

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Special Issue 13, October 2016

Design of Web Access Interface for People with Cerebral Palsy Disorders

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ABSTRACT: A major part of Indian population suffers from different types of motor disorders. A majority of this people has cerebral palsy. People suffering from cerebral palsy have great difficulties for communication. Augmentative and Alternative Communication (AAC) techniques are used to partially solve their problem. Though there is a huge number of modern tools and technologies available, they are all made for foreign socio cultural contexts, costly, and have to be imported. The present work is aimed by developing a computer based Special Access system for the web access for the Indian population suffering from neuromotor disorders, especially those suffering from cerebral palsy. Since it is difficult to develop systems for all Indian languages in a short time, the present work focuses on building systems in English initially. However, the system is designed in such a way so that systems for other languages can be developed easily from the existing system. The system described in the thesis is a Special Access System. The system has three components, namely a physical interface, the OS and web browser. With these proposed system, user can access internet through any web browser. The system can be operated with special access switches. The switches are required to make the system accessible to the people with severe motor disabilities.

I.INTRODUCTION

A. INTRODUCTION : Most studies find that about one fifth (20%) of the population has some kind of disability. Not all of these people have disabilities that make it difficult for them to access the internet, but it is still a significant portion of the population. Each of the major categories of disabilities requires certain types of adaptations in the design of the web content. Most of the time, these adaptations benefit nearly everyone, not just people with disabilities. Almost everyone benefits from helpful illustrations, properly-organized content and clear navigation. Similarly, while captions are a necessity for Deaf users, they can be helpful to others, including anyone who views a video without audio.

B. INTRODUCTION TO WEB ACCESS: Web accessibility means that people with disabilities can use the Web. More specifically, Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web.

C. WEB ACCESS: Web access is an essential part of our daily life. In general, internet is accessed via desktop, laptop and mobile. Some computer peripherals are very essential to access internet. In general peoples are easily able to access the internet using those essential computers peripheral like keyboard, mouse etc. In India, a large number of people suffer from different types of disabilities. A majority of this people has cerebral palsy. Disable persons can't access the internet because they can't handle computer peripherals like mouse, keyboard etc. Now a days, some modern technology system and web browser are present for disable persons to access the internet. But using those modern systems and web browsers, peoples with neuromotor disorders can't access the internet. So in this work we try to develop a Special Access System that will enable people with neuromotor disorders to access the internet.

D. CEREBRAL PALSY: It is a disorder that affects muscle tone, movement, and motor skills (the ability to move in a coordinated and purposeful way). Cerebral palsy can also affect to other health issues, including vision, hearing, and speech problems, and learning disabilities. There are several types of cerebral palsy like spastic, ataxic and hypotonic.

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E. WEB ACCESS FOR THE PEOPLE WITH CEREBRAL PALSY: When we want to access the internet normally, we click the mouse on the web browser icon that is present on the computer screens. Then the web browser page is open. Within that page we have done so many operations like url search, keyword search, page save, page print, history, bookmarks etc. Those operations are done using keyboard and mouse.

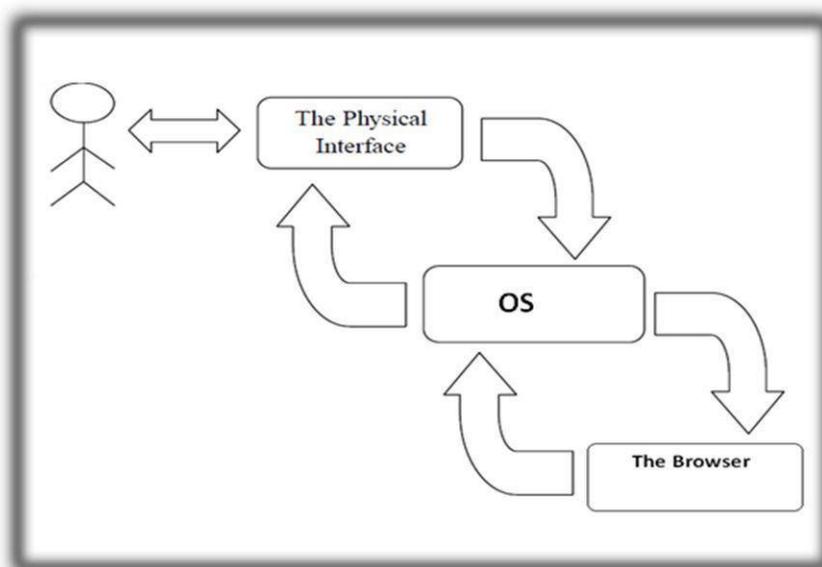
But those peoples are suffering from neuromotor disorders, especially those suffering from cerebral palse, have great difficulties of communication especially because of the lack of fine motor coordination. Through the use of computers, for these individual are to communicate their thoughts, ideas, emotions, and intellectual potential to the rest of the world. To use the computers, accessibility to its peripherals is a prime necessity. Those peoples are also physically challenged that's why they can't handle computer peripherals like mouse, keyboard. Nowadays, we use some AAC system and Special Access System to communicate for people with cerebral palsy. But using those AAC systems Special Access System, peoples with neuromotor disorders can't access the internet. So, they need some special system to access the internet.

II. THE SYSTEM ARCHITECTURE

A. INTRODUCTION: In my proposed computer based Special Access System contains three major components. These components are,

1. The Physical interface through which the user makes some selection (s).
2. The processing unit (OS) that works on the selection (s) made by the user to produce some output.
3. The browser on which all the operation are done and shown the output.

Figure shows the inter-relationship between above discussed three components.



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B. THE COMPONENT OF THE SYSTEM:

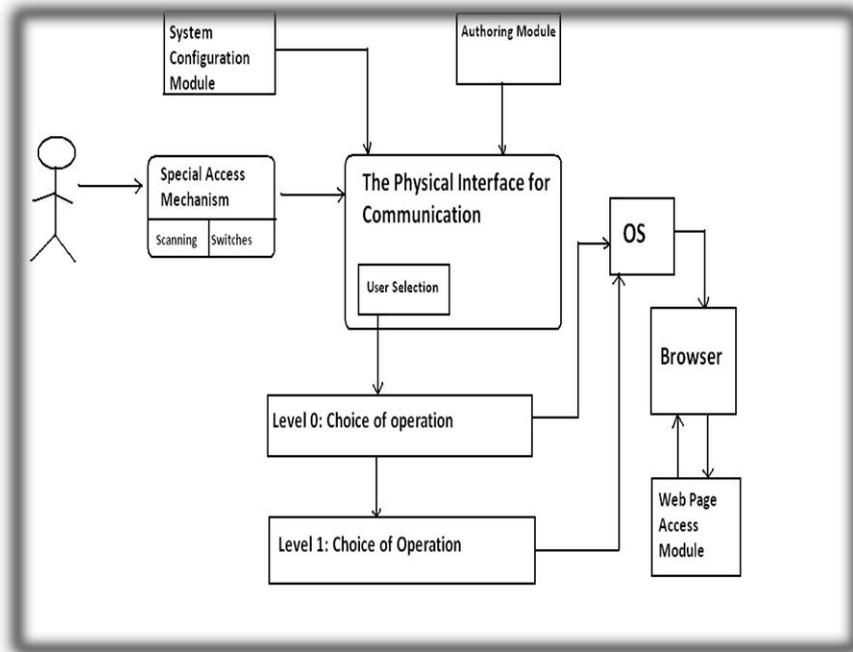


Fig.1: The detailed Architecture of the System

C. SPECIAL ACCESS SYSTEM: This module is used to make the system accessible to severely disabled users. It has two components. The software component, known as Scanning and the hardware component consisting of special hardware access switches. The scanning component is used to make the system accessible with the special hardware devices.

D. PHYSICAL INTERFACE FOR COMMUNICATION: From the user's point of view, the most important module of the system is the physical interface. In the present system, the interface shows to the user a set of operation and allows the user to select from them. The interface works in an interactive way where it poses some operation to the user and the user responds by selecting some icons from the interface. The selections made by the user from the interface are sent directly to the processing unit.

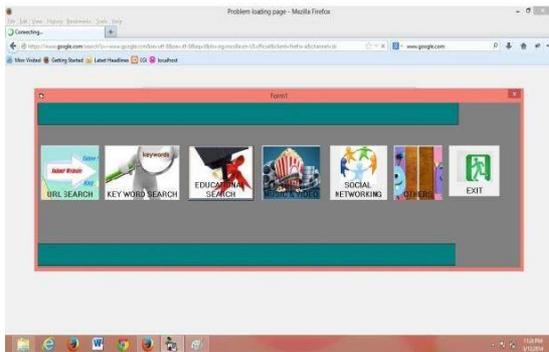
E. LEVEL 0: CHOICE OF OPERATIONS: In level 0, there are six operations present. Those are URL search, Keyword search, Educational search, Music & Video, Others and Exit. Every operation has an own specific task for accessing web browser. A brief description of each of the operation is given below.

i. URL Search: When we want to search some page in the web browser then we must write the URL or address of that page in a specific place which is address bar. So, in this proposed system when the URL search operations click through the switch, the soft keyboard is open. Using this soft keyboard, those target people are type the address of a specific page for their own choice through the switch. Whatever they type that must be shown in text box which is situated above the soft keyboard screen. After typing they must click on "enter" button on the soft keyboard. Then the specific web page is automatically open. In URL search operation, one special provision is there, that is if they want to open a page that is previously they used then they choose that specific web page address from the list box which is present on the right side of soft keyboard then that page is automatically open.

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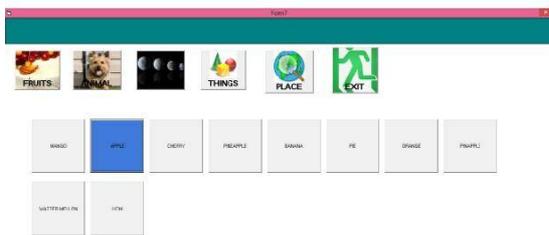
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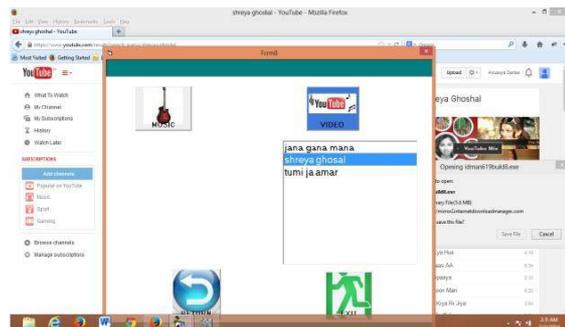
(a)



(b)



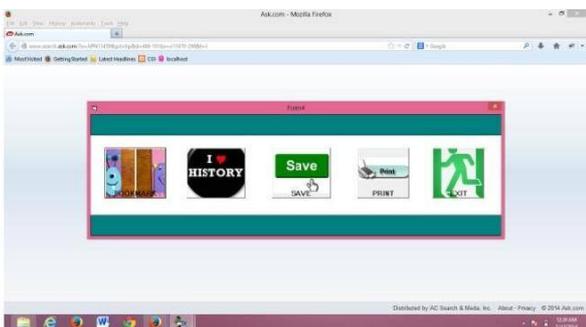
(c)



(d)



(e)



(f)

Fig.2: (a) The first form of the Interface for the proposed system (b) The soft Keyboard of the Proposed System (c) The Interface for Educational Search (d) The Interface for Some Predefined Music Searching (e) The Interface for Some Social Networking (f) The Interface for Others operation

ii. Keyword Search: When we want to know something about a specific topic then we must write the topic name on the search bar. So, in this proposed system when the keyword search operation clicks through the switch, the soft keyboard is open. Using this soft keyboard, those targeted people type the name of a specific topic for their own choice

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through the switch. Whatever they type that must be shown in text box which is situated above the soft keyboard screen. After typing they must click on “enter” button on the soft keyboard. Then the web page is automatically opened which contains the information about the defined topic. In keyword search operation, one special provision is there that is if they want to open a topic that is previously they used then they choose that specific topic name from the list box, then that page is automatically open which contain the information about the topic.

iii. Educational Search: In this proposed system, this operation is used only for educational purpose. Keep mind on their problems or reduce press operation on the switch, give this operation for searching some special predefined topic and their sub topic. When someone presses on the educational search operation through the switch then one new window is open and gives some topic name. When they press on any topic from the given topics, the system gives some sub-topic of that topic. But those topic name and sub-topic name are predefined so they can't change those topic and sub-topic name. When they press on the sub-topic name through the switch, a Wikipedia page is open for that sub-topic. One of the examples is that if topic name is flower and the sub-topic name is rose then pressing the switch, <http://en.wikipedia.org/wiki/Rose> page is open. If someone can't find a sub-topic name then they do the keyword search operation.

iv. Music and Video: In this proposed system, this operation is used only for entertainment purpose. When someone presses on the Music & Video operation through the switch then one new window is open and gives option for music or video. When they press on any topic from the given topics, the system gives some music name or video name of that topic. But those music name and video name are predefined so they can't change those music and video. When they press on the music or video name through the switch, a YouTube page is open for that corresponding name. One of the examples is that if music name is Shreya ghosal and then pressing the switch, http://www.youtube.com/results?search_query=Shreya+ghosal page is open. If someone can't find music or video name for his own choice then they do the keyword search operation.

v. Social networking: In this proposed system, this operation is used only to build social networks or social relations among people who, share interests, activities, backgrounds or real-life connections. A social network service consists of a representation of each user (often a profile), his social links, and a variety of additional services.. When someone presses on the Social Networking operation through the switch then one new window is open and gives option for Social Networking and if any of the buttons in the form is pressed it takes the control to the corresponding webpage.

vi. Others: When anyone presses this operation through switch, a new window is open. In that window, there are four operations. Those operations are bookmark, history, save and print. Pressing on those operation through switch those work has been done in the webpage.

vii. Exit: In this operation, proposed system is closed. If anyone presses this operation through switch then the proposed system is automatically terminated.

F. LEVEL 1: CHOICE OF OPERATIONS: In level 1, all the operation is their which is allowed to access the web page. Those operations are page up, page down, next page, previous page, a page browsing, others and exit. Pressing on those operations, corresponding works happened in the web page.

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Fig.3: The Interface for Level1 operation

III.CONCLUSION

In the present age of Information Technology, a computer should be properly termed as a 'Communicator' to realize its full utility. This new role of the device becomes more generous when its tremendous computation power is used to assist disabled people to communicate to the rest of the world. The present work is an attempt to design a web access interface for people with cerebral palsy disorder. In the Project, the design and implementation of a computer based Special Access System for the web access for the Indian population suffering from cerebral palsy disorders. Since it is difficult to develop systems for all Indian languages in a short time, the present work focuses on building systems in English initially. However, the system is designed in such a way so that systems for other languages can be developed easily from the existing system. The system has three components, namely a physical interface, the OS and web browser. With these proposed system, user can access web through any web browser. The system can be operated with special access switches. The switches are required to make the system accessible to the people with severe motor disabilities.

Due to their physical disability, the users require special access mechanisms to use the system. Usage of special access mechanisms increases the time of communication. This necessitates the design of systems that minimizes seek-time. The reduction of seek-time is possible by designing adaptive interfaces. In these types of interfaces, the interface content changes their position according to the user preference, thus bringing most favored item to the "front". This results in a further reduced seek-time.

One important feature of the system is that its content, that is the icons, can be personalized according to the need of the user. As adaptive interfaces help to reduce seek-time, so is predictive mechanism for reduction of physical effort.

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ISSN(Online): 2319-8753
ISSN (Print) : 2347-6710

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 5, Special Issue 13, October 2016

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