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A REVIEW OF ACCELEROMETER BASED 3D VIRTUAL GLOVE FOR ROBOT USING ARM

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ABSTRACT

We know the machine is desideratum of today's world. In this world we utilize different machine in different industry. Most of industrial robots are still programmed utilizing the typical technical process. In this paper is proposed an accelerometer-predicated system to control an industrial robot utilizing two low-cost and minuscule 3-axis wireless accelerometers. In this system incipient accelerometers are affixed to the human arms, capturing its demeanor (gestures and postures). An Artificial Neural Network (ANN) trained with a back-propagation algorithm was habituated to apperceive arm gestures and postures for utilize as input in the control of the robot. The aim is that the robot commences the kineticism concretely same time as the utilizer commences to perform a gesture or posture (low replication time). The results show that the system sanctions the control of an industrial robot in an intuitive way. However, the achieved apperception rate of gestures and postures (92%) should be amended in future, keeping the compromise with the system replication time (160 milliseconds). Conclusively, the results of some tests performed with an industrial robot are presented and discussed.

INTRODUCTION

Traditional interaction contrivances such as mouse and keyboard do not acclimate very well to 3D environments, since they were not ergonomically designed for it. The utilizer may be standing or in kineticism and these contrivances were projected to work on desks. To solve such quandaries we have designed a Accelerometer predicated 3D virtual glove which can be utilized in sundry robotic applications. The mouse is an astronomically popular technology to interact with our computer. While the majority of mice are connected directly to the computers peripheral input via a cord, wireless mice give computer users cordless accessibility.
In the proposed system I am designing a robot which will follow the 3D glove worn by the utilizer we are designing and developing the system in which utilizing the accelerometer technology. The proposed system will control the wireless robot which will give the parameters of the sensors interfaced We can designing up, down, left, right, pick and place actions via wireless glove. This project is ideally suited for critical applications such as Gas plants, Chemical Plants, Nuclear reactors and for hazardous applications such as Coal mines, Sulphur mines, under sea tunnels Oil mints etc.

LITERATURE REVIEW

Gallotti, P. et.al,[1] "v-Glove-A 3D virtual touch interface" introduced in the current interaction model for immersive environments, which is predicated on 3D mice, a transmutation of context is indispensable every time to execute a non-immersive task. These constant context changes from immersive to 2D desktops introduce a rupture in the utilizer interaction with the application. The objective of this work is to develop a contrivance that maps a physical contact interface in a virtual authenticity immersive environment. In order to interact in 3D virtual authenticity immersive environments a wireless glove (v- Glove) was engendered, which has two main functionalities: tracking the position of the user's index finger and vibrate the fingertip when it reaches an area mapped in the interaction space to simulate a physical contact feeling. Quantitative and qualitative analysis were performed with users to evaluate the v-Glove, comparing it with a gyroscopic 3D mouse.

Pedro Neto. et.al, [2] "Accelerometer-Based Control of an Industrial Robotic Arm" proposed an accelerometer-predicated system to control an industrial robot utilizing two low-cost and minuscule 3-axis wireless accelerometers. These accelerometers are affixed to the human arms, capturing its deportment (gestures and postures). An Artificial Neural Network (ANN) trained with a back-propagation algorithm was acclimated to agnize arm gestures and postures, which then will be utilized as input in the control of the robot. The aim is that the robot commences the kineticism virtually at the same time as the utilizer commences to perform a gesture or posture (low replication time). The results show that the system sanctions the control of an industrial robot in an intuitive way. However, the achieved apperception rate of gestures and postures (92%) should be amended in future, keeping the compromise with the system replication time (160 milliseconds). Conclusively, the results of some tests performed with an industrial robot are presented and discussed.

Ruize Xu.et.al, [3] "MEMS Accelerometer Based Nonspecific-User Hand Gesture Recognition" represents three different gesture apperception models which are capable of apperceiving seven hand gestures, i.e., up, down, left, right, tick, circle, and cross, predicated on the input signals from MEMS 3-axes accelerometers. The expeditions of a hand in kineticism in three perpendicular directions are detected by three accelerometers respectively and transmitted to a PC via Bluetooth wireless protocol. An automatic gesture segmentation algorithm is developed to identify individual gestures in a sequence. To compress data and to minimize the influence of variations resulted from gestures made by different users, a rudimental feature predicated on sign sequence of gesture expedition is extracted. This method reduces hundreds of data values of a single gesture to a gesture code of 8 numbers.

Kumar P. et.al, [4] "Hand data glove: A Wearable Real-Time Device for Human-Computer Interaction" concluded a authentic-time Human-Computer Interaction (HCI) predicated on the hand data glove for gesture apperception is proposed. HCI is moving more and more natural and intuitive way to be utilized. One of the consequential components of our body is our hand which is most frequently utilized for the Interaction in Digital Environment and thus intricacy and flexibility of kineticism of hands are the research topics. To apperceive these hand gestures more accurately and prosperously data glove is utilized. Here, gloves are habituated to capture current position of the hand and the angles between the joints and then these features are acclimated to relegate the gestures.

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OVERVIEW OF DATA-GLOVE OPERATION

The data glove (Figure 1) has kineticism sensors (e.g., accelerometer, gyros, and magnetic bend sensors) on the back of the hand and on the fingertips to provide information regarding kineticism and orientation of the hand and fingers. Bend sensors detect finger postures whereas the gyros detect hand rotations. In a homogeneous application, flying robots have been controlled utilizing wireless gloves with bend sensors [13]. With Talon robot and control module the data-processing unit on the glove reads and analyzes the sensor data and translates the raw data into control commands identically tantamount to those engendered by the Talon robot's joystick and switch. Then the data processing unit sends the commands to the Talon's controller wirelessly via radio frequency. The Talon controller assembles all commands from the data glove and

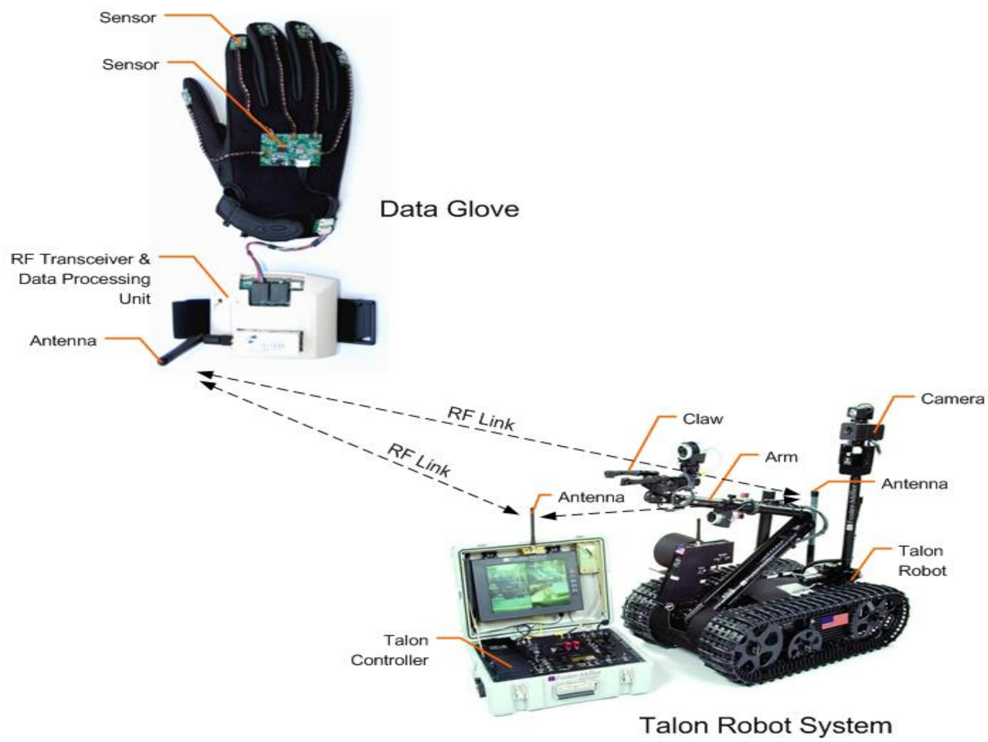

Fig. 1.Data glove

Other sources into a package and sends them to the robot for execution. This architecture has the advantage of sanctioning traditional control of the robot as well as conforming to the robot's subsisting interface. For some applications the data glove can control the Talon directly without utilizing the controller. For other applications, data-glove information can be translated into data to a PC via an RF-receiving station where the data-glove information is translated into data compatible with contrivances such as a mouse or game pad and transferred to the PC's USB input contrivance. The receiving station can interface to software for the Multiple-Operational Control Unit (MOCU), which is utilized to control the Talon and other robots.

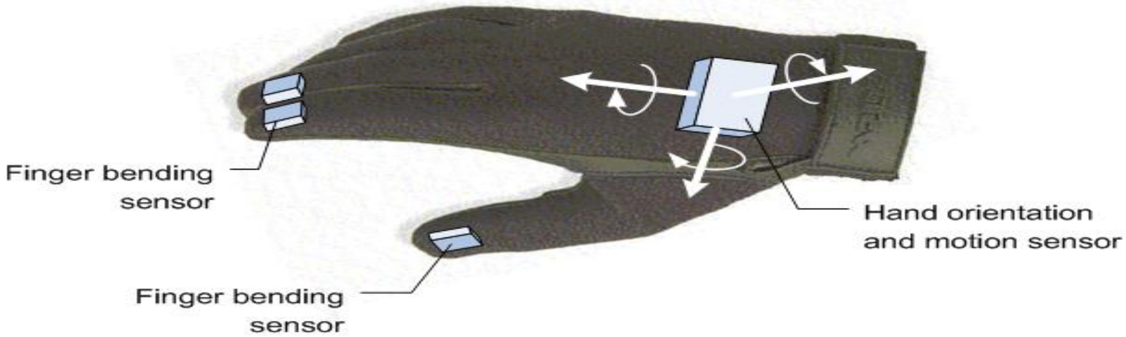

Fig. 2. Data glove sensor layout

FUTURE SCOPE

The 3D model approach can utilize volumetric or skeletal models, or even a coalescence of the two. Volumetric approaches have been heavily utilized in computer animation industry and for computer vision purposes. The models are generally engendered of perplexed 3D surfaces, like NURBS or polygon meshes.

One of the simplest interpolation functions is linear, which performs an average shape from point sets, point variability parameters and external deformators. These template-predicated models are mostly utilized for hand-tracking, but could withal be of avail for simple gesture relegation.

CONCLUSION

Due to the growing demand for natural Human Machine Interfaces and robot intuitive programming platforms, a robotic system that sanctions users to control an industrial robot. Utilizing arm gestures and postures was proposed. Two 3-axis accelerometers were culled to be the input contrivances of this system, capturing the human arms comportments. When compared with other mundane input contrivances, especially the edify pendant, this approach utilizing accelerometers is more intuitive and facile to work, besides offering the possibility to control a robot by wireless betokens. Utilizing this system, a non expert robot programmer can control a robot expeditiously and in a natural way. The low price and short set-up time are other advantages of the system. Nevertheless, the reliability of the system is a paramount constraint to consider.

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