Mind Reading Computer

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Abstract⸺ **Mind Reading refers to the observation and analysis of human mental condition such as getting to know how a person is feeling. For instance, it can be done by analysing the facial expressions of a person through an image using a pre-existing API or a suitable algorithm. A smile for example can be a sign for happy emotion. This enables a computer to understand someone's mental state and may be respond accordingly thereby making it a smart machine[2]. This Project focuses on the ways through which a machine can understand and respond to one's mental state. We'll discuss some methods for the same including FEA (Facial Expression Analysis), futuristic headband also called as functional near-infrared spectroscopy (FNIRS), Galvanic Skin Response technique, Blood Volume Pulse technique [4]. We'll also cover a wide range of applications to these mind reading techniques in the subsequent paragraphs along with the advantages of using it.**

Keywords⸺ **Mind Reading, functional near-infrared spectroscopy, Facial Electromyography, Galvanic Skin Response, electroencephalograph**

I. INTRODUCTION

We humans express our mental state, thoughts, and wishes, and everything through user's facial expression, way of speaking and body movements. This mostly happens when users are trying to interrelating them with the devices. Users psychological condition shapes judgements which users compose, it also governs that how users contact with other users, and affect our execution. "The ability to attribute mental state to others from our behaviour and to use that particular knowledge to guide our own actions and predict those of others is called as theory of mind or we can state it as mind-reading".

Pre exist computer devices interaction is often mind blind which is usually "oblivious to the user's mental state and intentions". Any computing device may wait to an unspecified time to any input from a user who is not present, or finalize to do unimportant assignment while human is frantically, working hard headed towards an definite goal.

Which results that an existing computer technology often frustrate the users because it has less influential control and can't instigate dealings with users. Even if it does take the first step, like now retired "Microsoft Paperclip", they are most of the time mistaken and inappropriate, which obviously annoy the users.

With the speedy increase in difficulty of the availability of the mobiles and the wearable equipments and computer technologies, so there is an urgent need of such equipments which are usually conscious with the user's psychological state that actively react to those psychological states.

Software from Neve vision recognized 24 features of the facial expressions and also record those in actual time, motion, profile and colour are then also analysed to identify behaviours, human natural behaviour like: - a smile or change in eyebrows. Combination of these changes is happening time to time which indicates the mental state. For better illustration we take an example in which the motion occurs in user's head and the change in facial expressions due to smile which might mean that user might be interested or not.

Recent ventures of Cambridge are taking the inputs like body postures and behaviour to get better suggestions. We can also apply exact replicas to the organizations which organize the moving pictures

of the comic characters. This becomes quite useful so we are looking forward to make use of the brain reading devices which supports "online shopping" & "learning systems" too. These systems can also be used to examine & to recommend enlargement in the individual interactions.

II. WHAT IS MIND READING?

Pre-defined structure of brain reading draws revelation from the psychology [7], and from the "computing vision" and "machine learning" [1], the team working in the Computing Laboratory in the University of Cambridge produced mindreading devices that implement a pre-defined model of mindreading to recognize psychological state of user by the change in their facial expressions.

The motive is to increase the interaction between the computers and the humans through some required responses and to rectify the development of the user and also to activate applications which are used to begin interactions and in the place of the user, but it does not wait for the input from that user.

With the use of a digitalized camera, the mindreading systems analysed human's behaviour of face in recent time and refers that to the user's principal psychological state, like: - whether he/she is either agree or disagree, either interested or not interested. Previous acquaintance of how someone's defined psychological states can be articulated in the face which is merged with the study of facial appearance and the head movements occurs in actual time.

"The structure represents all these at differentiative method which starts with the face and the head movements and creating those in time and space to form a cleaner structure of what mental state is being showed by the mind-reading computers".

The mind-reading systems corresponds the information about user's mental state as easily as a computer reacts to the user's commands. Just think

about a future in which we all are encircled with electronic devices like: - mobile phones, vehicles and online services use the internet which can encode user's mind and react as per the mood of the user. Not the mind reading devices in vehicles only to sense the vehicle driver's psychological state while driving like sleepiness, disturbance, and hunger. Recent surveys in the Cambridge University are deliberating some more and inputs for example – human body behavioural so the inferences can be improved.

III. WHY MIND READING?

How would the mind reading systems are changing our daily need of the technologies and our regular life? These machines are working with very popular car constructor so that we can check and put in practice the devices in car so that we can detect driver's mental state like dizziness, distractions, hunger.

Recent survey of a popular University is taking some further inputs like the changes occurred in our body so to improve the inference. The similar representation can also be used just to manage comic characters movement. Researchers are looking forward to use the mindreading systems which support online shopping using internet and student's studying systems. The mindreading systems can also be used only to observe by watching it continuously and to suggest some changes in person to person involvement. A very effective group of MIT Media Laboratory which is the Computing group is developing a very touching that can help to explore new technologies which augment and make better in people's social interaction skills also the communicating ability.

IV. HOW DOES IT WORK?

The mindreading systems mainly include the volume to measure & maintain the level of the oxygen in blood flow in the user's brain, by considering a popular technology called FNIRS (Functional Near-Infrared Spectroscopy). To do

that the suspect has to wear a kind of futuristic headgear which send some light in that particular spectrum into the blood tissues of the head where it will be absorbed or soaked by the active blood-filled tissues of user's head. The headgear is used to measure what amount of light is not absorbing also letting the computer interact with metabolic requirements which is creating by the brain or mind. Then the result of this is probably being evaluate in contrast to MRI's, but these can easily be gathered by the "low weight" & "non-invasive" tools.

On wearing the "Functional Near-Infrared Spectroscopy" headband sensors, the subjects on which experiments are doing were requested to just count the no. of squares which are rotating onto a screen and projected and were told to perform few other tasks tool. After the completion of all tasks the subjects were told to be gathered and asked to feedback about the level of difficulty of the assignments and also their evaluation which agreed with the intensity of the work which will be detected by the "FNIRS" headgears devices to 83% of normal time.

Fig1: A person wearing futuristic headband

"The particular area of the brain where the blood-flow change occurs should provide indications of the brain's metabolic changes and by extension workload, which could be a proxy for emotions like frustration[3]".On computing the psychological workload & the interruptions which can be strictly bounded whether approximately noticing the devices users or to process the surveys after the completion of the tasks. "A computer program which can read silently spoken words by inspecting

nerve signals in our mouths and throats has been successfully developed by NASA". The result defined that on using "button-sized"(very small in size) sensors, which are attached 'under the chin and on the side of the Adam's apple, it is possible to pick up and analyze nerve signals and patterns from the tongue and vocal cords that can be analogous to specific words'
.

Fig 2: futuristic headband

| Working Areas	Uses
Military Areas	A science fiction fantasy– where the governing authority reads people's memories and ideas and then re-establish them through torture before they even commit a crime based on a statistical machine.
Medical Areas	1. Mind-Reading Machine provides Voice, Movement to the Paralysed: Advance technology may help those who are locked inside their own bodies (like in locked in-syndrome). 2. Mind reader machine can communicate with the patients in coma: Researchers have developed an interesting machine which can read mind and could be helpful to communicate with the People who are in coma.
Gadgets	Mindreading technique can also used in mobile phones, cars, keyboards and mouse etc.

V. WEB SEARCH USING MIND READING COMPUTER
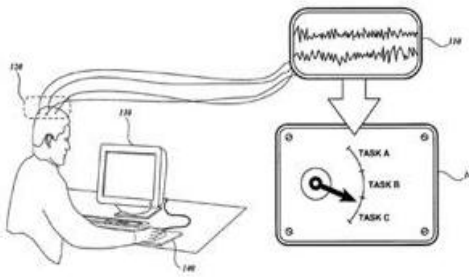
Fig 3: Web-Search

Let us check for 1st test of the sensor, in which the researchers skilled the softwares and programme them to acknowledge 6 words at a time including "left", "right" & 10 numbers for "go" The suspects attached with the sensors spoke the words silently to themself but the software heard that accurately and also picked up the signals up to 92% of the time, which is great for a device to do that. After that the researchers bifurcates the letter and put them into a matrix by aligning them into each and every row of matrix also label them with a different one-digit number to each. In such a way that each and every letter of the alphabet will be showed by a exclusive or a distinctive group of different numbers coordinates. "These were used to without noise spell 'NASA' into a search engine using a program. That proved we could browse the web without using a keyboard".

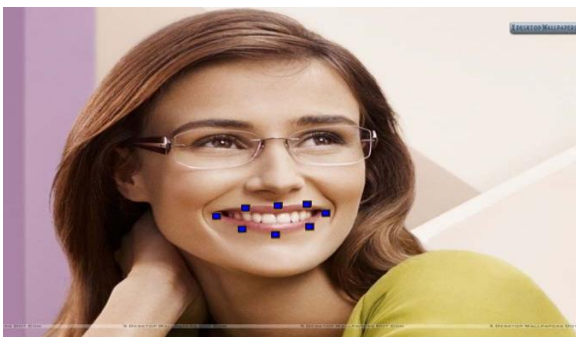### VI. TECHNIQUES:

- Facial Expression Analysis

Fig 4: Smile Expression

The action and expressions of anyone's faces are usually identify by some feature points like: -shape compilation, color & motion definers. Shape-based and motion analysis are particularly suitable for an actual time video system color based analysis is invariant and is computationally efficient to the viewpoint or scale of the face, especially when combined with feature localization [5] .

For lip shape tracking that identifies for example smile (lip corner pull) and lip fold the polar distance between each of the two anchor point and mouth corners is computed. The average percentage change in polar distance calculate with respect to a starting frame is used to judge mouth displays .

Estimation of head roll using the angle between the two inner eye corners

Fig 5: Facial Expression

- Facial Electromyography

A type of electromyography technique that approximate muscle activity by measuring the tiny electrical impulses that are produced by muscle fibbers when they contract is called Facial electromyography.

"It focuses on different major muscle groups in the face, the corrugator's supercilii group which is associated with the zygomaticus and scowling major muscle group which is connect with smiling".
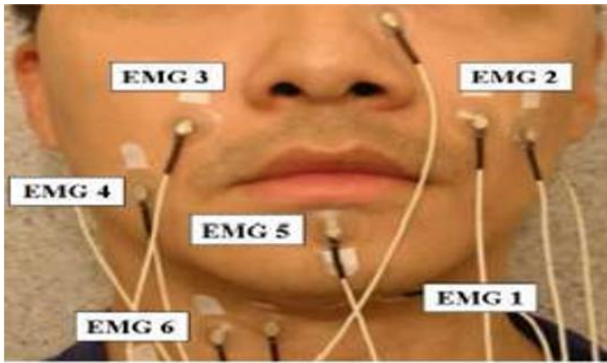
Fig 6: Facial Electromyography

- Galvanic Skin Response

"EDA (Electro-dermal activity) is the property of a human body that causes continuous variation in the electrical characteristics of the skin". Previously, Electro-dermal activity has also been known as skin conductance level (SCL), skin conductance response (SCR), psycho-galvanic reflex (PGR), electro-dermal response (EDR), sympathetic skin response (SSR) and galvanic skin response (GSR).

In the old stories or theory of the electro-dermal activities stated that it usually holds the resistance of skin which varies as the change in the sweat glands present in the skin of our bodies, because of which sweating occurs and is monitored by the sympathetic nervous system or the skin conductance which is an indication of physiological arousal. The skin conductance will grow if and only if the sympathetic branch of an autonomic nervous system is majorly aroused, which arises the activity of sweat glands and grows the skin conductance. This measures the sympathetic and emotional responses by the help of skin conductance. "More recent research and additional phenomena (admittance, resistance, potential, and impedance, sometimes responsive and sometimes apparently spontaneous) suggest that EDA (electro-dermal activity) is more complex than it seems, and research continues into the source and significance of electro-dermal activity".

Study of Electro Dermal Activity (EDA) stated such vital and important tools as the

electroencephalograph (EEG) and the electrocardiograph (ECG or EKG).

Fig 7: Galvanic Skin Response

VII.   ADVANTAGES OF MIND READING COMPUTER

1. This structure of mind-controlled wheelchair invented from the authorities of the University of Electro-Communication in Japan. Let user feel like the struggle of the two half Professor X and Stephen hawking which except with the theoretical physics skills of the former and the technical skills of the latter. A minute difference from the Mind-Computer Typing machines, these things works as a mapping brain waves when you thought about the movements like left, right, forward or backward, after that assigns to a wheelchair commands of actually moving to the left, to the right, to forward or to backward. This result in that user can slide the wheelchair even with the power of user's brain. This device doesn't give user the MIND BULLETS (apologies to Tenacious D) but these does allows the people who can't use other wheelchairs to get around in easy way.

2. In regular life, machines can be used to exchange the information with humans who can also use these in a crowded place like buses without knowing them.

3. It can also be used as to find and raise problem about submitted product of equipments used for "screening suspected" as the terrorist also as the

"predicting future" which can be hazardous in general.

4. We now-a-days are very closer than that of ever to the "crime-prediction" technologies of "Minority Report".

VIII.   DISADVANTAGES OF MIND READING COMPUTERS

1. Researchers from the Max Planck (IHCBS), along with scientists from Tokyo and London, asked subjects to secretly decide in advance whether to subtract or add two different no. they would later are shown. Using FMRI or functional magnetic resonance imaging and computer algorithms, the scientists were able to estimate with 70 % accuracy what the candidates' aims were, even before they were revealed the numbers. The popular press tends to dramatic over scientific advances in mind reading. FMRI results have to account for motion, heart rate, respiration and a number of other factors that may every cause variance in the signal. Also, individual brains differ, so scientists required to study a subject's patterns before they can teach a computer to recognize those patterns or make predictions.

2. The records and the Study defines that the DNA & all the organic features like dopamine receptors, frontal lobe issues and low serotonin are greatly associated with illegal behaviour. On the other hand no one can force to make you a criminal. It only occurs when the mixture of biological factors get worsened the natural conditions.

3**.** The scientific advances like official scholars are initiating to the questioning introduction rules of the illegal honest management.

IX. CONCLUSION

It has been noticed that the brain-reading is restricted to a particular limit. "In practice, exact reorganizations are not possible to achieve by any recreations algorithm on the basis of mind job's or behaviour's signals acquired by the FMRI organization. This happens because all the recreations will inevitably be restricted by incorrectness on the defined structures and noise in the calculated signals. The result demonstrates that the natural picture prior is a powerful (if unfamiliar) instrument for mitigating the consequences of the fundamental boundaries. A real image prior with only 6 million pictures are sufficient to create regenerations which are strictly structural and semantically exact to a target picture.

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