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Turn touch- Revolutionary control of the screen

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ABSTRACT

Screen Turn Touch is a software implementation of the touchscreen. It uses two cameras to visually track a feature on a material and use the movement of the tracked feature to directly control the mouse pointer on a computer. The material could be an LED light or the tip of the stylus or even the human hand. In this project, two cameras are used to monitor the movement of the tracked feature and accordingly calculate the relative positioning of the feature with respect to the screen of the device to be operated upon. Both the cameras will then diffuse the image and integrate it to form a single image and successfully calculate the coordinates. These coordinates are then used to move the mouse pointer to the specific location, as calculated by the system. Turn touch is based on a principle of Digital Image processing and involves many steps of image retrieval and processing such as image acquisition, color conversion, and thresholding, morphological processing, object identification, coordinate mapping. These steps facilitate the conversion of the tracked feature into coordinates. In this project, Java CV and Open CV libraries have been used. These libraries contain various classes that can be used for the processing and manipulation of the images. Using Java CV we can directly use Open CV libraries in JAVA that was originally meant to be used in C/ C++.

Keywords: Camera mouse, Face as a mouse, Software, hardware

1. INTRODUCTION

The goal of this project was to transform the normal LCD screen into a touchscreen. The help of two web cameras shall be taken to film the LCD and to detect the motion. The motion will then be transformed feasibly into adequate action like left mouse button click or a double click.

The application runs by mapping Webcam coordinates with LCD coordinates. Means that when Webcam detects the motion, it understand that coordinates inside the Image are grabbed. Those coordinates are then transformed into LCD coordinates by using a set of pre-calculated coordinates of the dots which are displayed during the initialization phase. Motion is detected by using red color detection on normalized "RGB" color space.

The application uses two web cameras to focus on the LCD screen and then detect any red color that is present in the region of LCD coordinates. This red color is present in the material. The red color is used in the demonstration but other than red any vibrant color can be used to operate the Touchscreen, provided it is visible enough to be easily captured and differentiated by the camera.



Digital image processing is the method of using computer algorithms to do image processing on digital images. Digital image processing has many tremendous advantages over analog image processing. It allows a much wider range of algorithms which can be applied to the input data and problems such as the build-up of noise and signal distortion can be avoided during processing. As, since images have been defined over 2 dimensions (perhaps more) digital image processing can be modeled in the form of multi-dimensional systems. Digital image processing allows the user for use of much more complex algorithms and thus can be offered with a more sophisticated performance at simple tasks, and it is clear that implementation is almost impossible in analog tasks.

2. PROBLEM STATEMENT

Touch screens for computers is a new term and are not readily available. I, myself under the guidance of respected faculties are intending to develop computer vision systems that may work under normal lighting which can detect the coordinates of the object pointing on the screen with the help of two webcams placed at some specific particular locations by the help of mouse to explore further on that specific location.

With the help of webcams, this system will take continuous screenshots and will calculate the respective coordinates accordingly. These coordinates would be further used to move the mouse pointer on the screen and to perform click operations at various locations on the screen. This system should be capable to integrate to any size of the computer screen without much change and difficulty. Also, the position of the webcam can be changed as per user's sought easiness and comfort.

3. RELATED WORK

3.1 The Camera Mouse

The "Camera Mouse" system has been developed to avail the computer access easiness to the people who have been retarded with severe disabilities. This system tracks the computer user's movements with Webcam's video camera and translates them into the movements of the mouse pointer on the screen. Body features such as the tip of the user's nose/finger can be tracked. The visual tracking algorithm is based on cropping an online template of the tracked feature from the current image frame and by testing where this template correlates in the subsequent frame. The location of the highest correlation is interpreted with the new location of the feature in the subsequent frame. Various body features are then examined for tracking robustness of system and user convenience and friendliness. A group of 20 people without disabilities had tested the Camera Mouse operation and they quickly learned its use to spell out messages or play games. Twelve people had been running with severe cerebral palsy or traumatic brain injury had also tried the system, out of the nine have shown a success. They also interacted with the environment by spelling out messages and then exploring the Internet.

3.2 Face as a mouse through visual face tracking

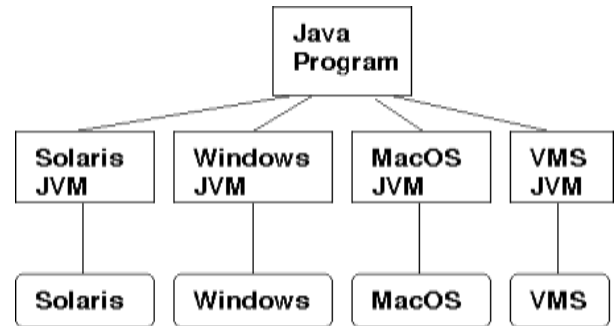
The aforesaid system introduces a novel camera mouse driven by 3 Dimension model based visual face tracking technique. In this case, the camera became standard configuration for personal computer and also computer speed becomes faster and much faster, thus achieving Human-machine interaction (HMI) through visual face tracking. It had become a feasible solution to hand-free control. The human facial movement can also be putrefied into rigid movement, e.g. rotation and translational motions, and non-rigid movement, such as the Opening and closing of the mouth, eyes, and facial expressions, etc. We now introduce our visual face tracking system that can optimally, robustly and accurately retrieve these motion parameters from the video in real-time. After calibration of the system, the retrieved head orientation and translation can then be employed to navigate the mouse cursor, and also the detection of mouth movement can be utilized to trigger mouse events. Three mouse control modes are then investigated and compared. Various experiments in Windows XP environment also verifies the convenience of navigation and Operations using our face mouse. This technique may also be an alternative input device for people with hand and speech disability and for futuristic vision based games and interface.

3.3 Software Description:

3.3.1 JAVA

Java is formed in 1991 by James Gosling, "Patrick Naughton, Chris Warth, Ed Frank, and Mike Sheridan" at Sun Microsystems. James Gosling develops the first working version of java in 18 months. This birth name of JAVA is "oak" but was renamed in 1995 into "JAVA". We implement

oak in the last of 1992 and publically java is announced in the spring of 1995, many other people contributed to the design and the evolution of language.



3.3.2 JAVA CV

Due to the designing of java CV is so that most Open CV functions can be used in Java CV in the exact same way as they would in C/C++ code. However, there are many functions that are treated differently, like when a pointer to a structure needs to be passed to Open CV.

3.3.3 OPEN CV

Open Source Computer Vision is the full form of open CV. It is the main storage of programming functions which is mainly used for real-time computer vision, developed by Intel Russia research center in Nizhny Novgorod, and this time supported by Willow Garage and Itseez. It is free for use under the open source BSD license. The library is cross-platform. It focuses mainly on real-time image processing. Proprietary optimized routines to accelerate itself if the open CV's system finds Intel's Integrated Performance Primitives.

4. IMPLEMENTATION

Implementation is the stage of a project when theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the developer, confidence that the new system will work and be effective.

The implementation stage involves careful planning, investigation of the existing system and its constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

Implementation is the process of converting a new system design into operation. It is the phase that focuses on user training, site preparation and file conversion for installing a candidate system. The important factor that should be considered here is that the conversion should not disrupt the functioning of the organization.

5. SYSTEM TESTING

The Purpose of testing is to discover errors. It is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, assemblies, subassemblies, and a finished product. It is the process of exercising software with the intent of ensuring that the Software system meets its user expectations & requirements and it does not fail in an unacceptable Manner. There is a different kind of test. Every test addresses a specific testing requirement.

6. CONCLUSION

The main working of this project was to transform the normal LCD screen into a touchscreen. This process is done with the

help of two webcams which filmed the LCD and detected the motion.

The application works by mapping Web Cam coordinates into LCD coordinates. The meaning is that its coordinates inside the image it has taken when Web Cam detects motion it knows. Those coordinates are then transformed into LCD coordinates by using a set of pre-calculated coordinates of the dots which are displayed during the initial phase. Motion is detected by using red color detection on normalized RGB color space.

Such a system was successfully developed and tested for various modules and different angles of projection. The web cameras were placed at various distances from the screen and at various sizes of screen and were found to be properly working. Thus this system can be easily integrated for commercial purposes with a better quality of the camera.

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