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| Sn. No | Paper Title | Authors Name | Description | Outcome of paper | Publication Year |
| 1. | A Novel Detection and Recognition Method for Continuous Hand Gesture Using FMCW Radar | YONG WANG , AIHU REN, MU ZHOU , WEN WANG, AND XIAOBO YANG | A novel method for continuous hand gesture detection and recognition based on a frequency modulated continuous wave (FMCW) radar is proposed in this article. In beginning, we use the 2-Dimensional Fast Fourier Transform (2D-FFT) to estimate the range and Doppler parameters of the raw hand gesture data, as well as to create the range-time map (RTM) and Doppler-time map (DTM) (DTM). | A method for detecting and recognizing continuous hand gestures was proposed in this paper. To begin, we gathered raw radar data to generate an IF signal, which we then utilized to calculate the RTM, DTM, and ATM of hand motions. Then, using the amplitude of the normalized hand gesture spectrogram along with a threshold, we suggested an amplitude-based detection approach. | 2020 |
| 2. | Hand Gesture Recognition Based on Active Ultrasonic Sensing of Smartphone: A Survey | ZHENGJIE WANG , YUSHAN HOU , KANGKANG JIANG , WENWEN DOU , CHENGMING ZHANG , ZEHUA HUANG , AND YINJING GUO | With the rapid growth of the Internet of Things, hand gesture recognition has gotten a lot of interest in the field of ubiquitous computing since it allows humans to communicate with computers in a natural and straightforward way. Due to its numerous advantages, hand gesture detection utilizing ultrasonic signals from a smartphone has become a prominent study area among these diverse implementations. | The goal of this study is to provide a detailed overview of current hand gesture applications employing an active sonar detecting system and a smartphone.  The focus of this research is on the critical properties of the ultrasonic sensing system's framework, as well as the related applications of dynamic gesture detection and hand trajectory tracking. | 2019 |
| 3. | Design of a Flexible Wearable Smart sEMG Recorder Integrated Gradient Boosting Decision Tree Based Hand Gesture Recognition | Wei Song, Qingquan Han, Zhonghang Lin, Nan Yan, Deng Luo, Yiqiao Liao, Student Member, IEEE, Milin Zhang , Zhihua Wang, Fellow, IEEE, Xiang Xie , Anhe Wang, Yang Chen, and Shuo Bai | This research presented a wearable smart sEMG recorder with hand gesture detection based on a gradient boosting decision tree (GBDT). The tissue interface is a flexible surface electrode band made of hydrogel and silicon gel. A neural signal acquisition analog front end (AFE) chip is used to gather the sEMG signal is proposed. | This research proposes a smart sEMG recorder with a gradient boosting decision tree based hand gesture detection algorithm that is small, adaptable, and wearable. To reduce latency, a parallel traversing tree structure is developed and implemented in hardware. To boost hardware efficiency, a pipeline is used.  On a human-computer-interface hand gesture set created in this study, 91 percent recognition accuracy was achieved. | 2019 |
| 4. | TS-I3D Based Hand Gesture Recognition Method With Radar Sensor | YONG WANG , SHASHA WANG , MU ZHOU , QING JIANG, AND ZENGSHAN TIAN | We propose a time sequential inflated 3 dimensions (TS-I3D) convolutional neural network approach for hand gesture recognition based on frequency modulated continuous wave (FMCW) radar s to address the problems of noise impact on the parametric image of hand gestures, the difficulty of gesture feature extraction, and the inefficient utilization of continuous gesture time sequential information. | We propose a time sequential inflated 3 dimensions (TS-I3D) convolutional neural network approach for hand gesture recognition based on frequency modulated continuous wave (FMCW) radar s to address the problems of noise impact on the parametric image of hand gestures, the difficulty of gesture feature extraction, and the inefficient utilization of continuous gesture time sequential information. | 2019 |
| 5. | Non-Touch Character Input System Based on Hand Tapping Gestures Using Kinect Sensor | JUNGPIL SHIN1 , AND CHEOL MIN KIM | This study offers a new character input system for Japanese hiragana and English characters that is based on hand tapping movements and can be used to improve human–computer interaction. The drumming of the fingers.  Gestures are hand motions that can be used to tap buttons on aerial virtual keypads.  Anyone, including hearing-impaired people, can use a hand alphabet. | This study offers a new character input system for Japanese hiragana characters based on hand tapping movements that can be utilized to improve human-computer interaction. Hand tapping gestures are motions that are used to touch a key on aerial virtual keypads using the hands. Each aerial keypad is made up of the same consonant hiragana character keys. By raising a and stretching his or her fingers over his or her shoulder, the user can use a virtual keypad for character input. | 2017 |
| 6. | A Novel Human-3DTV Interaction System Based on Free Hand Gestures and a Touch-Based Virtual Interface | SHUN ZHANG AND SHIZHOU ZHANG | The use of free-hand gestures as an input technique has increasingly become a popular study topic in the field of human-computer interaction. However, hand movements such as sign languages necessitate a great deal of knowledge and practice for interaction, while air writing methods necessitate the user holding the arm and hand in mid-air for an extended amount of time. When a high number of motions are necessary, these solutions severely limit the user experience. | We describe a revolutionary human-3DTV interaction system in this study that use a virtual interface to combine the benefits of free-hand gesture input and touch screen interaction.  The virtual interface display module in our human-3DTV interacting system creates a stereoscopic virtual interface with predefined contents at a specified location in front of the user, and the finger gesture recognition module searches the virtual interface's neighboring region for gesture recognition. | 2019 |
| 7. | Skeleton-Based Dynamic Hand Gesture Recognition Using a Part-Based GRU-RNN for Gesture-Based Interface | SEUNGHYEOK SHIN AND WHOI-YUL KIM | The creation of a variety of image-based human–machine interfaces has been aided by recent advancements in imaging sensors and processing units (HMIs). The usage of dynamic hand gestures for a gesture-based interface is a significant step in this direction, and various approaches have been developed to allow real-time hand skeleton construction from depth pictures for dynamic hand gesture identification. | Following noise removal, data normalization, feature component division, and feature extraction, we employed a PB-GRU-RNN to recognize skeleton-based dynamic hand movements. As a result, we were able to outperform most existing approaches in terms of recognition.  As a result, building HMI systems with neural networks requires less memory and improves performance. | 2020 |
| 8. | sEMG-Based Gesture Recognition With Embedded Virtual Hand Poses and Adversarial Learning | YU HU 1 , YONGKANG WONG 2 , QINGFENG DAI1 , MOHAN KANKANHALLI 2 , WEIDONG GENG 1 , AND XIANGDONG LI | We offer a unique hybrid technique that blends real sEMG signals with corresponding virtual hand positions to increase the accuracy of surface electromyography (sEMG)-based gesture identification. To capture the intrinsic link between the sEMG signals and the hand postures, a proposed cross-modal association model based on adversarial learning is used to generate virtual hand poses. | For sEMG-based gesture recognition, multimodal systems can achieve higher accuracy than unimodal systems, however the additional sensors required impair usability. As a result, we present a novel two-step pipeline classification approach for sEMG-based gesture detection, which we tested on seven sparse multichannel and four high-density sEMG benchmark databases. To capture the intrinsic link between sEMG signals and hand positions, we first present a cross-modal association model with adversarial learning. |  |
| 9. | Micro Hand Gesture Recognition System Using Ultrasonic Active Sensing | YU SANG , LAIXI SHI , AND YIMIN LIU | We propose a tiny hand gesture detection system and methodologies based on ultrasonic active sensing in this research. To achieve human–computer interaction, this technology recognizes micro dynamic hand motions (HCI). The hand-ultrasonic gesture (HUG) system combines ultrasonic active sensing, pulsed radar signal processing, and machine learning to recognize time-sequence patterns. | In this study, we offer an ultrasonic active sensing-based system and algorithms for micro hand gesture identification.  Better quality features can be recovered due to the great resolution given by ultrasonic waves. With minimal computing complexity, the suggested statetransition-based HMM technique attained a classification accuracy of 89.38 percent. We also employed an end-to-end strategy and were able to get a classification accuracy of 96.34 percent. | 2018 |
| 10. | Hand Gesture Recognition for Sign Language Using 3DCNN | MUNEER AL-HAMMADI , GHULAM MUHAMMAD , WADOOD ABDUL, MANSOUR ALSULAIMAN, MOHAMED A. BENCHERIF, AND MOHAMED AMINE MEKHTICHE | Automatic hand gesture detection has recently acquired popularity for two reasons.  The expansion of the deaf and hearing-impaired population, as well as the development of vision-based apps and touchless control on ubiquitous devices, are the main causes behind this. Because hand gesture recognition is so important,  A robust hand gesture detection system should take both spatial and temporal factors into account.  features. | The use of 3DCNN for hand gesture identification is investigated in this paper. Linear sampling was utilized to normalize the temporal dimension of hand motion samples throughout the preprocessing step. We used the length of the detected face and human body part ratios to normalize the spatial dimensions. Then, in two techniques, we used 3DCNN for feature learning.  A single 3DCNN instance was trained to extract hand gesture characteristics from the full video in the first approach. | 2020 |
| 11. | Hand-in-Air (HiA) and Hand-on-Target (HoT) Style Gesture Cues for Mixed Reality Collaboration | SEUNGWON KIM 1,2, ALLISON JING1 , HANHOON PARK 3 , GUN A. LEE1 , WEIDONG HUANG 4 , AND MARK BILLINGHURST1 | Hand gestures are frequently used in collaborative systems to convey information about a distant item. However, because the conventional HiA gesture appears away from the distant object, it can be difficult for the viewer to identify where the conventional gesture cue (Hands-in-Air style: HiA) refers to. In this work, we compare the use of the HiA gesture at 25 places with 5 distances and 5 view angles to see how two parameters, distance to the item and view angle difference between collaborators, influence the comprehension of the gesture. | Each collaborator in current collaboration systems has a first-person view and many view points in a vast task space. However, collaborative systems continue to use the traditional Hands-in-Air (HiA) type hand gesture cue, which has the issue of viewers misinterpreting what it is referring to. As a solution, we suggested in this paper a novel hand motion cue called Hands-on-Target (HoT), which places the virtual hands of the distant helper on the task object's surface. | 2020 |
| 12. | Improved Static Hand Gesture Classification on Deep Convolutional Neural Networks Using Novel Sterile Training Technique | JOSIAH W. SMITH , (Student Member, IEEE), SHIVA THIAGARAJAN, RICHARD WILLIS, YIORGOS MAKRIS , (Senior Member, IEEE), AND MURAT TORLAK , (Senior Member, IEEE) | Using a convolutional neural network (CNN) and frequency-modulated-continuous-wave (FMCW) millimeter-wave (mmWave) radars, we study novel data collecting and training strategies for enhancing classification accuracy of non-moving (static) hand gestures. Non-contact hand pose and static gesture identification have recently gotten a lot of press in a variety of fields, including human-computer interface (HCI), augmented/virtual reality (AR/VR), and even therapeutic range of motion for medical applications. | Using mmWave FMCW radar and convolutional neural networks, we studied novel data collecting and training strategies for enhancing the categorization of static hand motions in this article. The use of a radar mounted on a two-dimensional mechanical scanner to acquire vast, diverse radar datasets is offered as an unique data collection strategy for static hand motions. | 2021 |
| 13. | One-Shot Learning Hand Gesture Recognition Based on Lightweight 3D Convolutional Neural Networks for Portable Applications on Mobile Systems | ZHI LU 1 , SHIYIN QIN1 , LIANWEI LI1 , DINGHAO ZHANG1 , KUANHONG XU2 , AND ZHONGYING HU | Despite the fact that deep convolutional neural networks (CNNs) have made significant advances in the field of vision-based gesture recognition, it is difficult to deploy these high-performance networks to resource-constrained mobile platforms and acquire large numbers of labeled samples for deep CNN training. Furthermore, there are some application scenarios where there are only a few or perhaps a single sample for a new gesture class, preventing the recognition method based on CNNs from achieving good classification performance. | A new strategy for OSLHGR is provided in this research, which is based on the efficient spatial-temporal feature extraction of lightweight I3D and the discriminatory evolution of root sample with cosine similarity measure. The spatiotemporal separability of 3D convolution, as well as the lightweight structural design of Fire module and our past research, motivated this concept. The fundamental model is the I3D network with the greatest performance on the UCF-101 dataset. | 2019 |