Bluetooth technology. Another is the mobile application will be direct to a website for contact tracing assessment. A recording System with a database is responsible for registering the employees, students, and visitors capable of generating a QR code for each registered person. Also responsible for managing, monitoring, and storing the data that is significant in contact tracing.

Conclusion

The Following conclusions derived from the study’s findings’

A. The degree to which the sets funcional completeness, correctness, and appropriateness were interpreted as "Very satisfactory" by the respondents. According to the evaluation result of the functionality of the device and system, the Face shield functionality with body temperature scanner and recording system provided the specific tasks and user

objectives. Correctness particular of recording system provided tasks and user objectives, the the correctness of results with the needed degree of precision. It facilitated the accomplishments of specified tasks and goals.

B. The degree to the sets operability and accessibility were interpreted as "Very satisfactory" by the respondents, according to the evaluation result of the device and system's usability. Denotes that the Face shield with body temperature scanner and recording system is simple to operate and control in terms of usability. It provides a good and satisfactory interaction for the user with a diverse set of characteristics and capabilities to achieve a specific context of use.

C. According to the evaluation result of the device and system's reliability, the degree to which the set maturity and availability were interpreted as "Very satisfactory" by then correspondents. Infers that the reliability of the Face shield with body temperature scanner and recording system meets the needs for reliability under regular operation. Additionally, the system is operational and accessible when required to be used and is fault- tolerant.

D. According to the evaluation result of the device system's efficiency, the respondents' degree to the sets time behavior, resource utilization, and capacity were interpreted as "Very satisfactory." Proclaims that the efficiency of the Face shield with body temperature scanner and recording system utilizes resources to its capacity with excellent processing time when performing its functions.

E. According to the evaluation result of the device and system's maintainability, the degree to which sets reusability and modifiability were interpreted This as "Very satisfactory" by the respondents. indicates that the Face shield with body temperature scanner and recording system may be employed in other systems due to its flexibility and modifiability without compromising its existing system.

RECOMMENDATION

These recommendations are offered based on the work accomplished by the researchers during this project

and on the conclusion given on the previous section:

1. The researchers recommend to used alternative light-weight materials in creating this project such as 3D print casing of the face-shield and acrylic since the weight of the prototype device can be uncomfortable to wear for a long period of time.

2. The researchers also recommend integrating display module for temperature display for further development.

3. For futher development, the researchers also recommending of integrating voice module to the QR Scanner which will indicate that the user is already done with the assessment.