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Digital Smart Pen

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Abstract: The purpose of education and learning is often defeated when gadgets developed to assist in the process of learning is not user friendly or ends up becoming a distraction in the classroom due to its size. This work intends to describe a gadget known as smart pen which is a new and evolving technology that does not create distraction due to its portability, that is user friendly and above all its affordable nature. Just like any other pen, it is a writing device developed by the livescribe company. It is a digital and intelligent pen that is fast gaining recognition in synchronizing written notes.

I Introduction

Smart pen is a more specific term; it has the same basic characteristics, but also has other features like voice recording or a text scanner. Digital pens typically contain internal electronics and have features such as touch sensitivity, input buttons, memory for storing handwriting data and transmission capabilities. A digital pen is an input device which captures the handwriting or brush strokes of a user and converts handwritten analog information created using "pen and paper" into digital data, enabling the data to be utilized in various applications. This type of pen is usually used in conjunction with a digital notebook, although the data can also be used for different applications or simply as a graphic. we talk about an increasingly common writing technology called Smart pen. Being one of the latest and useful gadgets on the market today, this practical tool's only purpose is to make our life easier. It is small and compact, it is helpful in more than one way and it can be used by just about anyone.

The Live scribe Echo Digital Smart pen is a very ingenious pen that notonly can write but records too. This pen not only writes like any other pen but it also hears and keeps the information we know that is important and do not want to forget. Recording is done by simply tapping the record button in the notebook to start and tapping again to stop. Through the standard cable it is possible to connect the pen to the computer, which passes all the recordings and also turns possible the search to find both verbal and written notes "Digital pens also called smart pens are made of internal electronics with touch sensitivity, input buttons, transmission capabilities, and also memory for storing handwriting data. With such features, it's able to convert handwritten data into digital data . "Digital pens are usually connected to the computer or pads via Bluetooth or USB cables, they offer more functions compared to a stylus. The sensors fit in the digital pens to detect motion and then translate the motion into graphics, art or writing. Mostly used by graphic designers to make drawings and sketches on their computers while for some students they take notes using digital pens." "Digital pens have features like touch sensitivity, memory, input buttons and electronic erasing capability. A digital pen can be used to write on digital paper, and once done, the user can save what has been written. The pen usually vibrates or beeps as a sign of confirmation that the user has finished a page and the work has been saved. Most digital pens save handwritten work as images in the commonly used GIF or JPEG format. Some, however, use a proprietary format. There are various types of digital pens available on the market like the trackball pen (with a sensor attached to detect the motion of the trackball), camera pen (with camera attached), positional pen (to detect the position of the tip) and active pen. All of these have some special features to differentiate them." "Live scribe's Smart pens are also audio recorders so that students can capture the lectures with their notes. By pointing the Smart pen to their writing or drawings on the digital paper, they can play back the lecture they were listening to when they made those entries. " "An electronic ballpoint pen that digitizes, stores and transfers what is written or drawn to the computer. Instead of a mouse, a digital pen

provides a very natural way to hand write and hand draw into the computer. In addition, since it stores everything internally, the data transfer to the computer via wireless or USB can be done at a later time. Digital pens may also include audio recording "

II Literature Survey

People started to use goose feather for writing, then passing through the pen cartridge and reaching the simple ball pen, the way people wrote had passed through a major evolution. It is now possible to have a pen with more features than the simple writing. The company called Live scribe , which was founded by Jim Marggraff, had developed a tool that can be used by any person. For that, it was based on the model of a normal pen, making then a new redesign and adding some electronic features. By this way, it was created a multifunction writing tool called Smart Pen. This innovative pen is considered the most significant evolution that has happened to the regular pen since the advent of the computer.

It contains a small OLED display which shows the user the information about what had been written and what had been stored or collected from an application. This idea came up when Jim Marggraf was still working at the Leapfrog company and after he had developed the Fly Pen, which was technically impressive and with computerized devices. However, this new pen was not commercially attractive, resulting in its failure due to the need of a special paper (Fly Paper) so the pen could read what was being written.

Reading is important in today's life. Printed text is everywhere in the form of receipts, bank documents, reports, books. There are many systems done text to speech conversion, but they can't handle product labeling. But big limitation is use of this is difficult for blind people. This paper proposed camera based text reading to help blind peoples to read the product label. Main prototype of this system is 1) Novel based algorithm to solve aiming problem. 2) Novel algorithm ofautomatic text localization to remove the background of the text image. 3) Camera based framework used for binned people to read text.

S. Neha Vimala, M. Veda Chary and K. Ravi Kiran Having an effective video surveillance system is not only beneficial but also adds a sense of surety and comfort to the user 1 .There maybe no better reassurance than having a visual proof. Video monitoring and surveillance have now become much affordable to an average user, With widespread technologies providing great usability . Modern day technology offers devices which are easy to install and convenient to handle. Hence, managing and monitoring the behavior in spaces like homes, supermarkets, factories, hospitals, hotels, banks, and schools etc. has become much easier for the user, also providing far-flung accessibility. Earlier, video surveillance came with bulky set up which was only confined to larger spaces, and conventional set up involved CCTV cameras. Efficient use of the technology and resources can reduce all this hassle. The main aim of the proposed design is to offer easy surveillance of an area, to a distant user via live video streaming on the VLC media player over LAN/WLAN 3. Raspberry Pialong with a night-vision camera module is used in designimplementation . The code for programming the Raspberry Pi and initiating the live. broadcast to the VLC media player is written using Python programming language. Further, Virtual Network Computing is employed to establish remote connections between Raspberry Pi set up and the host device, for remote accessibility over a Local-Area Network .

Aditi Shrikant Jadhav 1 , Prof. Sudarshan R. Diwate Embedded Real-time video monitoring system is designed, in which the embedded chip and the programming techniques are used. The central monitor which adopts Raspberry pi is the core of the whole system. Real time video transmission is widely used in surveillance, conferencing, media broadcasting and applications that include remote assistance. Network video capture system using Raspberry pi is presented.

Dr. G. G Sivasankari Nowadays, closed circuit television for security and peace purpose for people. The traditional system has the several disadvantages such as inconvenient to carry, anomalies cannot be detected, storage space needed is more, and cost remains high. This paper provide the design and implementation of the technology called

Live video streaming using Raspberry Pi in IOT devices, with a single board computer which computes the Motion Detection Algorithm written in python as programming environment. The system uses the algorithm to significantly decrease the storage space and to save the cost. The algorithm is implemented on the Raspberry Pi, which provide the live streaming with motion detection. The live steaming can be viewed from any web browser or even from mobile in the real time.

III Proposed system

It has been employed for video broadcasting. Pi No IR camera V2 module is night vision camera module custom designed add-on for Raspberry Pi8. It is connected to the Raspberry Pi's camera port through a CSI bus which is the Camera Serial Interface; its designated use is to interface the cameras. Key features include: Night vision. (does not employ an infrared filter), Fixed-focus lens for high-quality imaging, 8-megapixel native resolution sensor capable of 3280 x 2464 pixel static images, and Supports 1080p30, 720p60 and 640x480p90 video. The Pi camera is connected to the Raspberry Pi 3 board and powered up. It is then enabled on Raspberry Pi GUI. Once this is done, the Pi camera delivers high-quality imaging when commanded. And being a night vision camera, it is also perfect for low light photography.

Raspberry Pi is a series of small single-board computers (SBCs) developed in the United Kingdom by the Raspberry Pi Foundation in association with Broadcom. The Raspberry Pi project originally leaned towards the promotion of teaching basic computer science in schools and in developing countries. The original model became more popular than anticipated selling outside its target market for uses such as robotics. Itis widely used in many areas, such as for weather monitoring, because of its low cost, modularity, and open design. It is typically used by computer and electronic hobbyists, due to its adoption of HDMI and USB devices.

Raspberry Pi 4 Model B was released in June 2019 with a 1.5 GHz 64-bit quad core ARM Cortex-A72 processor, on-board 802.11ac Wi-Fi, Bluetooth 5, full gigabit Ethernet (throughput not limited), two USB 2.0 ports, two USB 3.0 ports, 2-8 GB of RAM, and dual-monitor support via a pair of micro HDMI (HDMI Type D) ports for up to 4K resolution. The version with 1 GB RAM has been abandoned and the prices of the 2 GB version have been reduced. The 8 GB version has a revised circuit board. The Pi 4 is also powered via a USB-C port, enabling additional power to be provided to downstream peripherals, when used with an appropriate PSU. But the Pi can only be operated with 5 volts and not 9 or 12 volts like other mini computers of this class. The initial Raspberry Pi 4 board has a design flaw where third-party e-marked USB cables, such as those used on Apple MacBooks, incorrectly identify it and refuse to provide power. Tom's Hardware tested 14different cables and found that 11 of them turned on and powered the Pi without issue. The design flaw was fixed in revision 1.2 of the board, released in late 2019. In mid-2021, Pi 4 B models appeared with the improved Broadcom BCM2711C0. The manufacturer is now using this chip for the Pi 4 B and Pi 400. However, the tack frequency of the Pi 4 B was not increased in the factory.

It can contain the following components: it is the controlling peripherals.

- Power supply – It is an electrical device that cans supplies the electrical power.5v supply isused in that.
- Ethernet – It is used to access the e-dictionary website.
- camera –This is used for capture the image
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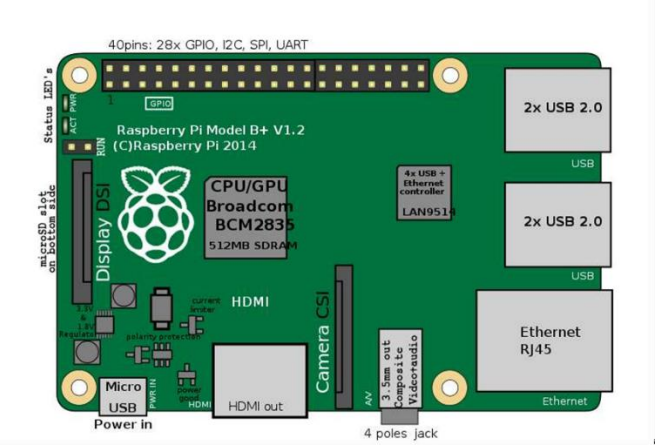


Fig.1 Raspberry Pi Circuit

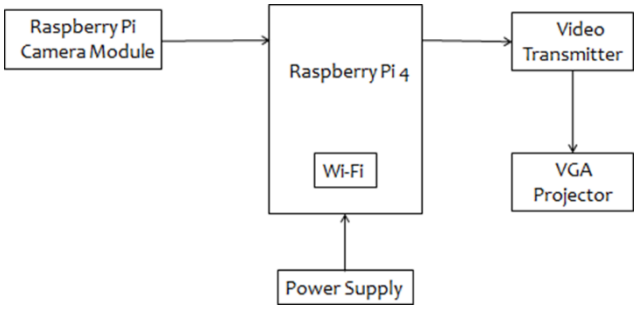


Fig.2 Block Diagram

- Raspberry pi –This project has been built around Raspberry pi B+ processor board.
- Speaker –It is used to listen the text on the image.

The Motion Detection algorithm works on principle of the frame differencing, Comparing that change of pixels' value from one frame to another and also for object change in image. The Problem with this detection algorithm is it neither detect the slow moving object, because of sensitivity in the threshold, if it is too low and it detect like shadow and the image change in thesunlight. This algorithm is not able to handle rotating object.

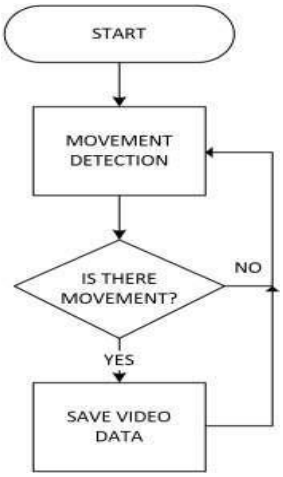
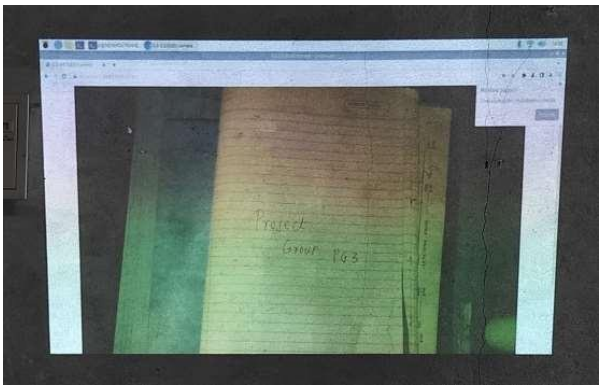


Fig.3 Flow chart

IV Experimental results

The proposed design uses Raspberry Pi 3 board and Raspberry Pi NoIR camera V2 module as primary components in system execution. Raspberry Pi uses Raspbian operating system and is programmed in Python, which is a powerful yet

easy-to-use programming language that allows connecting the system to the realworld. Execution process begins with initially booting up the Raspberry Pi. A 16GB micro SD card is given a proper format using SD Formatter and setup with latest Raspbian OS. To do so, the Raspbian OS is



downloaded from Raspberry Pi's official website in Zip file format. The downloaded files are then extracted to the micro SD card, after which it is inserted into the SD card slot on the Raspberry Pi. The Raspberry Pi is now plugged into a monitor via HDMI adaptor cable; input connections like

keyboard and mouse are properly established and powered up using a2.5A micro.

USB power supply or an equivalent battery pack. Once the Raspbian operating system is installed, the initial boot completes. The Raspberry Pi is then connected to the internet over LAN/WLAN and Pi's IP address is fetched; camera interface, as wellas VNC server, is

Fig.4 Initiating the live stream

enabled. In order to establish the remote connections over VNC server, the user needs to sign up for the service by providing working email address and a secure password for authentication. Now that the VNC server is setup. VNC viewer is downloaded on the host device for accessing the Raspberry Pi's desktop remotely. The VNC server creates a virtual desktop onto the VNC viewer which only exists in Raspberry Pi's memory.

Fig.5 Connections and Setup for Initial Boot.

The below presents the screenshots of the system. Here the control panel with control option to save the file which is used for capture of picture some change in video resolution. When some movement occur it analyses the incoming image and store important items, and here we can view the JPEG images and video will be played smoothly even we can watch on mobile with good reliable performance. While remotely can view in the 640x360 MJPEG image, the Raspberry Pi reports 67%CPU without overlocking.

Fig.6 Projector Setup

V Conclusion

An approach for the video surveillance monitoring system with the Motion Detection algorithm to decrease the cost as well as the storage using a raspberry pi as single board computer was propose in paper. But it is far from the final version and need to improve a lot. In Future we can improve with the threshold value which can be used in the Motion Detection Algorithm. The performance can be enhanced to certain condition .If we have the some good threshold value and algorithm can detect the object whichare moving and include slow or tiny object. Through this paper, the design and implementation of a simple yet powerful live video surveillance system are illustrated. Ease-of-access to modern-day gadgets increased user's dexterity with technology. Prioritizing the need for easily programmable, cost-effective piece of technology; this design employs Raspberry Pias the primary module for the job. Python programming language makes it viable for connecting this system to the real world. On the whole, this system reduces the intricacies of setting up a standard real-time

monitoring system over an online network.

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