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Develop a new Student Attendance System Using QR Code for Smartphones

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Abstract

Abstract: The student attendance system serves as a means to assess student engagement in a classroom setting. As universities transition from online to in-person lectures, they grapple with challenges associated with managing large student populations, notably the cumbersome task of recording attendance for performance evaluation. This process not only consumes valuable lecture time but may also be susceptible to errors and classroom disturbances. In response to these challenges, this paper introduces an attendance system using QR codes on smartphones based on PC. Each student is assigned a unique QR code, enabling them to mark their attendance using their phones, eliminating the need for an internet connection. Implementing this system offers the dual advantage of time efficiency in attendance tracking and the integration of technology to replace the conventional method of verbally calling out each student's name or asking them to write. The design of this proposed system leverages technologies such as OpenCV through Python, along Visual C++ Redistributable Packages for Visual Studio.

Keywords: *QR code; Python ; PC; OpenCV; Visual C++.*

I. INTRODUCTION

Class attendance serves as a method for documenting students' presence in a particular class, constituting a segment of university records that includes attendance information. The significance of class attendance in a university lies in its ability to track each student's academic progress. Consequently, the process of collecting attendance data must be accurate and free from manipulation to ensure the integrity of the recorded information(Budiman et al., 2023).

There are many solutions to avoid wasting lecture time during the attendance registration process, including that the division representative or one of the students register his or her colleagues who are present, or register attendance based on the students' answer sheets if there is an exam, but these solutions require the subject or department professor to re-transfer attendance to an Excel file, for example, to calculate warning penalties later, in addition to the possibility of making an error while transferring the attendance list to Excel or the student responsible for registering attendance registers his absent colleague as present in the lecture.

Not many researchers are focusing on this scope while it's really important in our daily life as a lecturer, but mostly they keep using the traditional way and not thinking out of the box, however, there are previous work that has been done using different ideas such as QR code or face recognition or finger print and so on and will mention them.

According to (Masalha, 2014) proposed a system that is based on a QR code, which is being displayed for students during or at the beginning of each lecture. The students will need to scan the code in order to confirm their attendance. In (Wei et al., 2018) the paper purposed a system that will handle a problem for recording the attendance. The proposed system is a couple of two applications, one for generating the QR Code by entering the student details and second application for taking the attendance and generating the attendance in CSV or XLS format. In (Lasisi & Ajibade, 2021) this paper describes the development of student attendance using QR-code ,This project work aims to assist the lecturer in taking student attendance, to automatically calculate attendance percentage, generate warning letters to the student and lastly preventing fraudulent activities by the student

In (Baban, 2018) proposed system to record and view attendance information using a QR code scanned by smart phones to help students avoid penalties that may result from poor attendance. In proposed system, students can easily view their attendance records for each course. However all the above mentioned works needs an internet which is not recommended in most of universities to use it by the student inside the class and the cost effects.

In other side some researchers were focused on other technique to record attendance such as bar code or face recognition or RFID/NFC and fingerprint (Guevarra & Corpuz, 2023)(Fariza et al., 2023)(Review, n.d.)(Yelve et al., 2023)(Gandhi et al., 2023), however we noticed that most proposals do involve applications being used by the instructor during class. Hence, if the attendance system requires some action from the instructor, as well as some applications are compacted and costly and mostly need internet.

II. RESEARCH METHODOLOGY

TheIn this work, we develop the attendance program which taking the student attendance through a QR-code which is available for each student, Each student has his own code to register his attendance and Facilitating the process of registering students' attendance without announcing their names, the program is consistent with the concept of universities leading society and thus directing society using modern technology . The features of the program facilitating the process of submitting absences to the department. The program automatically provides the history of the lectures. The program does not require manually writing the student's name, but rather uses the list of names available from the college department in Excel format. The list of names present at the stage in which the lecture will be delivered is selected and their attendance is taken automatically. The program uses the camera on the PC to scan the student code. When a student comes and passes their code, their attendance is recorded. Use the camera on the personal computer to scan the student code when the student comes and passes his code, and his attendance is recorded.

1. QR generator

A part that generates the QR-code for students automatically by reading the students' names from an Excel file and creating a PDF file in which each page contains a list of the QR-code with the student's name below each code to make it easy to print and distribute to the students (as in Figure 1) . This code is fixed and contains the student's name as installed in the Excel file entered into the program. The features of the code as following:

This code will be distributed once by any lecturer in the department and will be used later in the class for the rest of the lecturers.

The student can take the code which is under his name as a QR-code sheet or save the QR image in his mobile phone and use it as an alternative to the QR-code sheet.

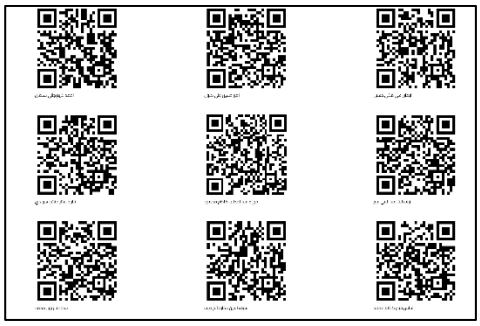

Figure 1. QR image with each student name

An example of the QR-code distributed to the student in Figure 2, where additional space is provided for the student to hold without blocking the code.

Figure 2. Example of QR code

2. PC application

The second part of the program contains the user interface and works separately from the first part. The program is distributed to the lecturer through an installation file, but the following must be taken into account:

- The program runs on Windows 10
- The program requires Visual C++ Redistributable Packages for Visual Studio 2013 and can be downloaded for free from the link https://www.microsoft.com/engb/download/details.aspx?id=40784 , After installing the program, it will appear as shown in figure 3.

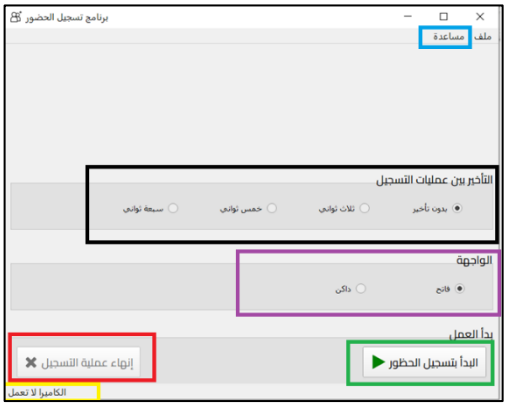

Figure 3. Program interface

It contains the basic elements to start the attendance process without having to move to other interfaces in the program. Where the interface consists:

- The "Start Attending" button (Green color) for the person responsible for starting the registration process
- "End registration" button (Red color) to end the registration process
- Delay between registration processes (Black color) .The lecturer can choose a delay amount in seconds between registration processes
- Interface (Purple color): The lecturer can choose between several empty frigates, as in

Figure 3, as well as a wide interface, as in Figure 4.

Figure 4. Dark interface

The program is currently available and is used by the authors in the aforementioned departments. The current program version is 0.4. In the future, other features may be added and the lecture can update the program by going to Help > Checking for updates to download the latest version as soon as it is available (Figure 5).

Figure 5. Check update

3. Attendance recording process

When you press the "Start Recording Attendance" button, the program confirms that the camera of your personal computer (laptop) is running. If the camera is not working, a message appears at the bottom of the program interface stating that the camera is not working (yellow color) (as in Figure 6), , if the camera is working, the file selection interface will open to choose the attendance recording file, as in Figure 7

Figure 6. Camera doesn't work

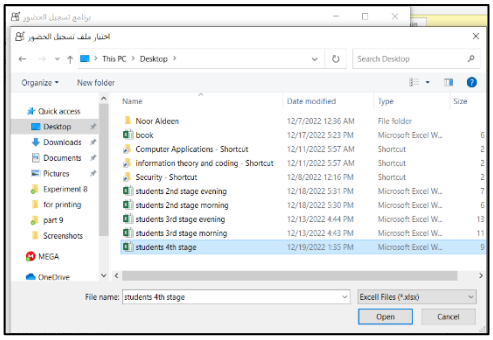

Figure 7. choosing the file that contain the list of the students names

	A	B	C
1	name		
2	احمد كريم جالي سلطان		
3	امير حسين علي كنون		
4	ايمان علي مكي حسين		
5	تبارك ستار منشد هويدي		
6	حوراء عبدالمطلب كاظم مح		
7	زينب ليث عبد النبي عزيز		
8	سجاد نزار جبار محمد		
9	سيف الدين ستار حاتم طلب		
10	عباس حيدر كاظم محمد		
11	عبدالله سلمان غثيث سلطا		
12	علي اياد محمد عكموش		
13	علي مهند راضي محمد		

Figure 8. Weibull distribution of all filler concentrations

After selecting the file which contains the stunts name as shown in figure 8, the program interface will be as in Figure 9, with the phrase "The attendance registration process is in progress" appearing, with the "Start attendance registration" button deactivated and the "End registration process" button activated. The goal is to display the data coming from the camera on the program interface so that the student knows whether he placed the QR-code in front of the camera or not.

The student puts his QR-code in front of the camera to record his attendance, as his name will appear as <student name> is registered with a

ringtone to effectively notify the student and the lecturer.

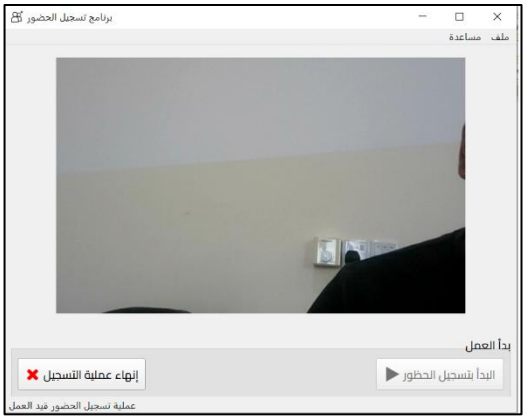

Figure 9. Waiting to detect the QR code

Figure 10. Detect the QR code and the student name appear

In the excel file new column will appear with the date of the day that the attendance record, every student will take his attendance there will be 1 in the cell of the new column , as shown in figure 11

	name	2022-12-19
2	احمد كريم ج	
3	امير حسين ع	
4	ايمان علي مك	
5	تبارك ستار مة	
6	حوراء عبدالم	
7	زينب ليث عب	
8	سجاد نزار جب	
9	سيف الدين م	
10	عباس حيدر ك	
11	عبدالله سلما	1
12	علي اياد محم	
13	علي مهند راض	
14	غيث عبد الك	
15	محمد جمال	
16	محمد حيدر	
17	محمد داخل	
18	محمد علي مه	
19	مرتضى عدنان	
20	مرتضى منعم	
21	ناديه فراس تر	
22	هادي حسن ـ	
23	عباس فريد ح	

Figure 11. New column with the date

In case the name is not on the list of the Excel file, this message will appear "the student does not exist" and a different alert sound will play but not the same as first sound when the registration proceed correctly, as shown in figure 12.

Figure 12. An example of the use of an image of a QR-code on a mobile phone

III. CONCLUSION

In summary, the implementation of the QR-code-based student attendance system has significantly enhanced the attendance recording process at Bilad alrafidain University College and Imam Ja'afar Al-Sadiq in Iraq, effectively addressing challenges associated with the manual method. The primary aim of developing this system is to assist lecturers and staff in efficiently managing student attendance, introducing a more systematic approach. The evaluation outcomes have yielded positive indications, suggesting imminent improvements to the attendance system.

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