Quick responsive code scanner

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Abstract
This work is focuses on the problem of detecting and scanning bar codes in video stream. The system identifying bar codes in panoramic images using Raspberry Pi 4 was developed. The program algorithm of the system detection and scanning bar codes video stream for Raspberry Pi was proposed. It is established that systems can be used in industry, medicine, Education and in the control system.

Keywords: Raspberry Pi 4, algorithm.

Introduction:

QR Code:
- A QR code is a machine-readable optical label that contains information. It’s a barcode, basically. With a slight difference: it’s two-dimensional. The data they contain can encode a variety of types, including numbers, characters, and binary, which can allow for many creative uses.
- QR codes contain information accessible along two dimensions: horizontal and vertical.
- A QR code is a square made up of patterns of smaller squares. Information in a QR code is encoded by the arrangement of these smaller squares. And, once scanned, it delivers information just like other barcodes.
- QR code stands for “quick response code” because they’re able to provide information faster than traditional barcodes.
- There are two types of QR-codes I). Static QR Code II). Dynamic QR Code

A static QR code is a fixed, un editable QR code. The more information you store, the bigger and more complex a static QR code is. With large or complicated sets of characters, a static QR code can look very busy and take slightly longer to scan.

A dynamic QR code can be edited after creation. As many times as you want. That means you can change the information encoded in a dynamic QR code without having to create and distribute new QR codes.

Bar code:
Barcode is a sequence of black and white stripe containing certain information in a suitable form for reading by technical equipment. Requirements of introducing bar codes dictated by the extremely high volume of deliveries, territorial dispersion of interdependent organizations and enterprises lack information about product features on the packaging and accompanying documents. Today the most commonly in using are linear barcodes for reading information. Panoramic photography can take pictures from 180° and more, so it can capture at this frame a large number of products with bar codes. Then, these images will be scanned and recorded in the database. Then it’s possible to run other bar codes in the frame Raspberry Pi.

A small, fully functional computer that can be plugged into a computer monitor, keyboard, and mouse. It has all qualities of a PC- a dedicated processor, memory,
and a graphics driver. It even has its own operating system called Raspberry Pi OS which is an optimized version of Linux.

Raspberry Pi does not offer storage, but you can use microSD cards to store whatever OS (Raspberry Pi, Ubuntu Mate, etc) you like. Raspberry Pi also contains Bluetooth, ethernet, and Wi-Fi based connectivity, so it can also be used to transfer files over the internet. Raspberry Pi project design and the software are not open-source.

Since a Raspberry Pi board is no less than an entire computer inside a Printed Circuit Board, it is often called Single Board Computer or SBC.

- Official Raspberry Pi part
- 8 megapixels
- Up to 1080p at 30 FPS
- Up to 3280 x 2464 still pictures
- Lightweight and compact
- Broad compatibility with Raspberry Pi model.

**Features**

- Superior software implementation
- 64-bit Quad-core processor
- Large RAM (latest Raspberry Pi 4 Model B Board has up to 8G of RAM)
- Processor speed- 700MHz- 1.5GHz
- Raspberry Pi has 40 input/output pins.
- It can be connected to the Internet.
- It can run all kinds of applications (including MS Office and Email).
- It contains everything- CPU (Central Processing Unit), GPU (Graphics Processing Unit), Ethernet port, GPIO (General-purpose Input/Output) pins, and power source connector.

**Pros**

- Since it supports an operating system, It can perform complex operations like Weather monitoring, Controlling robots, etc.
- You can use it as a portable computer because it has everything- from CPU (Central Processing Unit) to ethernet port and Wi-Fi support.
- It has a large number of GPIO (General-Purpose Input/Output) pins (the famous model of Raspberry Pi has 40 GPIO pins). Therefore, it can support a large number of sensors.
- It has superior processing power. The 4 B variant of Raspberry Pi comes with a 1.6 GHz processor.
- It can run all kinds of applications (including MS Office and Email).

**Steps:**

I chose to use a Raspberry Pi 4 due to how powerful it is, which can give the application a bit of a boost in speed when reading images.

I installed Raspbian on it by downloading the OS image and flashing it using Balena Etcher. Next, I connected to it via SSH and installed OpenCV.

The code works as follows:

- Set up the camera and QR code detector
- Read in a new frame and extract a QR code
- If there is a code, draw a box around it and display its data above
- If the exit key 'q' hasn't been pressed, go back to step 2.

The program also shows the updated frame with the overlaid graphics on each update.

**Pi Cam Vs Webcam**

This QR code scanner supports both Pi Cam and Web Cam.

The Pi camera board does not use a USB port and is directly interfaced to the Pi. So, it provides better performance than a webcam in terms of the frame rate and resolution. We can directly use the picamera module in Python to work on images and videos. However, the Pi camera cannot be used with any other computer.

**Objective**

To build a QR codes Scanner Using Raspberry Pi 4 which is capable of reading any type of QR codes.

**Hardware Requirements:**

Raspberry Pi 4 Model B, an SD card, Raspberry Pi camera Module, Power supply (Adapter)
QR code Scanner
A QR code scanner is an optical scanning device that’s able to read QR codes.

CONCLUSIONS
Structural scheme of detection and scanning bar codes in images for Raspberry Pi, and the algorithm of the program is the best option for proper system work, the optimal distance is 25 cm for identification and Recognition, speed depends on the resolution of the camera.

Future scope:
To reduce the codes on paper in examination papers. We are developing the system to introduce QR code system to Attendance system and examination papers.

REFERENCES