Title: Human Memory Backup

Submitter 1: Mohd Toaha Umar

Electronics 1st Year, ZHCET ,AMU

Submitter 2: Somya Agarwal

Electronics 1st year, ZHCET, AMU

Submitter 3: Simran Kaur

Electrical 1st Year, ZHCET, AMU

Abstract: How many times have we forgotten our syllabus in an exam, or the things our mom tells us to do? Don't you just wish on occasions that you had a device to help you remember things? Well, it's certainly possible!. In order to prevent memory lapses, this paper proposes to install a mechanism of memory backup in the brain. This can be done by installing a portable fMRI in the cerebrum, which is in charge of visual and audio senses. The fMRI measures the brain activity quite accurately, and using a suitable algorithm, it is possible to observe the images and the sounds being formed in the brain, and hence a video like recording can be obtained. To transfer the memory back into the person, the images are first converted into electric signals, and then transferred to the hippocampus, which is the memory storage centre of the brain.

I.INTRODUCTION

Human memory is one of the most complex features of the human body. Scientists have spent researching about the human memory, yet can't figure out a definite way as to how it works. It is one of the most enriching and useful features of the human body, as life would become meaningless if we have no memory of the things we do, of the things we see in daily life. Imagine the hardships that people with amnesia face. Human memory is extremely fragile, and can get affected by accidents, illnesses and shocks. People affected by serious head trauma, illnesses and mental shocks are the people most prone to amnesia. Thus it is critical to design a system which enables people to make a full recovery from amnesia. Keeping this noble idea in mind, this paper proposes a mechanism which will help to restore the precious memories of people.

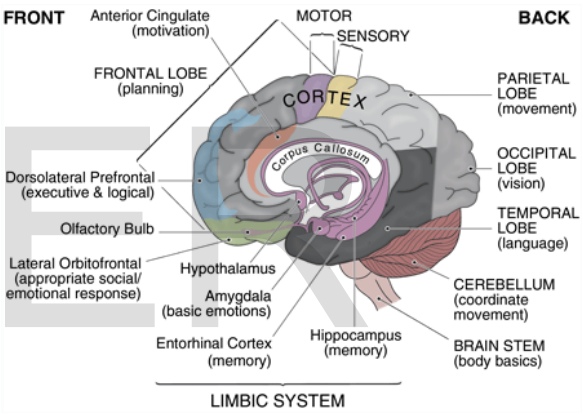

Fig 1: The different sections of the brain

II.METHODOLOGY

A. STORING THE BRAIN SIGNALS

The most important tool for the first part of the human memory backup is the functional magnetic resonance imaging device. Functional magnetic resonance imaging or functional MRI (fMRI) is a functional neuroimaging procedure that uses MRI technology that measures brain activity by detecting associated changes in blood flow. This technique relies on the fact that cerebral blood flow and neuronal activation are coupled. When an area of the brain is in use, blood flow to that region also increases. fMRI has come to dominate brain mapping research because it does not require people to undergo shots, surgery, or to ingest substances, or be exposed to radiation, etc, unlike the normal MRI.

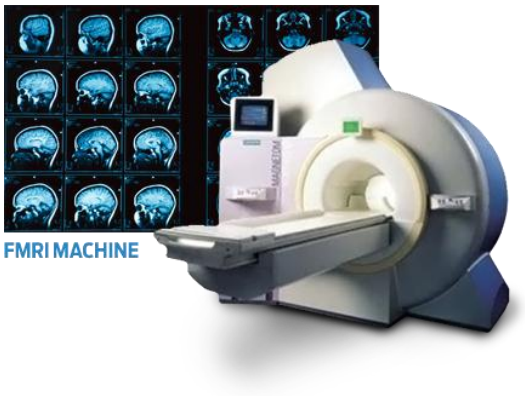

Fig 2. A Typical fMRI Machine

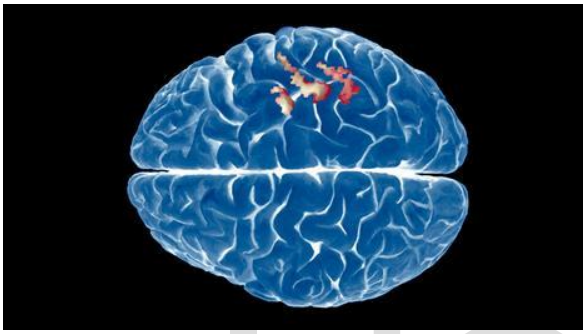

Fig 3.An fMRI Brain Scan

Researches by Jack Gallant, a researcher at University of California, Berkeley, have shown that by taking fMRI scans of the cerebral cortex, and then using a suitable algorithm, it is possible to extract , let's say, a video of the everything that the person is seeing and hearing. This paper proposes that the use of portable fMRIs in not just the cerebral cortex, but also the hippocampus, which is the memory storing region of the brain. The fMRI has the capability of mapping accurately the brain activity, and we can say with confidence that it would be able to make similar videos of the memories stored inside our brain. The fMRI should be continuously connected to a computer wirelessly, where all the thoughts, vision and audios recorded by the brain will be recorded and stored, thus creating a database.

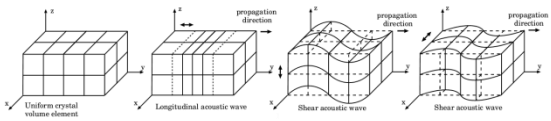

Fig 4. An acousto-optic converter

B. TRANSFER OF MEMORIES

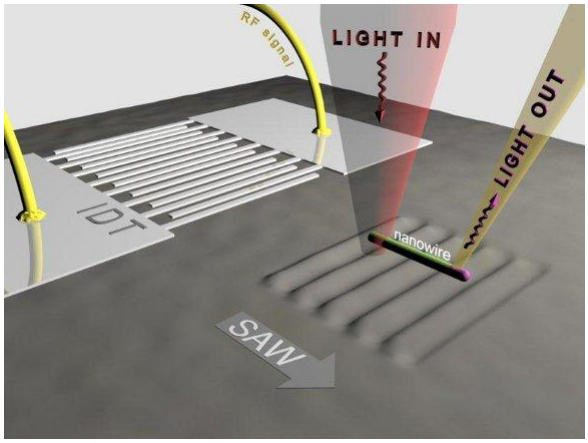

Fig 4: Mechanism of Acousto Optic Paratellurite Crystal

In the second and final step of memory backup, the videos stored in the database have to be converted into electrical signals, because all the brain activity is dependent on electric and chemical interactions between the synapses. This can be done by using an acousto-optic light signal converter in which the image is line scanned by a travelling acoustic train. According to the paper published by V I Balakshiĭ, A G Kukushkin, S K Mankevich, V N Parygin, B V Poletaev and G N Stavrakov , converter can be made of a paratellurite crystal which can resolve an image with 510 pairs of elements in a line at the television scanning rate. The electrical signals then should be passed to a modulator, where they are converted to a suitable wavelength for the brain, and then passed to another receptor installed in the hippocampus, which will detect these signals, and guide them to the hippocampus slowly for the restoration of memories.

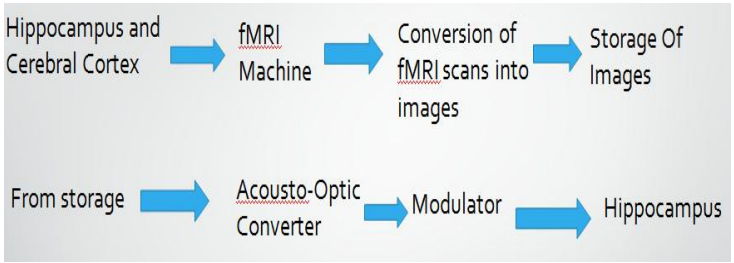

Fig 8.: Block Diagram of Mechanism

III. CONCLUSIONS

A. This research can have wide ranging consequences. It has the capability to completely transform the world.
B. This research is especially useful for war soldiers, who put their body on the line while fighting for the country, and are frequent victims of memory losses.
C. People suffering from Alzheimer's syndrome, who are prone to memory lapses every now and then.
D. If economized and made easily available, it has the power to reduce the human error in daily life situations to a bare minimum.
E. Memory losses of accident victims can surely become a thing of the past.

There are some hindrances that may arise that can slow down the arrival of such a technology. These are

A. Cost of FMRI machine
B. The portability of FMRI machine
C. The strength of the brain signals is weak, so the images formed are not of very high resolution, and their subsequent conversion into electrical signals will only reduce their intensity, thus forming clear memories can be a difficult process.
D. The low availability of acousto-optic materials, and hence they are relatively untested as well to know their exact efficiency.
E. The storage of memories of a single person is likely to occupy thousands of terabytes, and computers of such large storages are not commonly available and are quite expensive.

IV.REFERENCES

[1]. V I Balakshiĭ, A G Kukushkin, S K Mankevich, V N Parygin, B V Poletaev and G N Stavrakov. "Acousto optic device for conversion of images into electrical signals"

[2] John-Dylan Haynes & Geraint Rees "Decoding mental state from brain activity in humans".

[3] Edward F. Chang, Robert Knight, Brian Pasley" Decoding heard speech and imagined speech from human brain signals".

[4]http://www.bbc.com/future/story/20140717-i-can-read-your-mind

[5]http://www.darpa.mil/newsevents/releases/2014/07/09.aspx