ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Television Control Using Hand Gestures

S.Roja
M.Tech Student,
S.V College of Engineering (SVCE),
Tirupati, Andhra Pradesh, India.

B.Chandrakala, M.Tech
Assistant Professor,
S.V College of Engineering (SVCE),
Tirupati, Andhra Pradesh, India.

Abstract:

Embedded System based gesture recognition control system which provides 100% touch-free interaction with the device. Intuitive gestures like virtual mouse tracker provides the most complete touch-free interaction system available in the market. Use simple hand gestures such as left, right, wave and select, to perform quick actions such change a channel, control volume. In this project, the hardware system consists of ARM 32 bit microcontroller and OpenCV library which helps for image/video processing by using various features and classification algorithms. It overcomes the performance in terms of sensors and hardware cost which is also too high. Now the camera will capture hand gestures and perform user's stated actions. This system takes capture image by means of web camera connected to ARM microcontroller through USB and the image is processed by using OpenCV library. According to the User's hand Gestures the TV Operations should be performed.

Index Terms: Gesture Recognition, TV Control, ARM Architecture, Camera, OpenCV.

I.INTRODUCTION:

As gesture recognition technology has improved, gesture recognition systems have been gradually applied to electronic appliances in the daily lives. TV is a representative consumer device to which gesture recognition techniques are being dynamically applied. 3D motion sensors, which have gradually been applied to TVs, are useful for recognizing various complex motions for natural human-to-TV interfaces. So far, however, the following obstacles still need to be solved. 1) It is difficult to achieve competitive price and performance for high-end sensor units compared to low-end remote controls. 2) Dedicated hardware or motion recognition is absent. Resource allocation is required to process sensor signals.

Assuming that 20% of resources for hand gestures can be allocated for TV interfaces, 30% for face recognition, and 10% for voice recognition, then only 40% of all resources are available to process the remaining TV tasks. This reduces the quality of system performance. Although extra computing resources can be added, the price must rise. 3) Lastly, the user interface provides low usability. Although such interfaces can provide momentary entertainment and interest, users are often unwilling to always adopt this unfamiliar method.
3D motion sensors, which have gradually been applied to TVs, are useful for recognizing various complex motions for natural human-to-TV interfaces. So far, however, the following obstacles still need to be solved. 1) It is difficult to achieve competitive price and performance for high-end sensor units compared to low-end remote controls. 2) Dedicated hardware or motion recognition is absent. Resource allocation is required to process sensor signals. Assuming that 20% of resources for hand gestures can be allocated for TV interfaces, 30% for face recognition, and 10% for voice recognition, then only 40% of all resources are available to process the remaining TV tasks.

This reduces the quality of system performance. Although extra computing resources can be added, the price must rise. 3) Lastly, the user interface provides low usability. Although such interfaces can provide momentary entertainment and interest, users are often unwilling to always adopt this unfamiliar method. Gesture recognition is a topic in computer science and language technology with the goal of interpreting human gestures via mathematical algorithms. Gestures can originate from any bodily motion or state but commonly originate from the face or hand. Current focuses in the field include emotion recognition from the face and hand gesture recognition. Many approaches have been made using cameras and computer vision algorithms to interpret sign language. However, the identification and recognition of posture, gait, proxemics, and human behaviors is also the subject of gesture recognition techniques.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Gesture recognition can be seen as a way for computers to begin to understand human body language, thus building a richer bridge between machines and humans than primitive text user interfaces or even GUIs (graphical user interfaces), which still limit the majority of input to keyboard and mouse. Gesture recognition enables humans to communicate with the machine (HMI) and interact naturally without any mechanical devices. Using the concept of gesture recognition, it is possible to point a finger at the computer screen so that the cursor will move accordingly. This could potentially make conventional input devices such as mouse, keyboards and even touch-screens redundant. Gesture recognition can be conducted with techniques from computer vision and image processing.

II.IMAGE PROCESSING:

In imaging science, image processing is any form of signal processing for which the input is an image, such as a photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it. Image processing usually refers to digital image processing, but optical and analog image processing also are possible.

This article is about general techniques that apply to all of them. The acquisition of images (producing the input image in the first place) is referred to as imaging. Closely related to image processing are computer graphics and computer vision. In computer graphics, images are manually made from physical models of objects, environments, and lighting, instead of being acquired (via imaging devices such as cameras) from natural scenes, as in most animated movies.

Computer vision, on the other hand, is often considered high-level image processing out of which a machine/computer/software intends to decipher the physical contents of an image or a sequence of images (e.g., videos or 3D full-body magnetic resonance scans).In modern sciences and technologies, images also gain much broader scopes due to the ever growing importance of scientific visualization (of often large-scale complex scientific/experimental data). Examples include microarray data in genetic research, or real-time multi-asset portfolio trading in finance.

III.SYSTEM DESIGN:

In this system, user hand gestures are recognized by capturing the motion path when the user draws different symbols in the air. These gestures are used to interact with the TV. It is implemented using a single-camera dedicated hardware system. The camera can detect hand gestures.

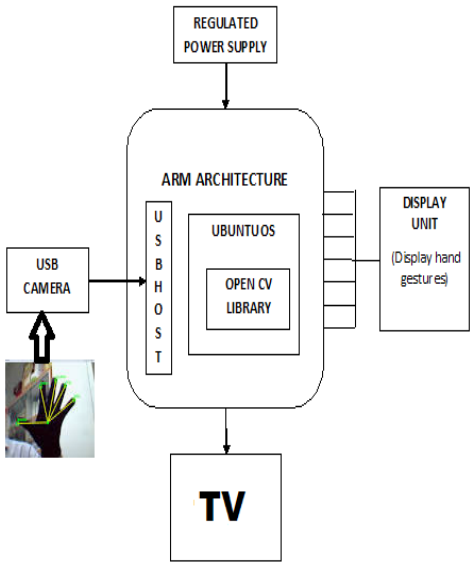


Fig. 1: Block Diagram for Proposed System

This system captures the gestures from web-cam which is connected to micro controller through USB host and the image is processed by means of image processing technique. Here we are using Open CV library to detect a frontal hand as an image using its Haar Cascade hand Detector, this will increase the human computer interaction. If any gesture is recognized by the camera, a rectangular box will appear on monitor. The identified gestures are sends to Raspberry PI board and we can perform TV related functions. In this way we are implementing single camera dedicated television control system using gesture drawing.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

IV.HARDWARE IMPLEMENTATION:

A.Raspberry Pi board:

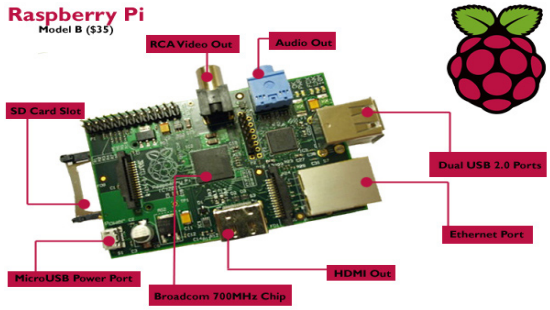


Fig.2: Raspberry Pi Development Board

The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded (Model B & Model B+) to 512 MB. It does not include a built-in hard disk or solid-state drive, but it uses an SD card for booting and persistent storage, with the Model B+ using a MicroSD. Model B is the higher-spec variant of the Raspberry Pi, with 512 MB of RAM, two USB ports and a 100mb Ethernet port. It's our most popular model: you can use it to learn about computing; to power real-world projects (like home breweries, arcade machines, musical root vegetables, robot tanks and much more); as a web server; a bitcoin miner; or you can just use it to play Minecraft.

B.UVC Driver Camera:

Fig.3: UVC Driver Camera

A UVC (or Universal Video Class) driver is a USB-category driver. A driver enables a device, such as your webcam, to communicate with your computer's operating system. And USB (or Universal Serial Bus) is a common type of connection that allows for high-speed data transfer. Most current operating systems support UVC. Although UVC is a relatively new format, it is quickly becoming common.

V.SOFTWARE IMPLEMENTATION:

A.Linux Operating System:

Linux or GNU/Linux is a free and open source software operating system for computers. The operating system is a collection of the basic instructions that tell the electronic parts of the computer what to do and how to work. Free and open source software (FOSS) means that everyone has the freedom to use it, see how it works, and changes it. There is a lot of software for Linux, and since Linux is free software it means that none of the software will put any license restrictions on users. This is one of the reasons why many people like to use Linux.

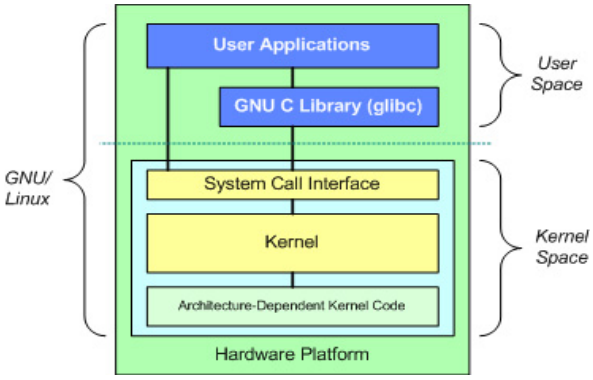


Fig.4: Architecture of Linux Operating System

A Linux-based system is a modular Unix-like operating system. It derives much of its basic design from principles established in UNIX during the 1970s and 1980s. Such a system uses a monolithic kernel, the Linux kernel, which handles process control, networking, and peripheral and file system access. Device drivers are either integrated directly with the kernel or added as modules loaded while the system is running.

B.Qt for Embedded Linux:

Qt is a cross-platform application framework that is widely used for developing application software with a graphical user interface (GUI) (in which cases Qt is classified as a widget toolkit), and also used for developing non-GUI programs such as command-line tools and consoles for servers. Qt uses standard C++ but makes extensive use of a special code generator (called the Meta Object Compiler, or moc) together with several macros to enrich the language. Qt can also be used in several other programming languages via language bindings. It runs on the major desktop platforms and

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

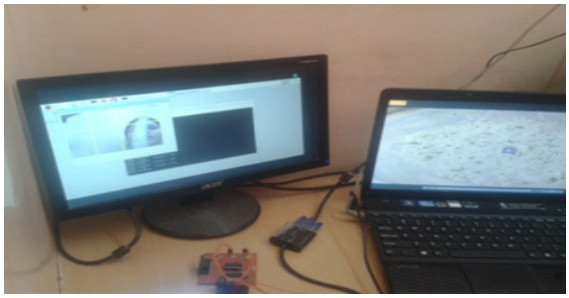
some of the mobile platforms. Non-GUI features include SQL database access, XML parsing, thread management, network support, and a unified cross-platform application programming interface for file handling.

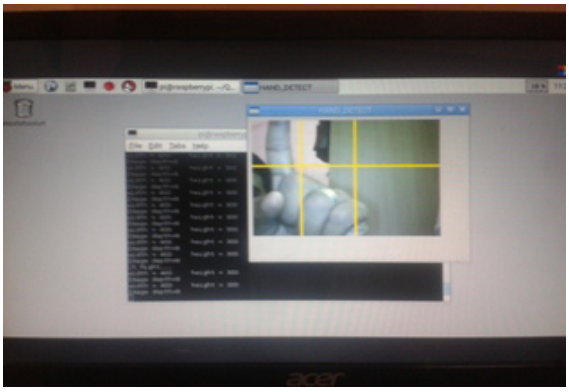
C.OpenCV Library:

Computer vision is a rapidly growing field, partly as a result of both cheaper and more capable cameras, partly because of affordable processing power, and partly because vision algorithms are starting to mature. OpenCV itself has played a role in the growth of computer vision by enabling thousands of people to do more productive work in vision.

With its focus on real-time vision, OpenCV helps students and professionals efficiently implement projects and jump-start research by providing them with a computer vision and machine learning infrastructure that was previously available only in a few mature research labs.

VI.RESULT:





VII.CONCLUSION:

The project "Automatic user state recognition for hand gesture based low-cost television control system" has demonstrated how to get a fully functional embedded product developed from scratch. This included the cross compilation and deployment of essential libraries, the configuration of embedded Linux and cloud computing technology for the development of specialized TV controlling using gesture recognition.

VI. REFERENCES:

[1] I. S. Mackenzie and W. Buxton, "Extending fitts' law to two-dimensional tasks, "in Proceedings of CHI'92, pp.219-226, May 1992.

[2] S. K. Kim, G. H. Park, S. H. Yim, S. M. Choi, and S. J. Choi, "Gesture recognizing hand-held interface with vibrotactile feedback for 3D interaction," IEEE Trans. Consumer Electronics, vol. 55, no. 3, pp. 1169-1177, Aug. 2009.

[3] H. Heo, E. C. Lee, K. R. Park, C. J. Kim, and M. C. Whang, "A realistic game system using multi-modal user interfaces," IEEE Trans. Consumer Electronics, vol. 56, no. 3, pp. 1364-1372, Aug. 2010.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

[4] D. W. Lee, J. M. Lim, S. W. John, I. Y. Cho, and C. H. Lee, "Actual remote control: a universal remote control using hand motions on a virtual menu," IEEE Trans. Consumer Electronics, vol. 55, no. 3, pp. 1439-1446, Aug. 2009.

[5] R. Aoki, M. Ihara, A. Maeda, M. Kobayashi, and S. Kagami, "Expanding kinds of gestures for hierarchical menu selection by unicursal gesture interface," IEEE Trans. Consumer Electronics, vol. 57, no. 2, pp. 731-737, May 2011.

[6] Y. M. Han, "A low-cost visual motion data glove as an input device to interpret human hand gestures," IEEE Trans. Consumer Electronics, vol. 56, no. 2, pp. 501-509, May 2010.

[7] L. C. Miranda, H. H. Hornung, M. C. .Baranauskas, "Adjustable interactive rings for iDTV," IEEE Trans. on Consumer Electronics, Vol. 56, No. 3, pp. 1988-1996, August 2010.

[8] J.-S. Park, G.-J. Jang, J.-H. Kim, S.-H. Kim, "Acoustic interference cancellation for a voice-driven interface in smart TVs," IEEE Trans. on Consumer Electronics, Vol. 59, No. 1, pp. 244-249, February 2013.

[9] I. Papp, Z. Saric, N. Teslic, "Hands-free voice communication with TV," IEEE Trans. on Consumer Electronics, Vol. 57, No. 1, pp. 606-614, February 2011.

[10] W. T. Freeman and C. D. Weissman, "Television control by hand gestures," in Proceeding of IEEE International Workshop on Automatic Face and Gesture Recognition, Zurich, Switzerland, pp. 179-183, June 1995.

[11] S. Jeong, J. Jin, T. Song, K. Kwon, and J. W. Jeon, "Single-Camera Dedicated Television Control System using Gesture Drawing," IEEE Trans. on Consumer Electronics, Vol. 58, No. 4, pp. 1129-1137, November 2012.