ISSN No. 0976-5697

Volume 5, No. 7, September-October 2014

International Journal of Advanced Research in Computer Science

RESEARCH PAPER

Available Online at www.ijarcs.info

Reducing Parallelism in Human Brain using Mutual Human-Robotics Brain Interaction

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Abstract: Direct Brain Interface (DBI) is a developing field that has been adding a new dimension of functionality in human and robotics brain. This paper introduces a concept of electronic circuit board chip to store all the information of human brain and provide mapping between human brain with the robotics brain.Two important functions of chip are to store all the record of tasks of human brain in robotics brain and act as an interface between the human brain and robotics brain. This paper also discusses about the structure and the functionality controlledby the human brain. This proposed mechanism helps to reduce the parallelism in human brain & gives sequential access to take any action.

Keywords: Human-brain interface, Robotics -brain interface, neuro-science, electric circuit board chip.

I. INTRODUCTION

Interaction between human brain and robotics brain can only be possible by using interface that is termed as "Direct Brain Interface". Several functions of BCI (Brain Computer Interface) are directly related with the DBI that act as a bridge/sandwich between the human and robotics brain. There are number of functions performed by any BCI system. The two most important functions are given below:

a. To measure some specific features of brain activity on operations basis.
b. To translate the features in such a way that helps to derive an actual output [2] [8] [12].

The complete functioning depends on the 4 components of any BCI system that helps to achieve an effective output.

The functions of BCI componentsare as shown in Fig.1.

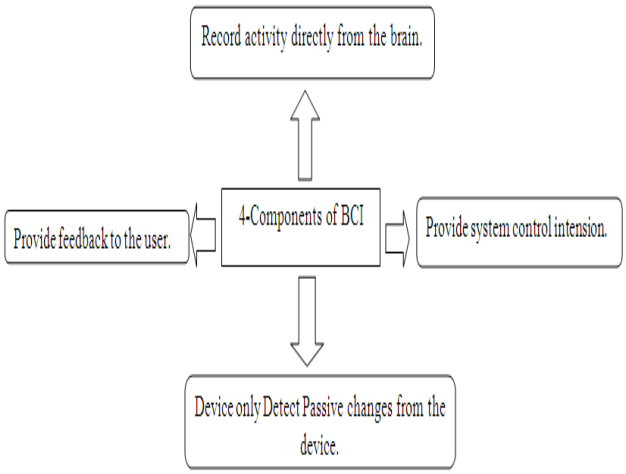

Figure 1. BCI-Components: Provides different functions at different times [3].

The implementation of these functions depends on the type of application chosen by the user and it may be easy or difficult. The practical use of BCI technology depends on the development of appropriate applications, identification of appropriate user groups, and careful attention to the needs and desires of individual users [6]. Although number of applications are available in the market for BCI systems, the most popular BCI application named as "RQNN-EEG"(Recurrent quantum neural network) that is translated on the basis of real time commands and gives the information about the complete functioning of human brain[4][9].

This paper presents a concept of electronic circuit board chip which act as an interface between human and robotics brain and its function is to store all the information (task record) of human brain in robotics brain and use later on the time of execution in future.This proposed concept helps to provide a direct communication pathway between humans and robotics brain. RPL (Robotics Programming Language) is used during the design of interface and the use of Interface is to exchange the information from the human brain to the robotics brain.RPL is further divided into four groups where the second group language is used in the robotics interface programming [11].The complete schedule of tasks are stored in the human memory where storing memories are more or less passive process for retaining information from the brain. There are several types of memories exist in the human brain that is listed below:

a. ***Sensory Memory:*** It is a kind of buffer that receives information from the five senses like ability to look and remember what it is looked like with just a moment of observation and not required conscious intensions.

b. ***Short term memory:*** It provides short term remembrance of information in the human brain to understand any sentence, beginning of the sentence need to hold in the brain etc.

c. ***Long Term Memory:*** Such type of memory helps to provide long term remembrance of information in the human brain. It is further divided into six types of memories which are listed below:

a) ***Explicit (Declarative) Memory:*** It is only concerned with the knowing means facts and figures that already declared and humans just have to retrieve information from the memory when required.

b) ***Implicit (Procedural) Memory:*** It gives the complete description of the working of unconscious state of brain to do things based upon some particulars of objects and movements of the body etc.

c) ***Episodic Memory****:* This type of memory stores all types of data, experiences and specific events at specific time in serial form.

d) ***Semantic Memory****:* It is independent of personal experiences and includes simple knowledge of objects and its functions.

e) ***Retrospective Memory****:* It is recollection of all past episodes.

f) ***Prospective Memory****:* It helps to remember the content in the memory for future. It may be event or time based [14].

The complete structure of memories in human brain is as shown in fig.2:

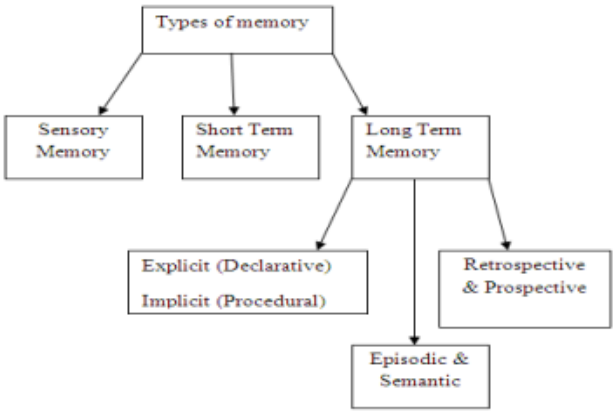

Figure.2. Memory Structure: Different types of memories available in human brain.

Different types of memories use different structures for processing of information in human brain in sequential manner. And the selection of structure depends on the type of memory chosen by the human. The flow of information processing in human is as shown in Fig.3:

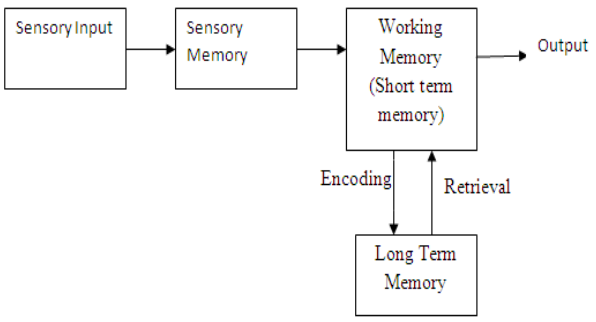

Figure.3. Workflow diagram: For Information Processing System in human brain [13].

Normally, Brain structure includes three different key design principles which are described below:

a) ***Hierarchal Structure:*** It includes the complete structure of the brain system and brain is connected with various nerves that seem to operate as its own distinct capacities.A detailed interaction between human and environment may be shown in fig 4:

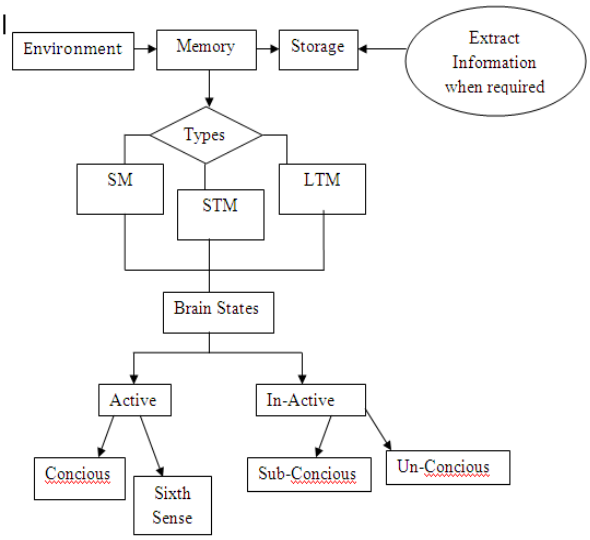

Figure.4. A Detailed: Interaction of brain with the environment.

a) ***Distributed Memory: -*** It is a combination of semantic memory, procedural memory and episodic memory.

b) ***Parallelism:-*** It shows the numbers of tasks to be performed stored in the brain at the same time that is in parallel manner and that parallelism must be controlled for systematic working of the brain and provide sequential access where the conscious brainavoiding parallelism is as shown in Fig.5.

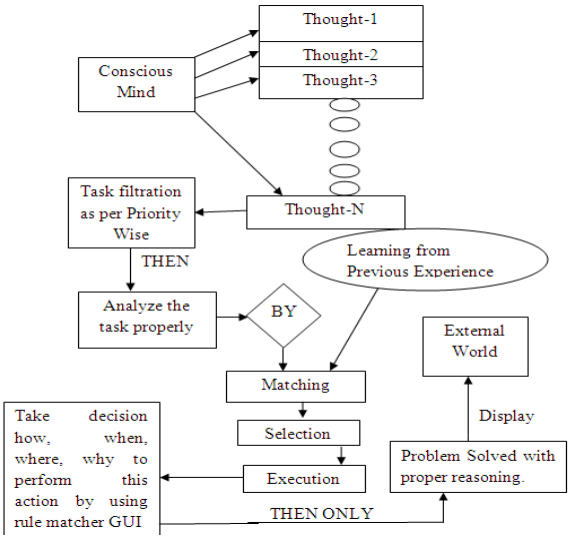

Figure.5. Conscious Brain State show: Parallelism.

As an example, the sub-conscious state of human brain working in parallel manner (without speaking and thoughts comes as for example dreams) and conscious state of human brain working in sequential manner (a single task can be performed at a single time).

This conceptual approach models are used for mapping of functions in human brain to take any action [1]. The complete information is stored in electronic circuit board chip and the information stored can be accessed by inserting the chip into robotics brain through BCI systems [7] where the working of motion control of any robotics system is totally based on BCI system [10].An interaction between human brain with environment can be represented by using air medium and shown in Fig.6.

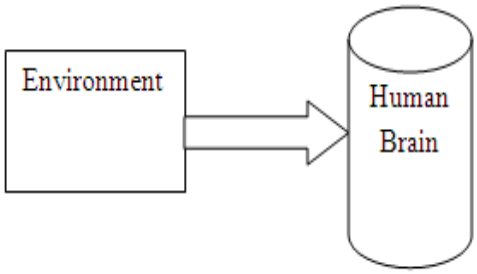

Figure.6.Air Medium shows: Interaction of Human Brain with the environment.

This rapidly emerging field is highly inter-disciplinary in nature and needs comprehensive expertise in the fields of neuro-science, computer science, A.I and user interface design etc.

II. NEURAL NETWORK WORKING OF HUMAN BRAIN

Normally, the numbers of thoughts in human brain exists in a parallel manner. This parallelism most of the times creates complexity in human brain. Therefore for reducing the level of complexity, there is a need to arrange the number of tasks in brain by using "Filter Activation Process".This process helps to provide protection from the flood of information that confronts the humans on daily basis, avoiding an overload of information and execute tasks in sequential manner [14] and as an example the working of human brain shows direct neural interface [5] in the form of neural network can be shown in Fig.7.

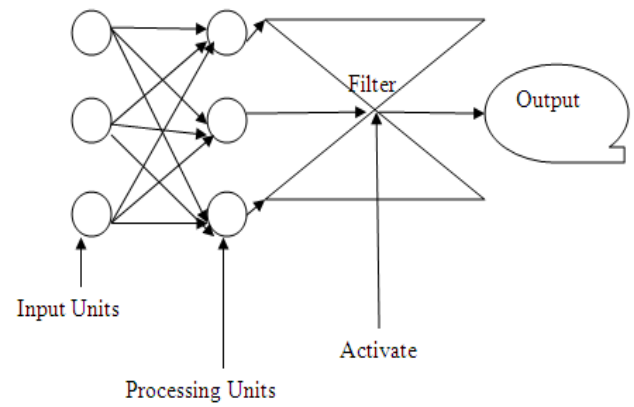

Figure.7. Working of human brain: Like Neural Network.

III. PROPOSED MECHANISM OF MAPPING BETWEEN HB (HUMAN BRAIN) + RB (ROBOTICS BRAIN)

This proposed mechanism introduced with a concept of mapping of human brain with the robotics brain. The mapping is hard because of thousands of nerve connections are available in human brain that creates complexity and sometimes tracing human brain path in the robotics brain is too typical for researchers. The proposed designed methodology for mapping of human brain with the robotics brain can be shown in Fig.8:

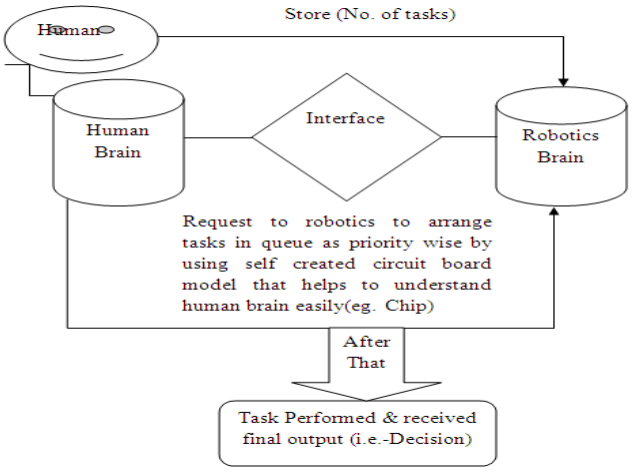

Figure.8.Interfaceshows: Mapping of human brain with robotics brain.

The mapping shows the interaction between human and robotics brain with the help of interface.This interface act as bridge or gateway. This is more natural form of interaction between HBI (Human Brain Interaction) and RBI (Robotics Brain Interaction).The other most important benefits of mapping of brains are to handle the tasks in sequential manner.Therefore this proposed mechanism also helps to reduce the level of complexity in human brain by creating a connection between human and robotics brain which is one of the key design principles of human brain.

A. Working based on Proposed Mechanism:

The interface shown in figure 8 is a sandwich between human and robotics brain. The function of interface is to store all tasks to be performed in robotics brain by inserting a new electronic circuit board chip. At first step, human stores the sequence of task records in robotics brain that are performed in future by using "electronic circuit board chip [8]. In the second step, robotics filter the tasks from the task record as per priority by using "Active filtration process" on FIFO basis that generates an activation signal. This activation signal indicates that a particular task is ready for execution and rest of the tasks are in a queue that shows waiting state. Therefore, this proposed mechanism helps to reduce the problem of parallelism in human brain and provides the access of tasks in sequential manner.

IV. CONCLUSION

The mechanism as proposed in this paper is designed in such a way that it avoids parallelism by introducing a concept of mapping between human brain and robotics brain. This concept shows the collaboration between human and robotics brain and takes joint action. This proposed mechanism can be implemented by inserting a new electronic circuit board chip modeled in a human brain. This type of implementation offers greater possibilities for advances in robotics and a new way of understanding of human brain.

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