Augmented Reality Based Virtual Cursor and Keyboard

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Abstract – The technology improvement in last few years is an unbelievable growth. We can easily see the tech in our day to day life which few decades before considered as impossible. Wireless tech is the latest fashion in the new age tech world. We are in a condition that we have to move along with the development and have to be updated to survive in this planet. We can see the tech improvement which are beyond our imagination through Virtual reality (VR) and Augmented reality (AR) which plays with our imagination and bring it virtually. In this paper we explained about the virtual keyboard which can be accessed by the motion of the fingers using camera which uses AR.

Index Terms – Augmented reality, Virtual keyboard, Hand gestures.

1. INTRODUCTION

One of the most important challenges is related to image interpretation and user fingertip tracking. In this context, we review the existing methods for hand segmentation, fingertip detection and contact surface detection. We consider a case study of virtual keyboard for user interface and smart environment. In this study, we propose a fingertip tracking system. We accordingly propose a hand segmentation approach. Experimental validation on real acquisitions is presented to illustrate the feasibility of the proposed system. There are different reasons for which people need an artificial intelligence to use a keyboard for typing. The number of people, who need to use the keyboard with the help of some article means, because of an illness. Moreover implementing a controlling system in it enables them to use the keyboard without the help of another person is very helpful. The idea of gesture controls is of great use to the future of natural input and more importantly the handicapped and disabled.

2. LITERATURE SURVEY

2.1 Object Tracking by Color and Active Contour [1]

This work presents a novel approach for an object recognition and tracking system, here known as SRCCA by using color recognition in the HSV color space and active contour models (ACM). The main innovations proposed makes use of the association of distinct techniques employed for object tracking and detection, as well as the elaboration of an open source software through the use of Python programming language and OpenCV functions. To enhance the tracking efficiency for targets in motion, the video capturing device was controlled by two servomotors, enabling the target to be followed, in case it moves in the x- or y-axis. The final system was tested and presented robust and efficient tracking and contour segmentation capabilities for targets in motion, regardless of shape and size.

2.2 Operation control training by minimal utilization of adhesive force with super twisting algorithm's and its application [2]

The friction between wheel and track is usually called adhesion force, and it is the critical factor for the movement of trains. On one hand, excessive driving force of a train may lead to insufficient utilization of the adhesion effect and cause wasted energy; on the other hand, insufficient driving force of a train brings inefficient train operation. To balance the issues of energy consumption, operational efficiency, and security, it is necessary to control a train to obtain its maximal adhesion force, particularly in the cases of fast acceleration and emergency braking. However, since engineering experiments indicate a complex nonlinear relationship between the adhesion force and the slip ratio of a train, such a control problem is difficult and challenging, particularly when the optimal slip ratio is unknown. Facing this problem, this paper proposes a novel control method based on the modification of the famous super-twisting sliding mode algorithm, and rigorous mathematical analysis is given to guarantee the ultimate roundedness of the proposed algorithm. Furthermore, by considering four different control scenarios, detailed control and estimation algorithms are both proposed. Simulation result verifies that the proposed control strategy can control the train to obtain its maximum adhesion force.

2.3 Enhancing Physical Education with Exergames and Wearable Technology [3]

Increases in the numbers of obese and overweight children are a major issue in post-industrial societies because obesity can lead to severe health-related problems. In addition, many challenges affect the quantity and quality of physical education (PE) provided by schools. Exergames that combine exercise with gaming have been recognized as a possible method for motivating children to become physically active and to make PE more fun. The exergames allowed players' movements to

be tracked to estimate the efficiency which utilize wearable sensors. The running Othello 2 exergame was developed which compete in a board game enhanced with physical and pedagogical missions where players wear a smartphone and a smart wrist band. In physical missions, the game uses inertial sensors and a heart rate meter to detect the physical activities of players. South Korean PE curriculum has the pedagogical part of the game. RO2 with South Korean third grade elementary school students are evaluated and some of the, learned curriculum topics by playing the game. The remaining students who studied the pedagogical content using handouts are comprised a control group. The results indicated that learning with RO2 was more efficient, the players were engaged, and their heart rates increased. Based on the evaluation, we identified several issues to be addressed in future research. Finally, RO2 supports the educational affordances of wearables and exergames uses wearables can overcome some of the challenges faced by PE.

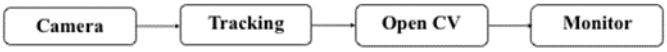

Figure 1 Architecture of the module

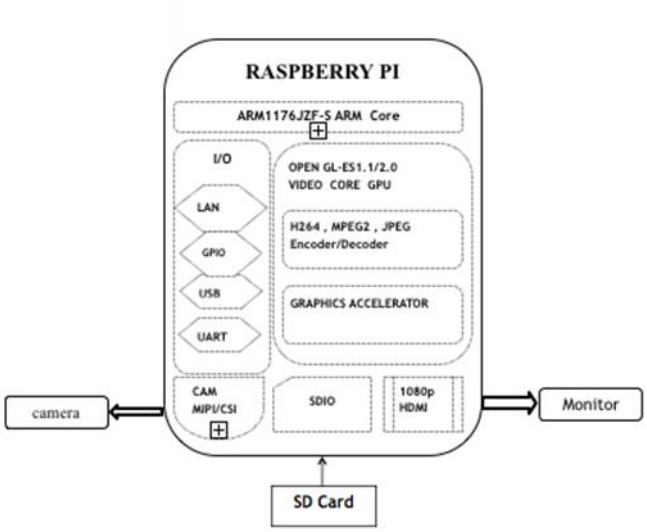

Figure 2 Architecture of Raspberry Pi

2.4 Dynamic Object Manipulation Considering Contact Condition of Robot With Tool [4]

This study considered the dynamic object manipulation by a spatula fixed to a robot. An analysis on the principles of dynamic movement revealed that the main issue is to satisfy conditions expressed in terms of gravitational, frictional, and inertial forces. This paper clarifies the conditions for achieving dynamic movements and presents a unified algorithm for generating a variety of movements from planning trajectories that satisfy such conditions. The conditions of the dynamic movements are given in the acceleration dimension. The trajectory planned by the proposed method was given to a robot as command values, and a spatula was mounted to a robot arm with 6 degrees of freedom. The experimental results demonstrated that the proposed method based on such principles enables multiple dynamic movements in a unified manner.

3. PROPOSED SYSTEM

The virtual keyboard will works using the hand gestures which can be controlled to perform functions like scroll, left click, right click etc. This module is an adaptation of sixth sense technology. The user can make their fingers as a medium using a finger tip colored marker and the color of the marker will be detected my the camera to capture the hand gestures. The camera which captures the gestures to type is based on at the image processing technique. The camera will capture the hand movement frame by frame in the form of images with the help of Open CV. One of the most important challenges is related to image interpretation and user fingertip tracking. In this context, we review the existing methods for hand segmentation, fingertip detection and contact surface detection. We consider a case study of virtual keyboard for user interface and smart environment. In this study, we propose a fingertip tracking system. We accordingly propose a hand segmentation approach. Experimental validation on real acquisitions is presented to illustrate the feasibility of the proposed system. The system consists of Raspberry pi, camera and monitor. The camera is used to capture and recognizes an object in view and tracks the user's hand gestures using computer- vision based techniques. It sends the data to the Raspberry pi. The camera, in a sense, acts as a digital eye, seeing what the user sees. It also tracks the movements of the thumbs and index fingers of both of the user's hands. When the user touch upon the keyboard ,the axis coordination's are found ,in this coordination's are compared with already taken template coordination and to find which key is user pressed by using Raspbian language and open CV library. The user has to sits in front of the display screen of private computer or pc, a specialize video camera established above the screen to study the consumer's hand gestures. The laptop constantly analyses the video photo of the attention and determines wherein the consumer is calling at the display screen. not anything is attached to the consumer's head or body. To "pick out" any key, the user seems at the key for a exact period of time and to "press" any key. On this device, calibration procedure is not required. For this system outside hardware is not required.

3.1 Modules and Output:

The proposed system mainly consists of a Laptop, Web Camera and Anaconda Navigator with built in support of Python 2.7.5. The python code mainly consists of five necessary packages

namely; numpy, argparse, imutils, cv2, and OS. The arg parse parses the arguments. Imutils is used to activate the web camera. X and Y axis are calculated. Cv2 is used to load the python console. Arguments are parsed in the argument parser package. The lower and upper boundaries of the HSV color space should be defined. If the argument fails, the cv2 video capture fails utterly. Else, the argument is sent on a loop process. First objects are tracked using the object tracking module. It will track the specified colored objects.

3.1.1 Object Tracking:

Object tracking is tracking of the given colored object, which is used as the cursor. This will track the color of the object. Locating a given object in successive frames is defined as object tracking. The Computer's vision and machine language is used to track the color sets of the Pixel Intensity, Red, Blue and Yellow. The object tacking is done by specifying the modules in the python code. The code is run using the Anaconda Navigator App. The default color value is set to yellow. The colors can be set to any value like Red blue and green and according to color parsing and color matching. So, evidently any yellow object or any colored object can be used as cursor. A coloured object is tracked using Object Tracking. Detecting the object in concurrent frames of a video is known as Tracking. Tracking in terms of computer vision and machine learning aspect does have a conceptual similarity but, different technical ideas.

3.1.2 Color Defining:

The colour is defined in this process for capturing the image. This is done by defining the limits of your pixel values. Colour defining will calculate the intensity of Red, Blue and Yellow colours in the process. For detecting colours in the image, the first thing is to define the upper and lower limits in your pixel values. Once after defining the upper and lower limits, you have to make a call to the cv2 in range method which will returns a mask, specifying which pixel fall in to your specified upper and lower range. After getting the input of the mask, you have to apply the same to your image using the cv2 bitwise and make it function for defining the colour. This is done using Anaconda Navigator Application, which acts as a python programming tool for defining the colour of the object for using the given tool as cursor.

3.1.3 Erosion and Contour:

Erosion will eliminate the grains and noise, while capturing the defined element. Erosion Control algorithms are used to eliminate the grains and noise. But the pixel values is minimum rather than maximum in dilation. The image is replaced into hi process under the anchor point with that given minimum pixel value. With this given input, the camera area of dark regions grow in size and the bright region reduces. Like the dark regions get eliminated and the bright region captured. Contour will enhance the accuracy of the defined element for better process. A simple curve joining all continuous points is known as contours which having the same color and intensity. They are used to analyze the shape and to detect the object to be recognized In the process. Binary images are used for better images. First you have to apply these holds or edge detection algorithm before finding the contour for a better vision. Erosion controlling algorithm helps to eliminate the grains and noise. Contour algorithm is used to enhance the accuracy. But the pixel value computed here is minimum rather than maximum. With both the algorithms the process is done with minimum values. So, eventually a camera with better megapixel and 1080p web camera can improve the efficiency of the above mentioned two algorithm.

3.1.4 Video Capture:

Video capture will capture the object each frame in order . To capture a video, video capture object should be created. It's argument can be either the device index or the name of a video file. Device index is just the number to specify which camera. Normally one camera will be connected. In this process only 10 frames are used based in the Available sources. When a better camera is used, we can make this with more frames for accuracy to capture the object precisely. But a camera with better specifications can capture the video at 60 FPS or 120 FPS. The latency and accuracy of the camera would be greatly improved, provided those algorithms and abetter camera with better megapixel and less aperture. Capturing video frame by frame is known as video capturing. Video capture object should be created to capture a video. The arguments could either be a name of the video file or the device index.

3.1.5 Frame Loading:

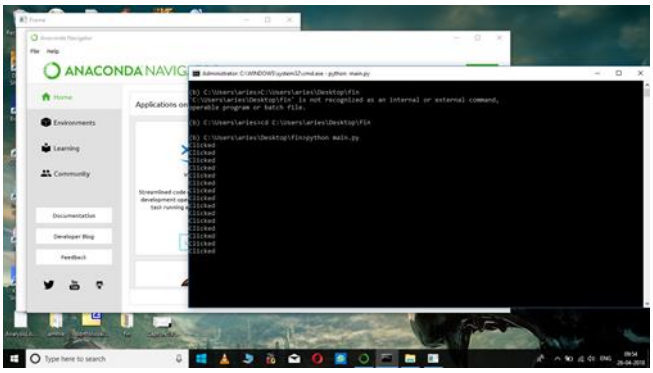

Fig 3. Execution from Anaconda navigator

Frame loading is the proceed which helps the images to be captured using the camera by the input of the given frames in order and in specific sequence. The captured frames are loaded as the input to the navigator which in turn detect all frames for the execution of the process. This can be improvised with a better processor with a dedicated chipset which can perform these tasks much better. Frame loading helps the camera to capture images, each image is a frame. The captured frames are

arranged as an input to the navigator, the execution of the process is done by detecting every frame.

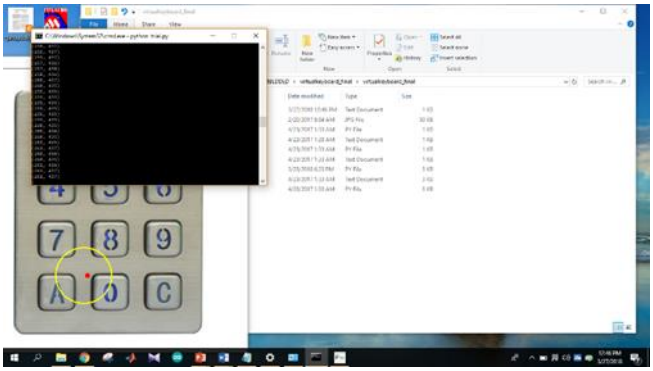

Fig.4. Movement of cursor using hand gesture

4. CONCLUSION

The issue of leveraging click-through data to reduce the intent gap of image search is discussed in this paper. The novel image search re-ranking approach are proposed and named spectral clustering re-ranking with click-based similarity and typicality. The fully adopted re-ranking scheme will guide the image. The novel image similarity measurement named click based multi feature similarity learning will integrates multiple kernel learning into metric learning. The proposed system can be improved with better hardware which will considerably improve the efficiency and will increase betterment in the system. This system can be very helpful to the people with disabilities. The experiment conducted in this paper will explain the superiority of the several re-ranking approaches.

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