Raspberry PI - Camera Based Digitzed Art Through Gesture Recognition

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Abstract:- The world has rapidly progressed towards digitization. Pictures, Text, Data are instantly available on screen as soon as we process them. Art be it of any kind earlier required a surface to form it. The proposed system defines the modern way of drawing art without the support of any surface. Through the mathematical principles being the input for gesture identification, the camera provided captures and tracks the movements of the hand. As the moment of the hand in the air is captured by the camera it displays the art in the monitor as an instant output. A small gesture done by the hand manifests the craft in four colors provided. It can be cleared, recreated and stored for later purposes.

Keywords:- Gesture Recognition, Digital Art, Digital Painting.

I. INTRODUCTION

Digitization is pivotal in today's world. It speeds up so many processes which had a slow intake in the past. From automobiles to entertainment, from transactions to transportation everything is virtualized. Digital world is the future of all the Industries connected to it. Earlier purchases had to be made on cash which now has been replaced by a new technology of online pay. Automobiles were only for driving anyhow now they are a packed version of various applications both for the comfort and safety of the driver.

This sums up one point which is common is that the growth in productivity, creativity, inventions and profit margins. Digitization is simply converting analog format into digital format in the context of data, information, images, voices etc.

It has replaced outdated electronic instruments with rapid functioning and tangible equipment's which has contributed in all the fields majorly the medical industry. It created software industry to evolve and bring out a competitive ecosystem, thereby ameliorating the quality and facilitate better technological services.

Art is an underrated skill in the technologized era. It is more of considered to be passion to pursue rather than hobby to pass time. The creativity to excel this is available on surface or on paper but the new proposed system extracts the best stream to cultivate more flair through digital play. Drawing Art through gesture recognition is a challenge to procure. It requires practice and technique to perform it. Any gesture done by hand can't be taken in the form of art, but a gesture made exactly to stretch out a figure or a fact can be visualized as an art. It is of prime to the people who expect real time output especially to the teachers to enhance their way of teaching making it look more specific and theoretic to the students. As tracking the moment of the hand is considered one of the major aspects, it contributes to the information from the brain to quickly sketch with hands. The digital display of the art drawn is quick to access, store and redraw.

Digital art is created using various unique tools than the traditional tools used before such as watercolor, oils and impasto. The latest form of art is done by single digital tools by means of a computer, a digitizing tablet and software. Digital Photography, Photo painting, Digital Collage, Digital Painting, Vector Drawing, Algorithmic/Fractals, Integrated Digital Art etc. are different types of digital art. The art is more technologized here because students use computers, cameras and other electronic gadgets to create art. They work in platforms like digital photography, electronic sound and music, graphic design, animation, and other digital or interactive media. This has lead an impact on digital technology and has transformed many arts such as painting, sculptures and drawing to new art forms like virtual reality, net art and digital installation art.

The gestures captured by the camera in take it in art form. It is the process of commanding the computer by gestures without touching the screen or any other peripheral device. The way the hand moves in front of the camera, the exact replica is manifested in the monitor. As an example the gesture of alphabet A or any numerical 1, 2 or 3 and of any symbol the art gets digitized. This is the basic form of gesture based art. Since the 1970s, this process is augmenting, being debated with names and techniques as this art is termed as new media art. This system is mainly concerned with the disciplines of photography and painting. The artist's emotion, vision, message and creativity can be expressed with form, color, composition and rhythm.
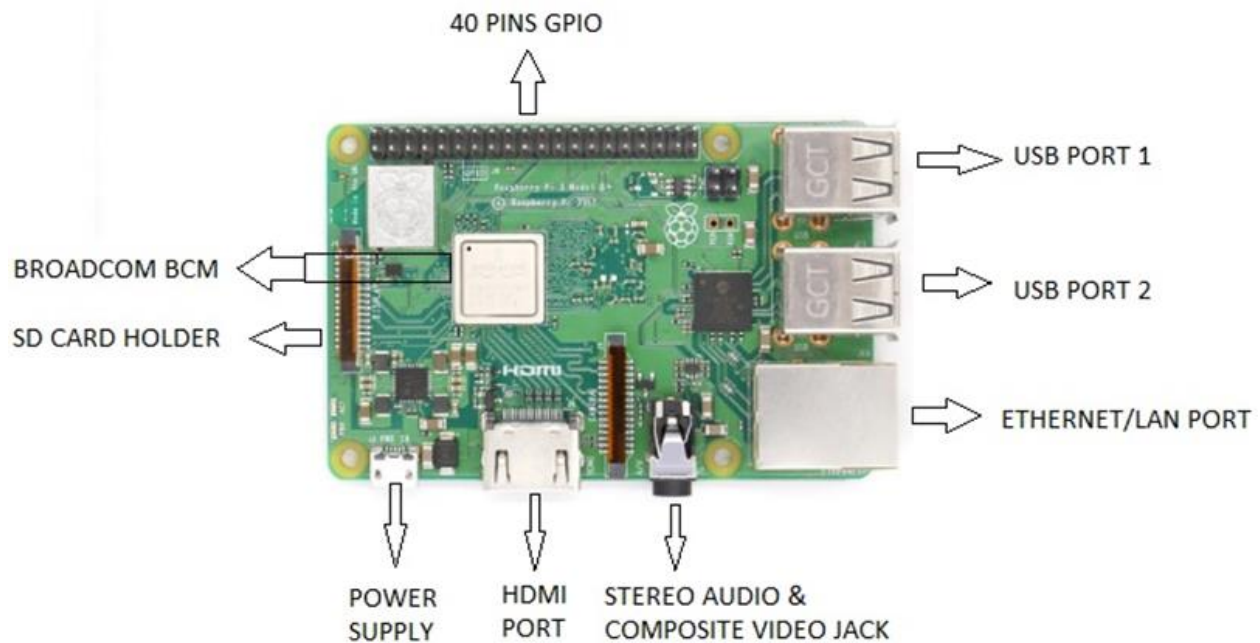
Fig 1:- Raspberry PI

II. PROPOSED WORK

A. Raspberry PI

Raspberry pi devices are known for their low cost handling, power management and computational operations which involves both software and hardware developments. They are small, compatible and have grown with extended versions to meet the latest technologies. These devices have in built operating system which multiplies the potential of solving problems and does multitasking augmenting the functionality.

Raspberry pi Model 3 B is the version deployed to the current system because of its network computing, RAM, Peripherals and extendable drives and memory. The latest version has inbuilt Wi-Fi and Bluetooth for crystalline connectivity. The performances compared to the previous versions with 1 GB RAM and quad-core of 64-bit ARM Cortex A53 clocked at 1.2 GHz outshines it. As raspberry pi is the heart of the system it can be installed to the protective enclosure without using any tools. The advantages of having Pi Noir camera module is a high quality sensor custom designed featuring a fixed focus lens of 3280 x 2464 High Definition pixel static images. Raspberry pi is given the power supply by connected the USB to PC or the monitor.

B. Open CV

Raspberry Pi is incorporated with Open CV which combines the best qualities of Open CV C++ API and Python language. This feature helps us to write computationally intensive codes in C/C++ and create a Python wrapper for it so that we can use these wrappers as Python modules. Open CV-Python is an appropriate tool for fast prototyping of computer vision problems. It introduces a new set of tutorials which will guide through various functions available in Open CV-Python.

C. Python

Python supports multiple programming paradigms, including object-oriented imperative and functional programming or procedural styles. It features a dynamic type system and automatic memory management and has a large and comprehensive standard library. The language provides constructs intended to enable clear programs on both a small and large scale. Python interpreters are available for installation on many operating systems, allowing Python code execution on a wide variety of systems. The code and internet protocol address are dumped in the pi. Booting Raspberry pi for the first time after being installed, authentication is required. For login with the following credentials are required: Username: **pi**; password: **raspberry**. The authentication is necessary for the unique IP address of Raspberry Pi and the access of the software is limited to the user. The Pi's SD card stores all the various Pi files, directories and the art drawn.

D. Linux

Linux is a free open source operating system and it belongs to the UNIX operating systems. Actually Linux means the kernel itself which is the heart of the operating system and handles the communication between the user and hardware. Normally Linux is used to refer to the whole Linux distribution. Linux distribution is a collection of software based on the Linux Kernel. It consists of the GNU-project's components and applications. Because Linux is an open source project, anyone can modify and distribute it. Since the system already consists of an operating system it cannot be connected to a PC until network computing software is installed in it. Monitor connected to the raspberry pi acts as the output for the system.

E. QHMPL Camera

Fig 2

QHMPL camera is used for capturing the gestures done by hand. It has interpolated 25 mega pixels and is also served for night vision. It is accurate to the current system because of the background changeable of live motion picture and has better exposure to give better picture even in dark. It is of USB 2.0 version and is connected to raspberry pi's USB port 2. While the program is made run through the code, camera window named "Tracking window" gets opened. The camera shows us the art we draw in the air without the support of any surface. There are four colors provided blue, green, red and yellow and a block of "clear all" to clear the art and to start with a fresh content. When the gesture of the finger or the hand is moved to the colors the art gets constructed in that one color, respected to change with another color. Paint Window displays the same art drawn on the tracking window with a plain background. The program runs on loop until the art is continuously drawn with new figures and abstracts. On pressing the 'q' alphabet it stops the program and closes the window.

III.   LITERATURE REVIEW

➢ Digital painting has been approved by various artists due to its recompenses in excess of conventional media (Chu and Tai, 2002)
➢ With the World Wide Web, it is currently probable for any person to increase admittance to digitized art pieces through the Internet. It is as well becoming potential to analyze art works at a bigger scale (Li, 2004).
➢ Digital painting is a system for generating an art digitally in addition to a technique. At the same time, as a method of creating traditional painting we use acrylic paint, oil colors, ink and various colors on canvas of natural fiber cloth, paper, polyester etc. Digital painting refers to up-and-coming art form where conventional painting methods were used by the help of computer device. (Aleksander, 2012).

IV.   WORK FLOW
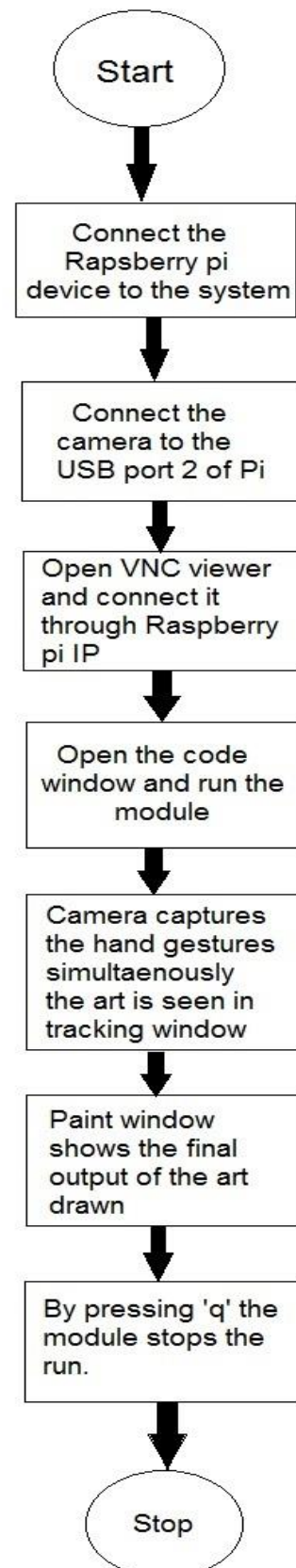
V. RESULTS

To manifest the result on computer, VNC viewer (Virtual Computing Network) software is installed to get connected to the raspberry pi device. The authentication is done in the computer with the credentials and the folder of the files gets open.
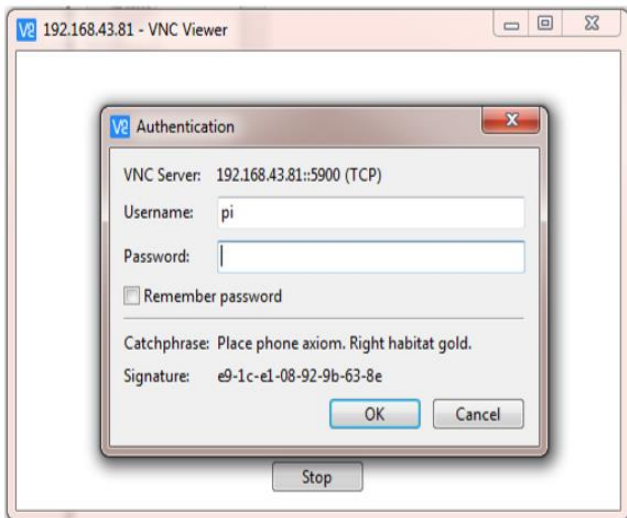

Fig 3

The code window gets opened, where the entire code is written for the running of the program. Go to Run and click on Run Module on which the program starts running and new windows get opened
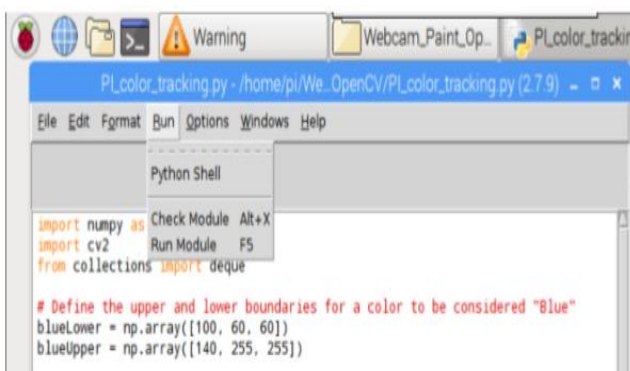

Fig 4

The program is set to run, the Paint window and the tracking window gets opened. Tracking window is the display of the camera where the art is drawn and paint window is the exact replica of the art drawn on a plain background as the output.
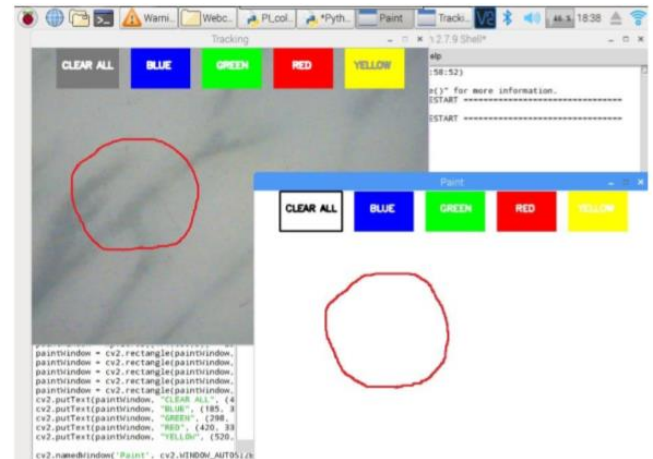

Fig 5

A blue tip is used to draw the art (specifically color blue because it could help the camera to capture the gesture in night vision) which could be a finger painted with blue color or a cap of a blue pen. The camera identifies the blue color and takes in the moment of the finger, identifies it and pens the art. A single moment taken by the finger visualizes the art on the screen. As the art is drawn in air the camera captures it and displays it on the screen simultaneously.

VI. CONCLUSION

The major application of this concept is to construct art on digital platform for better craft and skill ship. To provide an effective way for teachers to elucidate various methodologies by drawing in air, without the support of any surface. Drawing art and digitizing it with real time output.

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