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A SURVEY ON MODERN METHODOLOGIES FOR PHYSICALLY CHALLENGED

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ABSTRACT: In today's era, with the dominance of technology, there are many methodologies for physically challenged people. The most difficulty faced by physically challenged people is that they have to depend on others for their movement. This paper presents a survey on the modern methodologies for physically disabled people. This survey compares traditional methodologies and modern methodologies. From this survey we can clearly understand that modern methodologies are the best in current era. It contains the secondary data of existing modern methodologies and the merits and demerits are distinguished.

INTRODUCTION:

Nowadays the means of all virtual input are now provided by keyboard and mouse. There are other options than a keyboard or mouse like grasping of virtual objects, head, hand, body gesture, eye fixation tracking are becoming popular with the popularity of ubiquitous and ambient devices like OLED TV, play stations, virtual reality games, etc. As a process of huge demographic change, there

will be more elderly people and fewer younger people. In the future, there will be significant growth in the population of older people. It is widely accepted that we need to address this issue by doing further research work. This survey investigates and elaborates on the research works of gesture-controlled technology for user interactions that had been developed. Research studies have been listed that are about 10 years. The final result has been listed and described to give the background of gesture-based technology development for gesture type, use of different parts of the body, gesture commands, chronological evolution, gesture application, interface, technology, user type, issues addressed, and tasks. This paper describes the next options of the gesture-controlled wheelchair after proper analysis. Mobility aids are such devices design to help people who are facing problems in moving around. Old adults and people who have disabilities or injuries have an increased risk of falling, choose to use mobility aids. These devices provide more independence reduces pain and increased confidence and self esteem also provides

several benefits to the users who have mobility aids.

SURVEY ON MODERN METHODOLOGIES:

Though traditional methodologies are used wisely, modern methodologies are the one which dominates the current era. In recent years wheelchairs were used in several other sport discipline like different ball games hockey, fencing, and weight lifting. Older adults recovering from the surgery and people who have had an amputation also greatly benefit from the use of modern methodologies.

Some of the existing surveys are discussed below:

- N. Shinde and K. George[1] has Designed a robotic wheelchair controlled and driven by brain waves and eye blinks of the user are presented for wheelchair locomotion. Brain impulse varies from person to person and needs to be calibrated for proper locomotion.
- Rafael Barea, Luciano Boquete, Manuel Mazo[2] has Developed a wheelchair for mobility impaired individual controlled by the eye movement within the socket based on electrooculography. An acquisition system captures electrooculograms and the continuous wavelet transform and neural network are analyzed in real time using a micro controller based platform running the Linux operating system. The proposed navigation system cannot work properly in dim environment and the eye size of an individual also contributes to proper navigation. The itching or irritations sensation could develop after long use.
- X. Huo, J. Wang, and M. Ghovanloo[3] has developed the Tongue Drive System (TDS). By using a magnet and magnetic sensors it drives the wheelchair by detecting tongue motion. The proposed navigation system requires tongue to be pierced. Individuals should avoid inserting Ferromagnetic objects into their mouth and the magnetic tracer should be removed if the user is undergoing MRI. It's quite uncomfortable to talk to individuals with the magnetic tracer in the mouth.
- B. Kumaran and A. P. Renold[4] has developed a robotic wheelchair controlled and driven using voice recognition. The proposed system cannot be used by dumbs. It is not effective in a noisy environment.
- Aleksandar Pajkanovic, Branko Dokic[5] has designed a robotic wheelchair controlled using head motion. The prototype consists of the digital system (an accelerometer and a microcontroller) and a mechanical actuator. The accelerometer gathers head gesture data and the microcontroller computes the data, which is used to position the wheelchair joystick in accordance with the users head gesture.
- Preeti Srivastava, Dr. S. Chatterjee, Ritula Thakur[6] has designed a wheelchair controlled using gesture recognition with the help of accelerometer IC MMA7361L placed on the head of the user.
- Feng-sheng Chen, Chin-Ming Fu, and Chung-Lin Huang[7] has described the introduction on hand gesture reorganization system to

recognize the continuous gesture before stationary background. To trace the moving hand and extract the hand region when applied the real time hand tracking and extraction algorithm. we observe that this system is depend on the HMM model to recognize to recognize the gesture. To recognizing the gesture the complexity is more and accuracy is less so it not beneficial and not compatible to the user.

- Rafael Barea, Luciano Boquete, Manuel Mazo[8] says that an acquisition system captures electrooculograms and the continuous wavelet transform and neural network are analyzed in real time using a microcontroller based platform running the Linux operating system. The proposed navigation system cannot work properly in dim environment and the eye size of an individual also contributes to proper navigation. The itching or irritations sensation could develop after long use.
- Aleksandar Pajkanovic, Branko Dokic[9] has designed a robotic wheelchair controlled using head motion. The prototype consists of the digital system (an accelerometer and a microcontroller) and a mechanical actuator. The accelerometer gathers head gesture data and the microcontroller computes the data, which is used to position the wheelchair

joystick in accordance with the users head gesture.

- SmithaPaulose, M.P.Fathima, Anooda GeethuMohan, M.S.Sajana,[10] says This system intended the accelerometer sensor is used foe to convert fingers and hand gestures into computer interpreted signal. The accelerometer data is calibrated and filtered for gesture or finger reorganization. This system is not affordable for patients for handling view so it not so user friendly.



COMPARISON ON EXISTING WORKS

S.NO	TITLE	TECHNOLOGIES USED	ADVANTAGES	DISADVANTAGES
1	Wheelchair controlled using Eye Movement	Eye Movement within the socket based on Electrooculography	Wheelchair for mobility impaired individual controlled by the eye movement within the socket based on electrooculography.	Cannot work properly in dim environment. The itching or irritation sensation could after long use.
2	Tongue Drive System	Magnet and Magnetic Sensor	It drives the wheelchair by detecting tongue motion.	Uncomfortable to talk to individual with the magnetic tracer.
3	Voice Recognition	Voice Recognition connected with Arduino	Less Hardware Required. Economical reduce man power.	The proposed system cannot be used by dumps. It is not effective in noisy environment.
4	Wheelchair controlled using Head motion	Mechanical actuator and micro controller	Increased the number of disabled people in employment.	Paralyzed people cannot move their head.
5	Wheelchair controlled using Electroencephalogram(EEG)	Radial Basis Function Neural Network(RBFNN) Brain Computer Interface(BCI)	New method of interacting with machines where no physical touch is required.	Current Version limits to only four different actions.
6	Wheelchair controlled using Facial Expression	Machine Learning Techniques	It is intuitive , modern, does not require physical effort and can be integrated into a smart phone or tablet.	Human emotions are uncertain.

7	Hand Gesture Controlled Wheelchair	MEMS(Micro Electro Mechanical System)	It is easy to design and manufacture as all the components are easily available. Wireless makes ease of operation.	Failure of device or components may have dire consequences, fatal accidents can occur.
8	Wheelchair Controlled using Sip-n-Puff	Sip-n-Puff (SNP)	Patient does not need to produce accurate and tiring driving motions and makes the individual feel independent.	It is costly that they do not really commercialized it and it takes time to get used to it.
9	Electric or Power Wheelchair	Electric Power, Arduino, Joystick	Quick and easy Manual. Movement on difficult terrain. Perfect for Children.	Repair and Maintenance cost are expensive. Due to size and weight its difficult to move.
10	Fuzzy Control of a stair climbing wheelchair	Fuzzy Logic Control (FLC). Mamdani-type Fuzzy rules with Multi Input Single Output (MISO)	Simple and Complex Structure flexible Moment Good stability.	Need electric power to charge battery. It works with limited weight and chair climbs the stair backwards.

CONCLUSION

This survey paper presents a broad review about various traditional methodologies and modern methodologies used by physically challenged people particularly wheelchairs. We have also presented the merits of using modern methodologies in today's world. The summary is made by combining results obtained by different researches. Finally, a comparison table is presented with all the existing methodologies that are tabulated and mentioned along with their pros and cons. Thus, the modern methodologies are the one which dominates the current era .

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