Design of Security System for Data Hiding using QR Codes

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Abstract: Now a days, the importance of QR image came into existence and for many of the secured information behind image was victimisation by the businesses and even by the govt. So, this Paper is to develop the embedded system which can rewrite the data that was there within the QR image. Here Raspberry pi (ARM11 SoC development board) acts as major platform for process and modules area unit interfaced thereto. Here, the hardware interface modules to Raspberry pi are camera, GSM, Keyboard, mouse and monitor. A raspberry pi icon are going to be generated by victimisation open CV compiler code and victimisation C++ programming which can be accustomed scan the QR image through net camera. Associate degree OTP are going to be send to mobile through GSM to the approved person for security purpose. When coming into OTP solely Raspberry Pi can rewrite the QR image and can show the info that was enter earlier. It'll be displayed within the text box beneath the video.

Keywords: Raspberry Pi, QR Image, Open CV Compiler, Web Camera, GSM, Keyboard, Mouse and Monitor.

I. INTRODUCTION

This paper is aimed toward evaluating the performance of associate degree software on associate degree embedded system. Before delving into its implementation, associate degree introduction is required to the components concerned within the paper. The complete report is centred round the field of embedded systems and therefore the use of Linux operating system to run applications on them. Thus associate degree introduction to Embedded Systems associate degreed victimisation Linux operating system as an OS in them is provided. A QR code could be a second barcode that may inscribe info like numbers, letters and binary codes [1]. QR code holds a significantly bigger volume of data than a 1D barcode. QR code contains info each in vertical and horizontal direction. Most storage capability of QR code is 4296 characters [2,3]. There area unit forty versions of QR codes and area unit utilized in a spread of applications, like post info to social networks, accessing websites, transfer personal card info, [3]. This skillfulness makes them a valuable technique in any trade that seeks to have interaction mobile users from written materials. a very important issue in QR codes is that the sq. shapes and restricted color tolerance. This challenge has generated nice interest for algorithms capable of activity info in QR codes and embedding QR codes into pictures while not loosing decryption lustiness [4].

There are many efforts to boost the looks of such embedding in QR codes [5] which might be classified in 2 classes, strategies that modify the luminosity or color of image pixels and strategies that replace QR modules. The luminosity intensity of the QR codes conferred in [6,7] relies on the strategy of finding the most effective cluster of QR modules to substitute by the image or info within the QR code. the data that is to be hide in QR codes, it's depends on the various versions of the QR code for that exact info or brand to be enter. The second class of Embedding algorithms relies on the modification of the pixel's luminosity. The approach in [7] chooses central pixels of every module of QR codes to switch its luminosity, since the four patterns area unit typically sampled by the decoder. The entering strategies planned during this paper is that the use of halftoning technique to distribute the changed pixels of QR code that is to be embedding into color image, in order that it mustn't be visible to eye on the colour image and to attenuate the quantity of changes within the luminosity of the colour image. The organization of this paper is as follows. SectionII reviews previous studies and related research papers especially embedding image into QR code for security systems. SectionIII describes our proposed-system architecture. SectionIV shows firmware implementation of this application. SectionV shows the results and the last conclusion was elaborated in SectionVI.

II. RELATED WORK

In this chapter, we'll discuss concerning the data found by study and analysis that's vital and have a crucial worth within the contribution of the entire paper. It additionally provides some basic information or theoretical base and is employed as a foundation to with success deliver the goods the most objectives. Most of the literatures are from the connected articles, journals, books and former works of identical fields.

These literatures then compiled and use as a steerage to the work of this paper.

A. Existing system

Till currently we have a tendency to implementing code recognition system through files. The file consists of code pictures. Through the file solely we have a tendency to retrieving and recognizing the pictures. However we have a tendency to don't seem to be generating the codes from cameras or keyboards. If we would like to get a code spirited, this methodology isn't supporting. This is often the most disadvantage gift in existing system as shown in Fig.1.
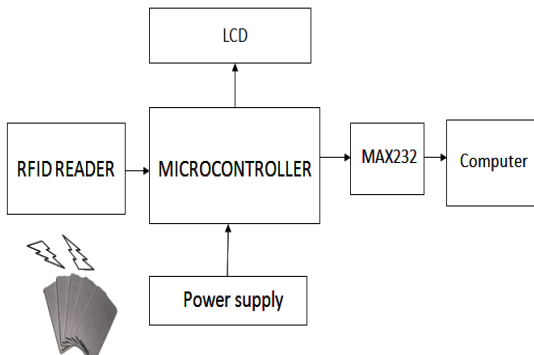

Fig.1. Existing method Block Diagram.

B. Similar Papers

1. A Survey on QR Codes: In Context of Research and Application: QR code is that the kind of matrix barcode, that was initial designed for the automotive trade by Denso Wave in Japan. The QR Code system has become loved outside the automotive trade attributable to its quick readability and larger storage capability compared to straightforward UPC barcodes. This paper realise of QR codes basics, its real time application in day to day life and analysis areas associated. With the technology of mobile phones perpetually rising, particularly within the space of mobile web access, QR codes appear to be AN adequate tool to quickly and with efficiency converse URLs to users. This additionally permits offline media like magazines, newspapers, business cards, transport vehicles, signs, t - shirts and the other medium which will embrace the print of a QR code to be used as carriers for advertisements for on-line product. QR code being therefore versatile due to its structural flexibility that it results in such a lot of various field for analysis like increasing knowledge capability, security applications like completely different forms of watermarking and steganography in addition.

2. Halftone QR Codes: QR code could be a fashionable kind of barcode pattern that's ubiquitously accustomed tag info to product or for linking advertisements. While, on one hand, it's essential to stay the patterns machine- readable; on the opposite hand, even little changes to the patterns will simply render them illegible. Hence, in absence of any procedure support, such QR codes seem as random collections of black/white modules, and are usually visually unpleasant. We have a tendency to propose AN approach to provide top quality visual QR codes, that we have a tendency to decision

halftone QR codes that are still machine-readable. First, we have a tendency to build a pattern readability operate whereby we have a tendency to learn a chance distribution of what modules will be replaced by that alternative modules.

III. SYSTEM ARCHITECTURE

In this System, we have a tendency to develop a brand new approach user interface based mostly algorithmic rule to scan the information embedded into the QR Code exploitation the open supply tools live USB camera can incessantly stream the video with the information recognition algorithmic rule running background, whenever to the system a QR Code is displayed before of the Camera, it'll decrypt the information of the QR image onto the screen. The diagram of the planning is as shown in Fig.2. It consists of Raspberry pi processor, USB camera. The temporary description of every unit is explained as follows.
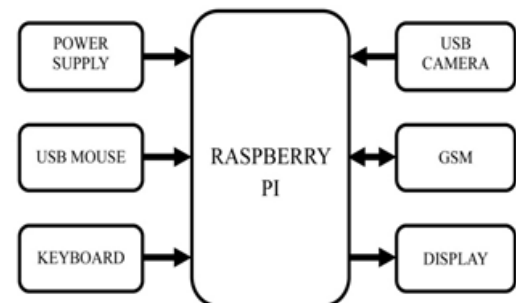

Fig.2. Block diagram of proposed system.

A. Working Procedure

The main aim of this paper is to decrypt the information embedded into the QR (Quick Response) pictures exploitation Raspberry Pi. Initial of all we've to make the QR pictures on-line when getting into the text that you would like to plant into the QR image. When you'll be able to transfer that image and take output of that image otherwise you directly show that image before of the camera interfaced to the Raspberry Pi. By exploitation open CV compiler software system and exploitation C++ programming, we have a tendency to generating an icon on the computer. If you open that icon it shows the video, that is captured by the camera at the side of a text box under that, If you show that QR image to the camera and Raspberry pi send the OTP to GSM mobile. OTP enter into the textbox then Raspberry Pi can decrypt the QR image and can show the information that was you plant earlier was written within the text box underneath the video.

B. Raspberry Pi

The Raspberry Pi could be a credit-card sized pc that plugs into your TV and a keyboard. It's a capable very little pc which might be utilized in physical science comes, and for several of the items that your desktop computer will, like spreadsheets, word-processing and games. It additionally plays high-definition video. The Raspberry Pi features a Broadcom BCM2836 system on a chip (SoC), which has an ARM1176JZF-S 700 MHz processor, VideoCore IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded (Model B & Model B+) to 512 MB. It doesn't

embody an intrinsic hard disc or solid-state drive, however it uses SD card for booting and protracted storage, with the Model B+ employing a MicroSD.

C. GSM Modem

Communication among vehicle, Owner, police and emergency is established consequently as per demand through GSM (Global Service for Mobile communication). A GSM electronic equipment could be a specialised sort of electronic equipment that accepts a SIM card, and operates over a subscription to a mobile operator, a bit like a mobile. From the mobile operator perspective, a GSM electronic equipment appearance a bit like a mobile. A GSM electronic equipment are often an obsessive electronic equipment device with a serial, USB or Bluetooth association or it should be a mobile that has GSM electronic equipment capabilities. A GSM electronic equipment might even be a regular GSM mobile the acceptable cable and software system driver to attach to a port or USB port on our pc.

D. Flowchart and Algorithm

Once the flowchart is drawn, it becomes easy to write the program in any high level language. Often we see how flowcharts are helpful in explaining the program to others. Now flow chart for "Design of Security system for data hiding Using QR codes" can be given below Fig.3.
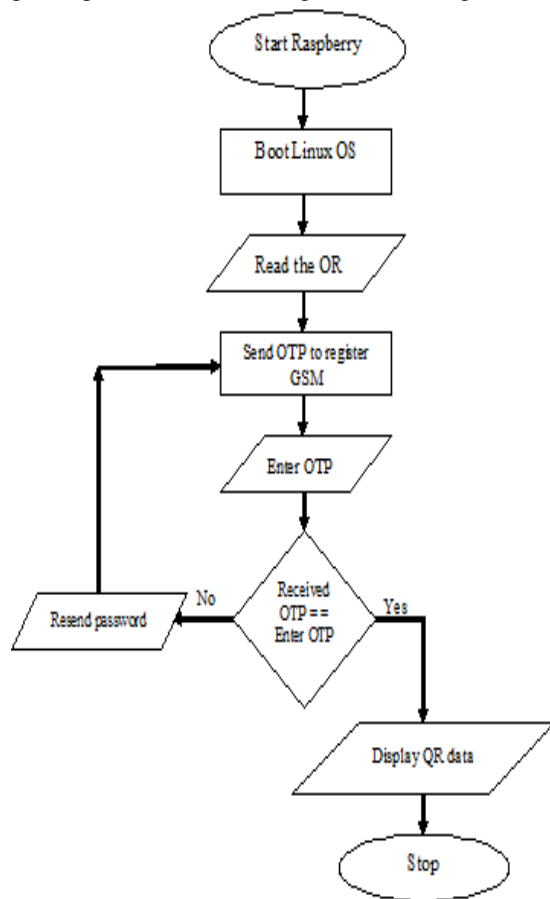

Fig.3. Flow Chart for Design of Security system for data hiding Using QR codes.

Algorithm:
Step1: connect the devices to Raspberry Pi kit
1. Power supply
2. Mouse
3. Keyboard
4. Camera
5. GSM
　　Start Raspberry Pi kit
Step2: Raspberry pi Loads the OS
Step3: Read the QR image through the camera whatever data embedded into QR
　　Image
Step4: send the OTP to register mobile GSM
Step5: Enter the OTP through keyboard on display
Step6: if enter the OTP is correct display the QR data otherwise resend the password to GSM mobile repeat the step 4&5
Step7: Stop the kit.

IV. FIRMWARE IMPLEMENTATION OF THE PROPOSED SYSTEM DESIGN

A. Python

Python is a high-level, interpreted, interactive and object-oriented scripting language. Python was designed to be highly readable which uses English keywords frequently where as other languages use punctuation and it has fewer syntactical constructions than other languages.

- **Python is interpreted:** This means that it is processed at runtime by the interpreter and you do not need to compile your program before executing it. This is similar to PERL and PHP.
- **Python is Interactive:** This means that you can actually sit at a Python prompt and interact with the interpreter directly to write your programs.
- **Python is Object-Oriented:** This means that Python supports Object-Oriented style or technique of programming that encapsulates code within objects.
- **Python is Beginner's Language:** Python is a great language for the beginner programmers and supports the development of a wide range of applications from simple text processing to WWW browsers to games.
- Python was developed by Guido van Possum in the late eighties and early nineties at the National Research Institute for Mathematics and Computer Science in the Netherlands. Python is derived from many other languages, including ABC, Modula-3, C, C++, Algol-68 and other scripting languages. Python is copyrighted. Like Perl, Python source code is now available under the GNU General Public License (GPL).

B. OPENCV

(Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision, originally developed by Intel research center in Nizhny Novgorod (Russia), later supported by Willow Garage and now maintained by Itseez. The library is cross-platform and free for use under the open-source BSD license. Python packages in Raspbian which are compatible with Python 2.x

will always have a python- prefix. So, the picamera package for Python 2.x is named python-picamera (as shown in the example above). Python 3 packages always have a python3- prefix. So, to install rpi.gpio for Python3 you would use: Sudo apt-get install python3-rpi.gpio uninstalling packages installed via APT can be accomplished as follows: sudo apt-get remove python3-rpi.gpio.

V. EXPERIMENTAL RESULTS

The implementation of realization of "Design of Security system for data hiding Using QR codes" is done successfully. The communication is properly done without any interference between different modules in the design. QR images optimized image embedding in QR codes using raspberry has five modules mainly Raspberry pi, Web camera, GSM, Keyboard, Mouse. Raspberry pi plays an important role in the paper as it is a platform. Paper Figs.4 to 9 are shown below.
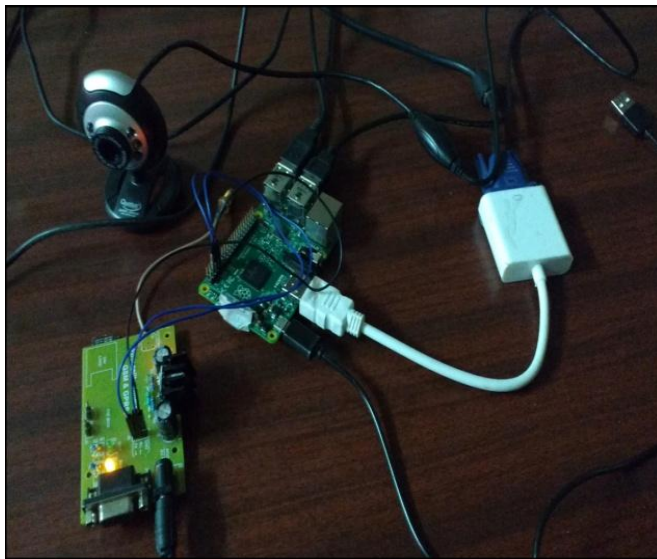

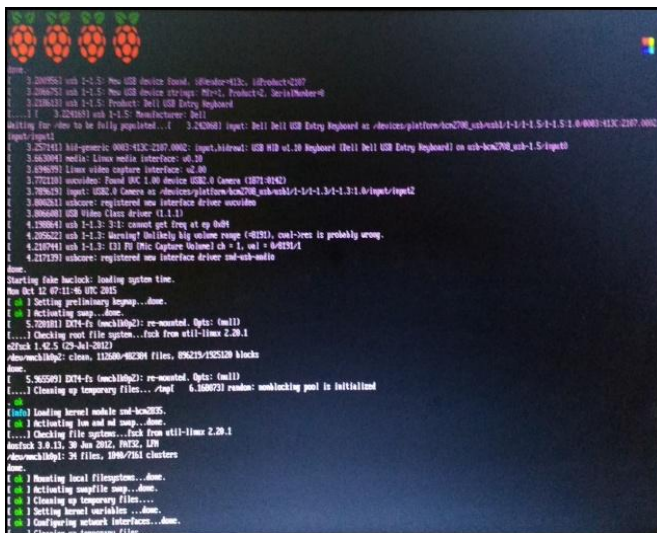**Fig.4. QR Images Optimized Image Embedding in QR Codes Kit.**

Fig.5. Power on the Raspberry pi then Opens like above Figure Then Enter the Username and Password.

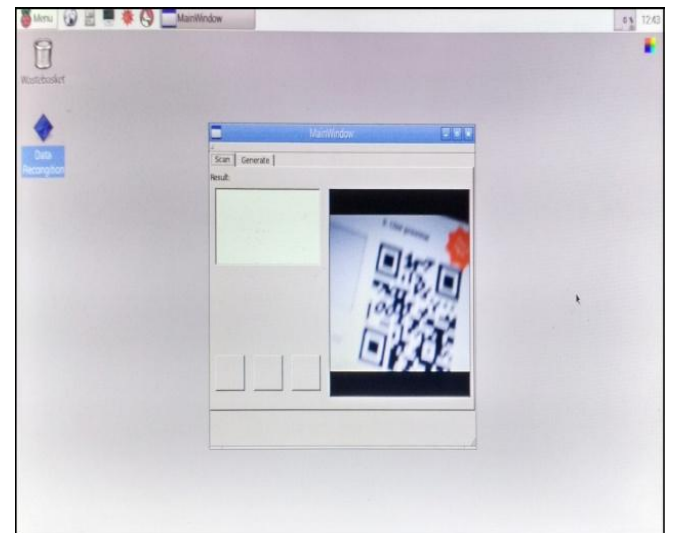**Fig.6. After that Raspberry pi image is displayed and icon is created at left side.**

Fig.7. Automatically Opens USB Camera Terminal and Reads QR Image Like Above Figure.
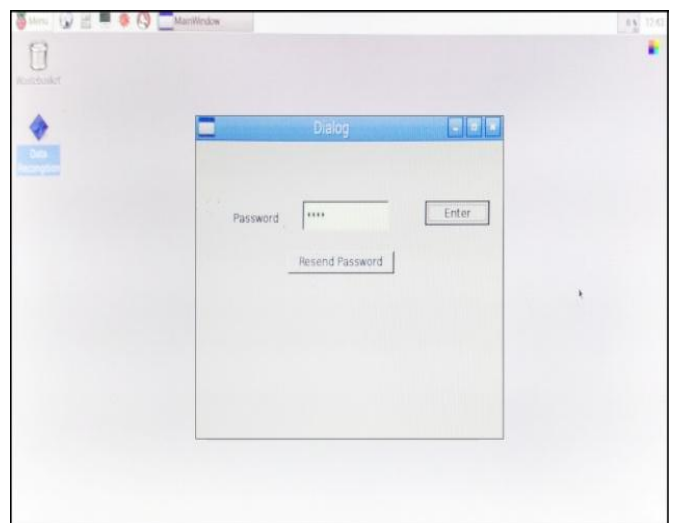

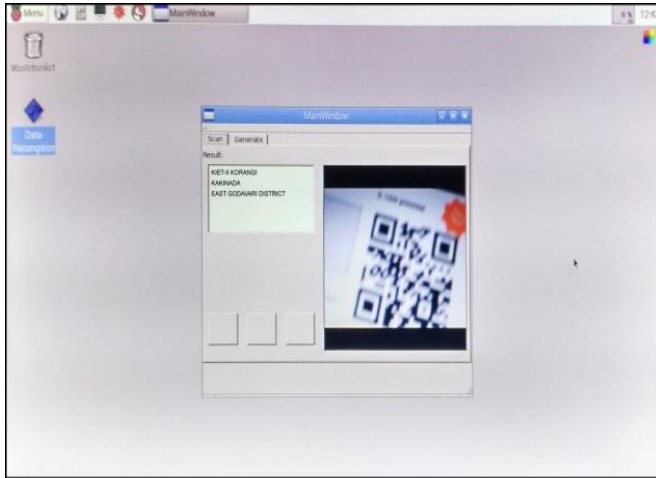**Fig.8. Enter the OTP in the terminal.**

Fig.9. Display the QR data after entering the OTP.

VI. CONCLUSION & FUTURE SCOPE

As we have gone through the literature and reviewed most of the recent developments in QR codes. Although, 1D barcode has been developed to a great extant and so, here hiding of information is not enough. This review paper mainly focuses on the research effort with an eye of enhancing security for the information in various levels by using QR code. To create the QR images online after entering the text, after it can download that image and take printout of that image which you want to embed into the QR image. Show that image in front of the camera interfaced to the Raspberry Pi then it send the OTP to GSM mobile. OTP enter into the terminal then Raspberry Pi will decode the QR image and will display the data which was you embed earlier was printed in the text box under the QR image. Overall QR Images Optimized Image Embedding in QR code through Raspberry pi is cost efficient easily deployable real time systems.

Future Scope: In this paper we can use security with the OTP to embedded the information into the QR image. Embedding metadata as QR codes in gray scale images, to colour video files is going to have an important role in next generation smart environment.

VII. REFERENCES

[1] Gonzalo J. Garateguy, Gonzalo R. Arce, Daniel L. Lau and Ofelia P. Villarreal, "QR Images: Optimized Image Embedding in QR Codes", IEEE Transactions on Image Processing, vol.23, pp.2842-2853, July 2014.

[2] G. J. Garateguy, G. R. Arce and D L. Lau, "Voronoi tessellated halftone masks", 17th IEEE International Conference on Image processing, pp.529-532, September 2010.

[3] Max E. Vizcarra Melgar, Alexandre Zaghetto, Bruno Macchiavello, Anderson C, A. Nascimento, "Colored Quick-Response Codes", 2nd International Conference on Consumer Electronics, vol.3, pp.321- 325, September 2012.

[4] Y. Lin, Y. Chang, and J. Wu, "Appearance-based QR Code Beautifier", IEEE Transactions on Multimedia, vol.15, pp.2198- 2207, December 2013.

[5] Mu Zhang, Dan Yao, Qian Zhou, "The Application and Design of QR Code in Scenic Spot's eTicketing System", International Journal of Science and Technology, vol.2, pp.817-821, December 2012.

[6] Phaisarn Sutheebanjard and Wichian Premchaiswadi , "QR-Code Generator ", 8th International Conference on ICT and Knowledge Engineering, vol.3, pp.89-92, November 2010.

[7] Munoz-Mejia's, Ivan González-Diaz and Fernando Diaz-de-Maria, "A Low-Complexity Pre-Processing System for Restoring Low- Quality QR Code Images", IEEE Transactions on Consumer Electronics, vol.57, pp.1320-1328, August 2011.

[8] Fu-Hau Hsu, Min-Hao Wu and Shiuh-Jeng Wang, "Dualwatermarking by QR-code Applications in Image Processing", 9th International Conference on Ubiquitous Intelligence and Computing, pp.638-643, September 2012.

[9] Kartini Mohamed, Fatimah Sidi, Marzanah, A. Jabar, IskandarIshak , "A Novel Watermarking Technique in Data Transmission between QR Codes and Database", IEEE Conference on Open Systems (ICOS), vol.3, pp.95-99, December 2013.

[10] H. Yang, A. Kot, and X. Jiang, "Binarization of low-quality barcode images captured by mobile phones using local window of adaptive location and size", IEEE Transactions on Image Processing, pp.1-8, September 2010.

[11] RouA-Lin, Feng Yuan and Geng Ying, "QR code image detection using run-length coding", 18th International Conference on Computer Science and Network Technology, vol.4, pp.2130-2134, November 2011.

[12] Y. Shantikumar Singh, B. Pushpa Devi and Kh. Manglem Singh, "Different Techniques on Digital Image Watermarking Scheme", International Journal of Engineering Research, vol.2,pp.193-199, July 2013.

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