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## Abstract

The system of authenticate and monitor students' temperature at the entrance of a school. Is a system that has a student's ID barcode scanner, temperature measurement, hand washing, and access lighting system. With that, the school administration and nursing will have access to the database and authenticity of the student at the entrance of the school and have a daily tracking of the student's temperature. Also, this system is to prevent the entry of students who are not authorized to enter the school campus by posing as a student to have access to the school to commit any act of violence against the students or computer information systems of the schools of the Puerto Rico Department of Education.

## Introduction

Authenticity and security in the schools of Puerto Rico are a topic of great importance for students, parents, and school administration. Therefore, the main objective of the project is to implement an Authenticity and Temperature Monitoring system in schools of the Puerto Rico Department of Education. Since today schools need secure systems to be able to guarantee the safety of students and to be able to maintain a secure environment of information systems, preventing unauthorized persons from entering and having access to the school [1].

## Background

Taking advantage of the new challenges of this new era of access control and temperature monitoring due to the Covid-19 pandemic it is important to develop an Authenticity and Temperature monitoring system. Today's students are already used to this new access control system and therefore its implementation is easier since they have created awareness of what access control is. Therefore, this benefits us to be able to carry out authenticity controls and to be able to complement a safer and calm environment within the schools of the Puerto Rico Department of Education.

## Problem

In the face of the new challenges that have been unleashed during these years as a result of the Covid-19 pandemic, the schools of the Puerto Rico public system lack a robust system of student authenticity and continuous monitoring of student's information. Because admission to the school must comply with the protocols established by the Department of Health of Puerto Rico [2]. Therefore, it is important to understand that the same situation occurs in other countries and taking as reference the article [3], where they propose a system to eliminate the possibility of human error, secure data and awareness of attendance among students to have a backup of information. It's been determined that safety and authenticity in schools are a huge responsibility.

## Methodology

The diagram in Figure 1 below shows the process of Authenticity and Temperature Monitoring for students. The process begins with the creation of the Student Identification Card with the student's personal information, photo, and student barcode. Then the system scans the bar code and authenticates it with the database developed for the authenticity system. Once the student is authenticated, the temperature is taken and captured to comply with the protocols established by the Puerto Rico Department of Health [2]. Where, at the end of the temperature measurement, a system for hand washing and an indicator light for safe access to the school campus will be activated.

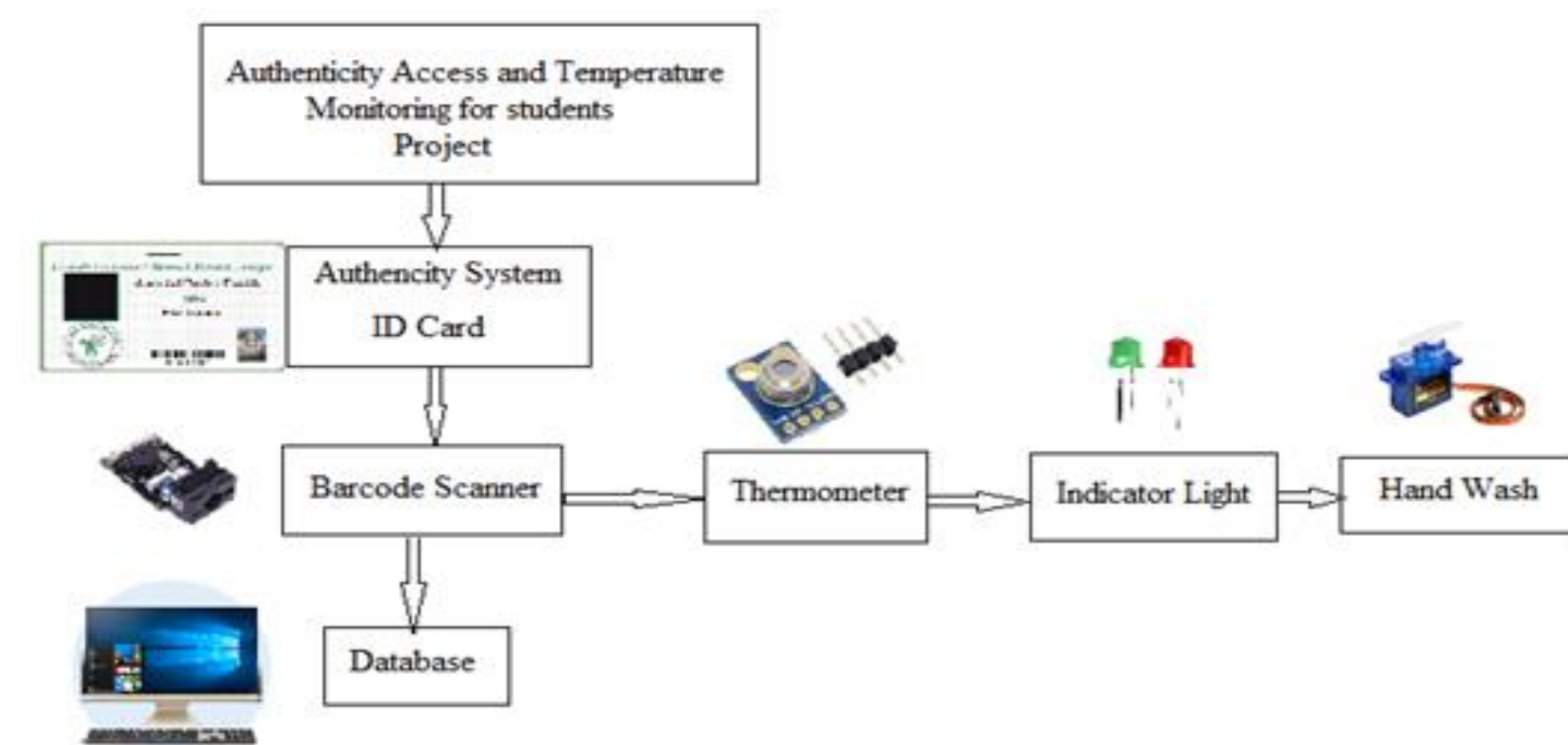


Figure 1  
System Interface

The design of the system consists of the implementation of the barcode system in the search for student information for its authenticity. Where, through the database created in Microsoft Access, school personnel can access the student's information and authenticate her identity. In the design of the Form in the database, there are command buttons for searching for students, adding new students, and deleting students who are no longer part of the school campus. Figure 2 shows how the student can be accessed by scanning the barcode of the student's SIE number. The barcode system scans the student ID and when the scanning process is completed, all student information that is stored in the system can be accessed. Since the SIE number is unique for each student enrolled in a public school of the Puerto Rico Department of Education.

Also, in this project, the Arduino microcontroller will be programmed to take the temperature of the students [4]. Figure 3 shows the Arduino microcontroller and how it is connected to the LCD which indicates the student's temperature. This temperature must be within the parameters established by the Puerto Rico Department of Health and must not exceed 37.8 degrees Celsius.

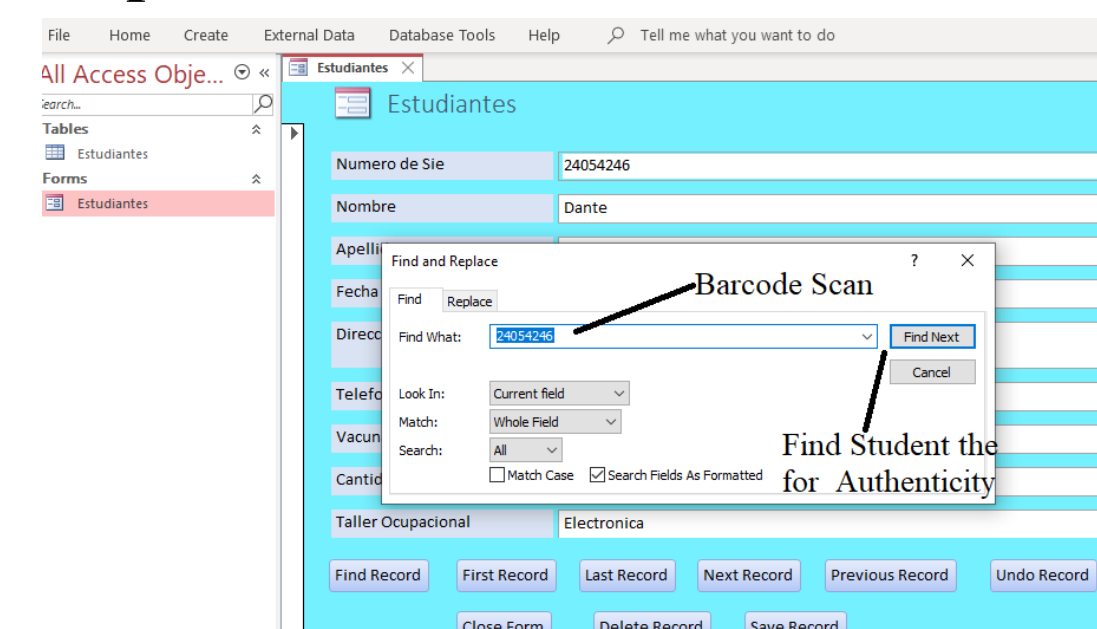


Figure 2  
Find the Student for Authenticity



Figure 3  
Temperature Monitor Design

## Results and Discussion

During the process, the student was authenticated with the identification card scanning system, and then his temperature was taken, and it was determined if he complied with the body temperature allowed by the Puerto Rico Department of Health. Once the tests were carried out, the student flow went smoothly, achieving an approximate estimate of 5 seconds per student. With the determined time, it can be determined that its implementation fulfills the purpose of the authenticity of the student and the taking of his temperature. Given this time analysis, it is possible to determine the number of stations that would be needed in a school to be able to verify the authenticity and temperature monitoring. Table 1 shows that every 5 seconds a student can be authenticated. This means that in Table 1 it is determined that for every 1 minute 12 students can be authenticated, every 10 minutes 120 students and 720 students in one hour. With this information, it can be established that 720 students can be authenticated with a station in one hour. But if the school wants to have a further advance in authenticity, 2 stations can be installed at the entrance of the school to speed up the process and avoid crowds at the entrance.

Table 1  
Students barcode scan and temperature monitoring time.

Students Scan per Seconds	Number of Students per Minutes	Number of Students every 10 minutes	Number of Students in an Hour Hours from 7:00 a.m. to 8:00 a.m.
5 seconds per student	12 students per minute	120 students every 10 minutes	720 students every 60 minutes

Figure 4 shows a prototype of how the stations will be in the school once all their parts are installed. This consists of an LCD screen that contains the database of the students of the information system of the Microsoft Access software where in addition the GM65 1D 2D Barcode Scanner is connected that will be used to scan the student identification card for its authenticity. In the system is also placed the Arduino microcontroller that contains the program codes for the use of the Infrared Thermometer GY-906. This system can be fixed or mobile according to the needs of the facilities of the school.

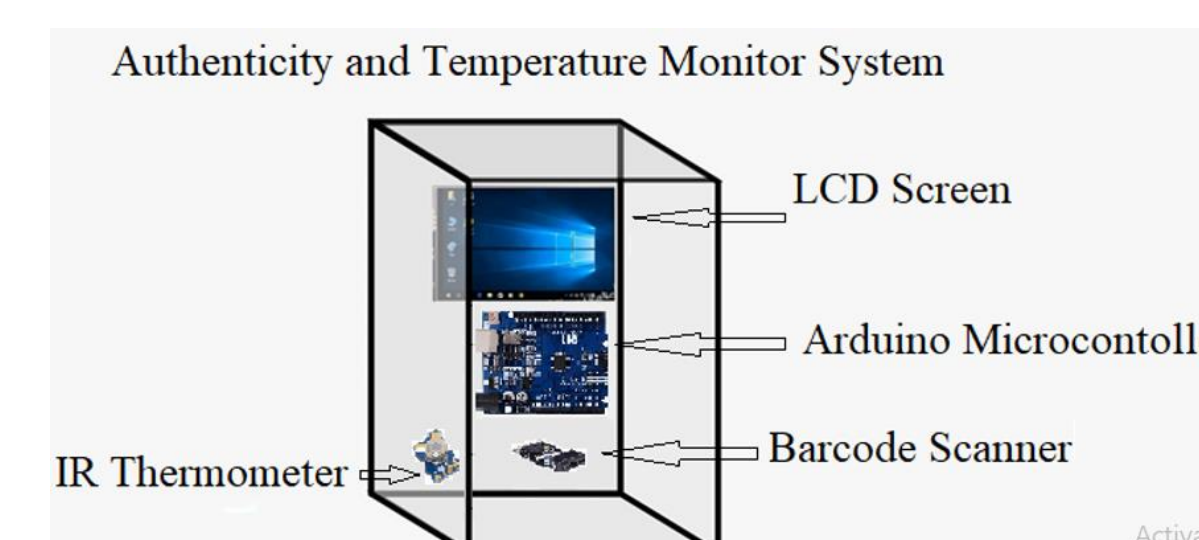


Figure 4 Authenticity and Temperature Monitor System

With the development of the Authenticity and Temperature Monitoring system for students, the Puerto Rico Department of Education will have a robust and secure system to be able to identify and keep school campuses safe. In addition, it has a student temperature monitoring system and will allow students to enter the school campus safely. The system has the necessary tools to prevent anyone who wishes to enter the school campus from pretending to be a student to violate student security or access information systems.

## Conclusions

The system provides a useful security tool for the school administration of the Department of Education of Puerto Rico. This has the real identification of a student through various methods. The system has a unique ID card created for the school with a unique barcode for each student. With the barcode scan, the student is authenticated at the entrance of the school. Helping strengthen the security of the school since security personnel can scan the student ID card from anywhere in the school and determine its authenticity. Also, the system provides an adjusted and programmed temperature monitoring system through the Arduino microcontroller according to the needs and protocols during the COVID-19 emergency. Security and authenticity are issues of great importance and concern because information systems continue to grow every day and cybersecurity is the key to protecting any place and system from any cyber threat.

## Future Work

The Student Authenticity and Temperature Monitoring System can be expanded to other needs depending on the situation of each school. In the case of authenticity, more data can be added to the Microsoft Access database to obtain more accurate information about the student. And in the case of temperature monitoring and verification of COVID-19 vaccination, it is a section that is currently included due to the current reality of the COVID-19 pandemic, it can be improved or adapted as variants or needs continue to arise that require new measures to safeguard the health of students.

## Acknowledgements

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## References

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