

QR Code Task Logger for Special Need Student on Continuous Achievement Monitoring

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Abstract: Children with a Special Educational Needs (SEN) is a condition where this special child faces learning difficulties in the form of disorders and disabilities. Some of the most common learning disorders among these special children are Dyslexia, Dyscalculia and Dyspraxia. Not to forget that there are also children who have medical disorders such as Attention Deficit Hyperactivity Disorder (ADHD) and the most common disorder is Autism which will face learning disruptions as well. The goal of this study is to provide a learning aid to the teacher or instructor in order to monitor the progress and also the improvement of the special educational needs (SEN) students. With the help of this project, teachers may monitor and observe their SEN students and record all their progress instead of depending on observation only individually. For this project, the ESP32 Camera was used as a medium to scan QR codes that are encoded with the SEN students' data that later will be stored in Microsoft Excel on a cloud server. The final result of this learning aid has demonstrated that it is possible to use this project in order to aid the workload of teachers and also can be quantitative evidence of the SEN students progression in the study.

Keywords: ESP32 Cam, QR Code, Special Needs, Learning Aid, Monitoring, Cloud Server

1. Introduction

The term 'special educational needs in the context of the Salamanca conference refers to all children and teenagers with impairments or learning challenges. Many youngsters struggle with learning and as a result, have special educational requirements at some point throughout their education. It assumes that human variances are natural and that learning should be tailored to the kid's requirements rather than the child being forced to conform to predetermined assumptions about the pace and nature of the learning process. Integration of children and teenagers with special educational needs is best done in inclusive schools that serve all students in a community, according to experience in many nations. Those with exceptional educational needs can make the most educational development and social integration

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in this environment. The core premise of an inclusive school is that, if feasible, all students should study together, regardless of their problems or differences [1].

Many alternative classifications are used to identify impaired learners in Malaysia, and terms such as 'handicapped,' 'less able,' and 'special needs' are used interchangeably within the educational discourse. These labels have been incorporated into official definitions by the Ministry of National Unity and Social Development's Department of Social Welfare [Department of Social Welfare, Malaysia (DoSW), 1999a] and the Ministry of Education's Special Education Department [Special Education Department, Malaysia (SED), 1999a]. According to the Malaysian Education Act & Selected Regulations, these agencies are authorized by the government to diagnose, place, and help impaired students in partnership with the Ministry of Health (1998) [2].

As a teacher of special needs students, it becomes a job for the teacher to give their full attention and support to these students. The teacher will have to monitor each of their students individually in order to keep up with their study progress and improvement. Basically, the method that they can do is only through observation and there is no quantitative data for it as the teacher only can prove their special needs student progress only by saying it verbally to their parents or guardians. As we know, different types of special needs students required different teaching methods for them to learn and do individual basis and it requires a different approach between the teachers and students. So, a different teaching plan is required for each of the students. With that, proper teaching aids are required for this kind of problem.

With the QR Code Task Logger for Special Need Students on Continuous Achievement Monitoring Project, the teacher or instructor should be able not only to monitor their special need student on their studies and improvement for the moment being but also throughout the whole semester. In terms of one semester, it usually consists of 6 months. With the help of these teaching aids, the teacher can monitor their special need student progress in order to execute their lesson plan throughout the semester. With the help of these teaching aids, it should be able to provide quantitative data of each special need student on their studies or even daily basis.

2. Materials and Methods

2.1 Project Workflow

Teachers are using a camera that acts as a QR code reader to track the progress and improvement of their special needs students. The camera will send the QR code scanned and send the data to MS Excel in the cloud server. From the data, the user can extract information for the special need student data by converting the data into graph data for analysis and becoming visible evidence for references. Cloud storage can be simply defined as cloud computing storage, or as a cloud computing system with a big storage capacity. There are four layers in a cloud storage system - storage layer, administration layer, application interface layer, and access layer as shown in Figure 1. These layers are the essential components of a cloud storage system [3].

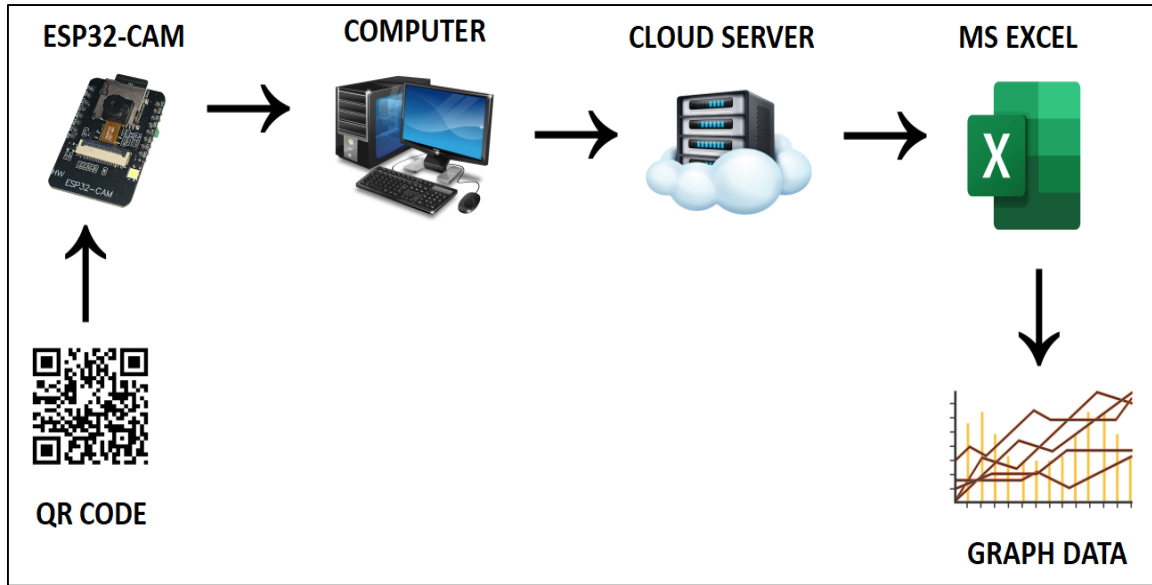


Figure 1: Workflow of the project

2.2 Methods

Figures 2 and 3 show the process flowchart for creating a set of QR Codes and QR code reading processes. The purpose of showing this flowchart is to give an overview of this project execution.

For the initial process, as shown in Figure 2, the user is required to insert the data into Microsoft Excel manually. The data can be in terms of student's name, ID's, student code or etc. After that, a QR code must be generated for each of the data in Microsoft Excel. This is done by using a QR Code Generator software or applications.

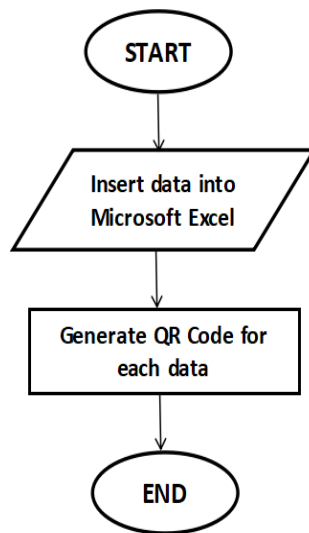


Figure 2: Process Flowchart (Generating QR code)

For the next process which is the QR scanning process, first of all, the system will start with the ESP32 CAM being turned ON and act as an eye or camera to scan the QR code displayed by the users. Then, it will scan the QR code and the data will be received by the Arduino which acts as the brain of the system to decode the QR code. After the QR code has been read, a signal will be sent out to Microsoft Excel which have been linked with the system. The same data which have been inserted or

gained in Microsoft Excel will be stored or uploaded to the cloud server for storage purposes. The user also can generate a report from the data received which has been saved in the cloud server whenever they want to observe it.

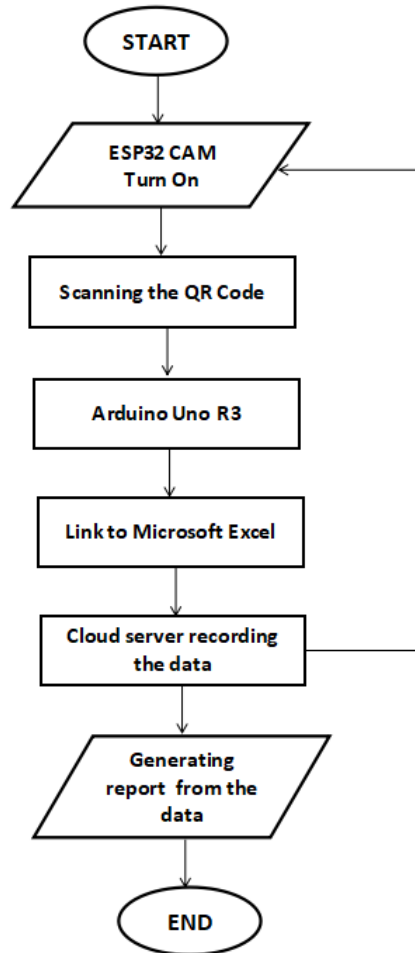


Figure 3: Process Flowchart (QR code reader)

2.3 Circuit Design

All the pin connections between the ESP32-Cam with the FTDI Module are connected by jumper wire [4]. Once the code is successfully uploaded to the hardware, the connection between GND and IO0 needed to be disconnected in order to exit the programming mode [4]. The circuit connection is shown in Figure 4 and Table 1 lists all the pin connections between ESP32-CAM with FTDI Module

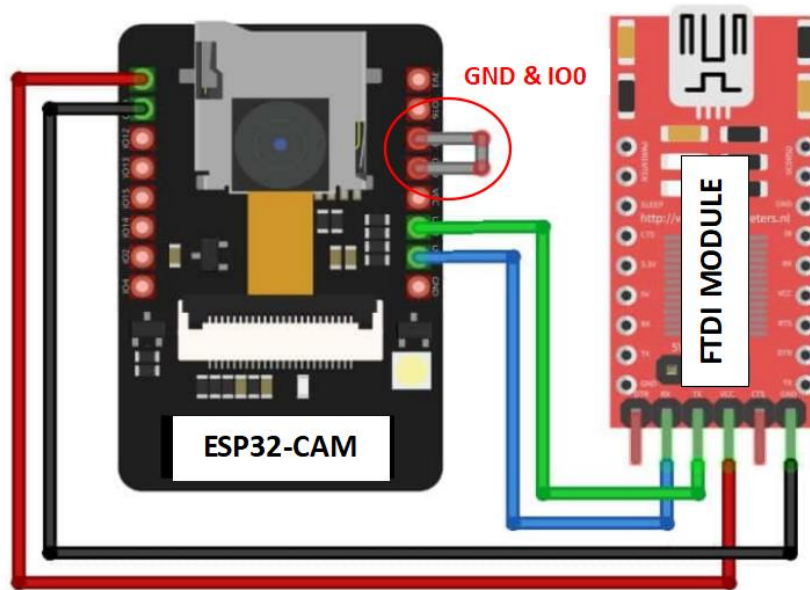


Figure 4: Circuit connection of ESP32-Cam with FTDI Module

Table 1: Pin connection between ESP32-CAM with FTDI Module

ESP32-CAM	FTDI Programmer
GND	GND
5V	VCC
U0R	TX
U0T	RX
GPIO0	GND

3. Results and Discussion

3.1 Hardware Setup

The hardware setup for this project consists of the usage of ESP32-Cam with FTDI Module (Figure 5). The ESP32-Cam should be functioning as a QR Code reader when a QR Code is being shown to it. Then, the FTDI module will decode the data stored in the QR Code and store it in Microsoft Excel which later is uploaded to the cloud server (Google Drive).

3.2 Generating QR Code

For this initial process, teachers or instructors are needed to generate a QR code by using some applications or software enabling them to encode the data of the students in the QR Code. From the QR Code being made, the teacher can compile it into a single sheet in MS Excel for reference purposes later. This project consists of two QR codes for each student which are 'IN' and 'OUT'. Figure 6 shows the QR Code Generator Online.

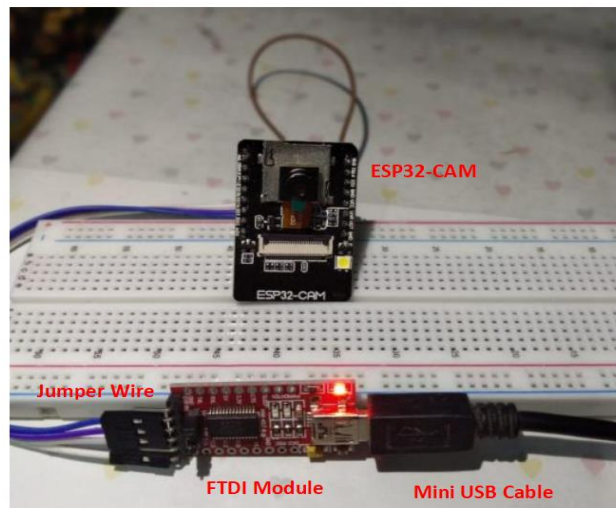


Figure 5: Hardware Setup

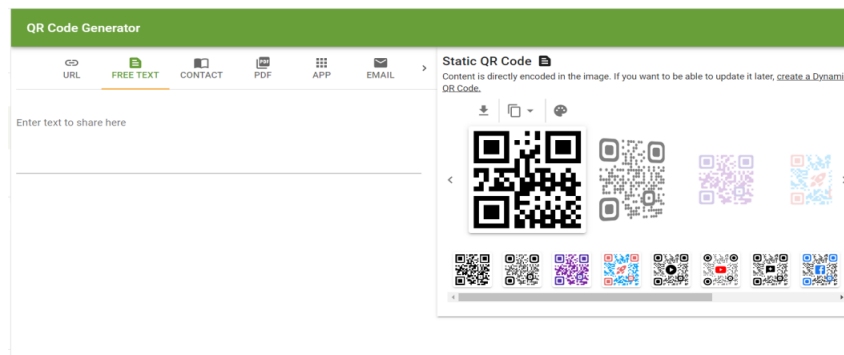


Figure 6: QR Code Generator Online

3.3 Data in Microsoft Excel

Once the setup was done and the camera can be used to scan the QR code, all the data will be compiled into a single MS Excel sheet. The sequence of data will be stated based on the QR code scanned by the user. For this project, we take around five people for data collection. The data can be sorted out in terms of 'IN' and 'OUT' situations. Figure 7 shows the data from the student QR code being scanned.

	A	B	C
1	TIME	CODE	
2	2022-06-16 11:56:05	Mohd Ali (IN)	
3	2022-06-16 11:56:22	Abu Huzafah (IN)	
4	2022-06-16 11:56:25	Nurul Sarah (IN)	
5	2022-06-16 11:56:32	Nurul Aina (IN)	
6	2022-06-16 11:56:34	Saiful Amirul (IN)	
7	2022-06-16 12:29:17	Mohd Ali (OUT)	
8	2022-06-16 12:29:30	Abu Huzafah (OUT)	
9	2022-06-16 12:29:34	Nurul Sarah (OUT)	
10	2022-06-16 12:29:37	Nurul Aina (OUT)	
11	2022-06-16 12:29:40	Saiful Amirul (OUT)	
12			
13			
14			
15			
16			

Figure 7: Data scanned stored in MS Excel

3.4 Graph Data Analysis

Next, the teacher may use MS Excel and edit it manually in order to gain the data report based on weekly or monthly. For example, the teacher may sort out data from a single student into a single sheet of MS Excel that contains data from activities throughout the semester. From that, the teacher may generate the graph data to be quantitative data as evidence of the student’s progress and improvement. As an example, Figure 8 shows the data obtained from a single student on time taken to answer a test throughout the semester.

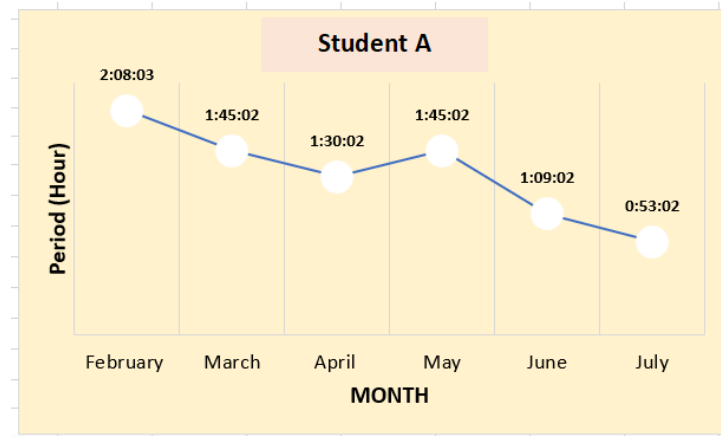


Figure 8: Data Analysis for Six Months of Student A

In order to observe a few students progress and improvement, the same method has been used for the students. From the graph comparison in Figure 9, the teacher can conclude that some of the students had an improvement and don’t need strict monitoring anymore. There are some other cases where the student’s result is failing like ‘Student C’ where the red line indicates the increase in time taken for the task throughout the semester is increasing. Therefore, students require some more monitoring or changes in lesson RPP.

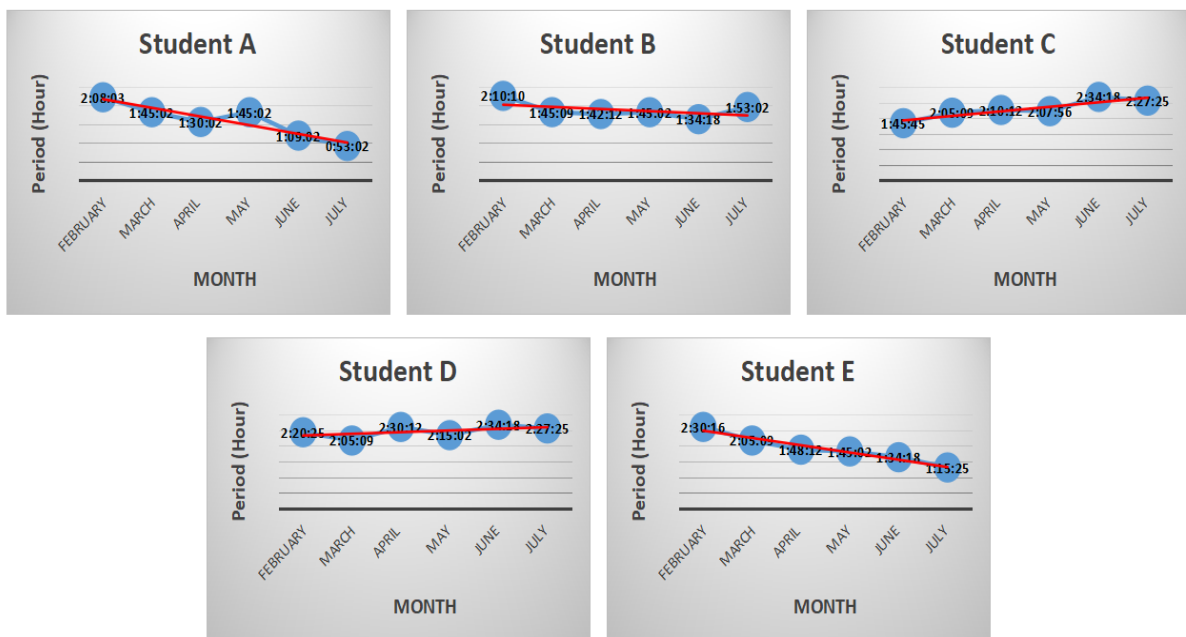


Figure 9: Graph Comparison of Five Students

4. Conclusion

In conclusion, this project was a success as it manage to be a learning aid for the teacher for monitoring purposes of their SEN students. From the project, the teacher or instructor should be able to give out full attention to these students so that they be able to progress efficiently not only on daily basis but also in their studies. With the aid of this project also, it can be quantitative data evidence for the SEN student's parents for reference in case their children required any other approaches in their daily basis or studies.

Acknowledgement

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