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AI WITH CYBORG INTELLIGENCE – FUTURE OF INTELLIGENT MACHINES

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Abstract*:* Artificial intelligence do provide a decision making mechanism that operate over a predefined programming scopes that restrict it from taking decision beyond the limits of a program. Whereas human thinking and intelligence can able to solve uncertainty in an unexpected situation. Future of science and engineering must have to deal with intelligent machines by interfacing human intelligence with artificial intelligence. A futuristic machines is not just a type of science specific creation but the interfacing of all related technologies from diversified spheres of sciences. This paper emphases on the current state of AI and its future demand for cyborg intelligence.AI systems could greatly benefit from biological intelligence, solving problems that are still beyond the capabilities of the state of the art.

Keywords: Artificial Intelligence, Cyborg intelligence, Neural cell interface.

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INTRODUCTION

The blue brain project, artificial neural network, fuzzy logic, genetic algorithm and pattern recognition are few of the techniques that lets the building of a artificial intelligent system which is controlled by a software or a specific program. In reality the skill of a programmer is the real intelligence and not the performance of the machine, it just obey the order of executed instruction in every clock cycle. The modern developments in processor and machine architecture help the machine and programmer to work better. And this is what artificial intelligence is all about. The word 'artificial' is the reason why.

While dealing with an undefined programming logic in the code, the AI machine halts or make wrong execution reducing the efficiency of code.

COGNITIVE SCIENCE:

The gold standard of cognitive science is Tran's disciplinary cognitive modeling of human behavior evaluated by quantitative comparisons with experiments involving human participant, encompassing psychology, artificial intelligence, linguistics and many more disciplines. Cognitive science is the science that let need to think beyond programming scope of the machine with more human way. AI itself is an attempt to build and understand agent that can behave intelligently, the engineering AI which built agent without modeling natural intelligence.

CRUM: Computational Representational Understanding of the Mind. Cognitive scientist disagree with the nature of the computational process that takes place in the intermediate level and also about the form the mental representation take. The diagram shown in figure elaborates CRUM, based on Searle's characterization of cognitive science in the Rediscovery of mind(1992), also in Thagard's In Mind(1996) .

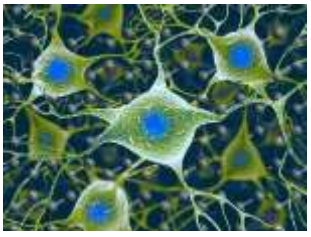

Fig. Neuron cell

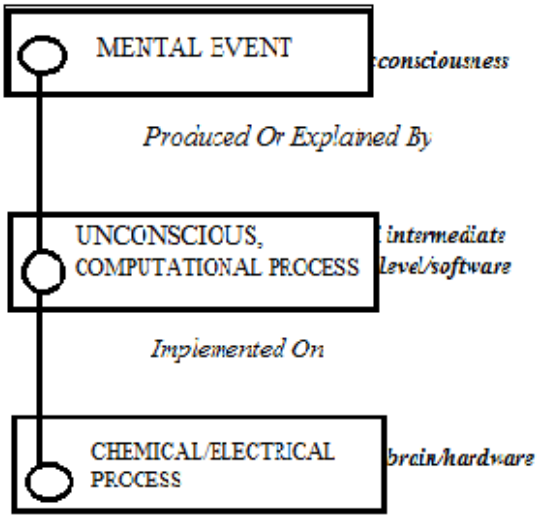

Fig. CRUM

BIONICS: Is a common term for bio-inspired information technology, typically including three types of systems, namely:

• Bio-morphic (eg neuromorphic) and bio-inspired electronic/optical devices,

• Autonomous artificial sensor-processor-activator prostheses and various devices built into the human body, and

• Living-artificial interactive symbioses, e.g. brain-controlled devices or robots.

In spite of some restrictive use of the term 'bionics' in popular culture, as well as the unfulfilled promises in the fields of neural networks, artificial intelligence, soft computing and other 'oversold' areas, it was agreed that the name bionics as defined above is the right one for the emergent technology also described as bio-inspired information technology.

MAJOR TASKS AND CHALLENGES:

1. To understand the structural complexity and the processing mechanisms of the brain.

2. The isomorphism between the structure of the brain and the structure of its output (be it thinking or behavior).

3. Functional anatomy, necessary to understand structural principles of the brain.

4. Neurophysiology, necessary to understand the signals processed in the brain.

5. Computational neuroscience, including models from robotics, artificial intelligence, spatial-temporal computing etc, which provides the theoretical framework within which experimental questions are asked, highlights the mechanical, geometric and control issues that the brain must come to grips with, and generates models which help test the adequacy of scientific explanations and engineering applications.

6. To understand the mechanisms of a synapse with intrinsic plasticity, and their implementation.

NEURAL MICROSYSTEM:

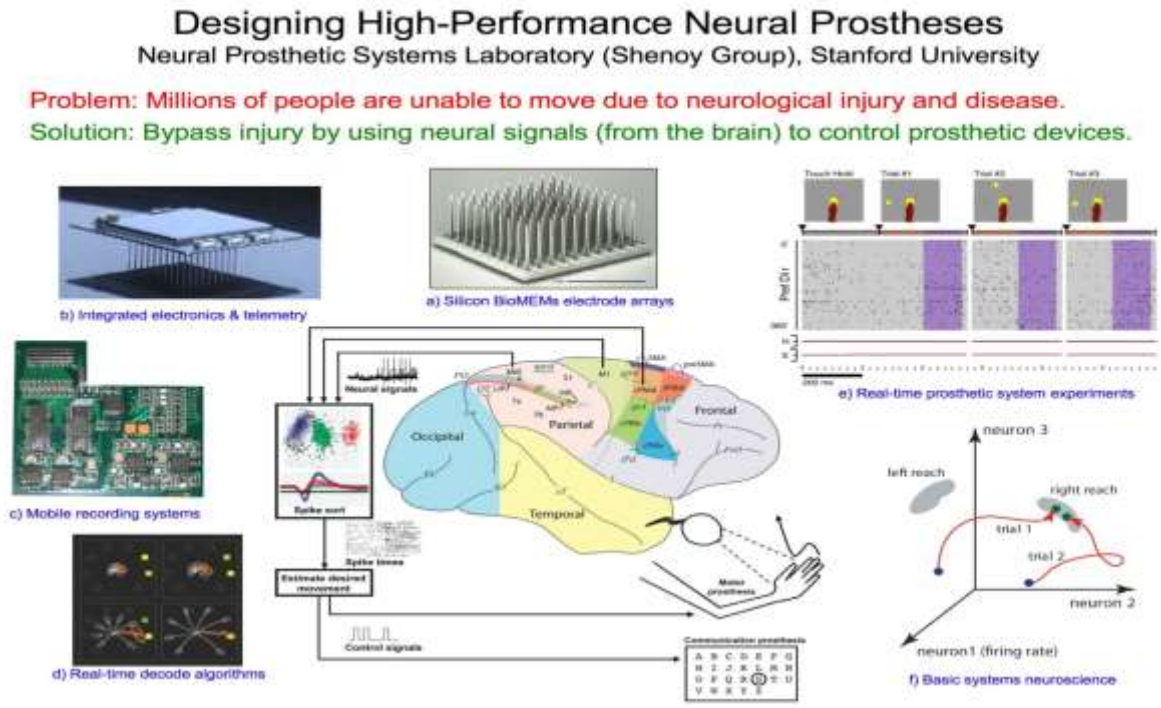

Fig. Neural Prostheses

From an engineering point of view, the nervous system, which is made of neural tissue, is a most complex biological system. All possible instruments or tools for applications related to the nervous system are part of another type of complex systems: biomedical instrument systems. As in any interacting system, "communication" can occur at the interface of these two systems. Depending on the kind of application, this communication can be either unidirectional or bi-directional. The signals found in these two systems are of very different

Nature:

• In the nervous system, signals carrying information over distances use evoked potentials involving a high number of ionic transport and neurotransmitter activation mechanisms. Transduction of a signal coming from the external world (e.g., chemical, optical, mechanical, magnetic) is performed by receptor cells using countless mechanisms (Bear et al, 2001).

• Most signals in biomedical instrument systems are electrical, chemical, optical, mechanical, and magnetic. The nonelectric signals are usually converted at one point or another via a transducer into electrical signals in order to be compatible with the electronic computer world.

MACHINE LEARNING WITH NEURAL CELL: The artificial neural cell and network with synaptic plasticity also known as Hebbian Learning to train a robot to respond intelligently. Experiences change the way one perceives, performs, thinks and plan. They do so physically by changing the structure of the nervous system, alternating neural circuits that participate in perceiving, performing, thinking and planning. A very simplified view of learning would state that learning modulates (changes) the input output, or stimulus action relationship of an organism. Certainly our environment influences how we react to it, and our reactions influence our environment. Artificial neural network with limited neuron needs to be programmed first to achieve task, but neural cell grow itself to make synaptic connection while learning.

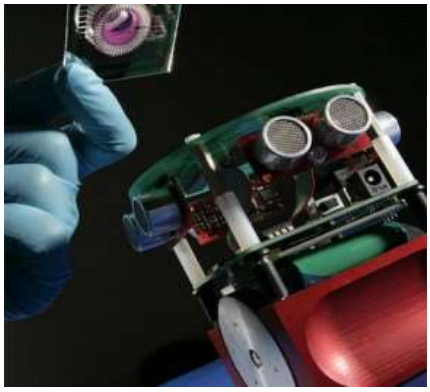

Fig. Robot with neural cells

BRAIN MACHINE INTERFACE: The brain machine interface (BMI) is a new method for man machine interface which enable us to control machine and communicate with others, without input device but directly using brain signals. A fully implantable wireless system is indispensable for the clinical application of invasive BMI in order to reduce the risk of infection. It include a

integrated analog amplifier chip, a Bluetooth wireless data transfer circuit, a wirelessly chargeable battery, 3 dimensional tissue fitting high density electrode.

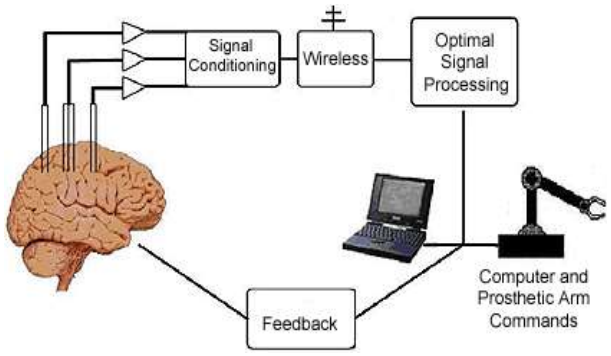

Fig. BMI Invasive Method

PATTERN RECOGNITION WITH ANIMAL SENSOR INTERFACE WITH NEURAL CELL: Pattern recognition is a data analysis method in robotics and artificial intelligence. This include image recognition, face recognition and so on. The recognition method with animal sensor can make the machine more environmentally responsive as compared to limited input. Example include heat sensor in snake, sonar sensor in bats, better night vision and so on. Few part of brain are responsible for certain sensor but if cultured neuron, if learned, to access extra sensors, it will provide more input data to machine so that it can be take more decision efficient than human.

CYBORG: As research continues, the line between humans and machines begins to blur. In fact, AI is extending to include biological Intelligence. Cyborg intelligence is dedicated to integrating AI with biological intelligence by tightly connecting machines and biological beings, for example, via brain-machine interfaces (BMIs). BMIs bring the promise to enhance strengths and compensate for weaknesses by combining the biological perception/cognition ability with the machine's computational ability. Here, cyborg refers to a symbiotic bio-machine system, consisting of both organic and computing components. Tightly-coupled connection between the organic and computing parts is a key feature of cyborg intelligence. There are two critical emerging technologies pushing the convergence of machine and biological intelligence. The first one is BMIs, often with real-time neurofeedback (NF). BMIs aim at a communication pathway in bridging the workings of machines and the brain. BMIs operate at the nexus of thought and action, exploiting the brain's electrical signals to maneuver external machine actuators and feeding the machine-coded neural information back to the brain to regulate the brain's behaviors. Bidirectional BMIs with real-time NF are promoting the connection of machines and the brain at multiple levels. The second technology is neuromorphic computing,

which further envisions the closely-coupled connection and software systems to mimic biological models of neural systems (such as perception, motor control, and multisensory integration). It often attempts to incorporate detailed behavior models of an individual neuron, even including realistic neural conductance and ion channel models. The fine-grained electric mimicry of the nervous system makes the machine side closer to the biological side. Thus, it reduces the difficulty in integrating machine and biological intelligence. The future of cyborg intelligence may lead towards many promising applications such as neural intervention, rehabilitation, medical treatment, and early diagnosis of some neurological and psychiatric disorders. It may replace, repair, assist, and augment human sensory-motor or cognitive functions. For example, neuroprosthetics can replace a missing body part and still interface with the human nervous system and brain to increase precision and comfort of movements or memory chips for restoring and enhancing memory function. Cyborg intelligence has the potential to make the bionic man reality. While cyborg intelligence has many potential exciting applications, research in this area is still in the preliminary stages.

DEVELOPMENT OF CONSCIOUSNESS IN MACHINES: We might conclude that consciousness emerges gradually with the development of brain.

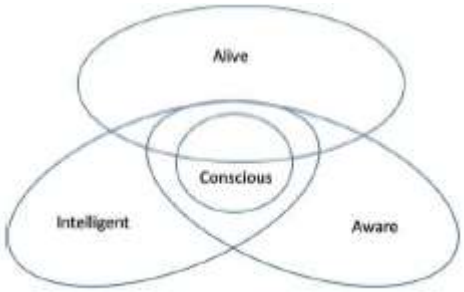

Fig. Consciousness Presentation

Intelligence uses sensors and actuators within its embodiment to perceive and act on the environment. In this interaction with environment, it learns to recognize objects and learns effects of its actions. By learning limitations of its embodiment and predicting how its own embodiment may affect the environment around it, machine learns to be aware of itself in a given environment. The machine with neural cell will learn through machine learning mechanism (try and error) develop neuron network that let it aware about its existence and its skills. Consciousness can only be developed if it compare itself with rest of the environment with similarities and differences. The consciousness is a neural and philosophical activity, more the neuron higher the consciousness and it takes generations of machines just like primitive to

complex life transformations. So if machines needs to be conscious it must be a machine with neural cells.

CONCLUSION:

Human brain can't be replicated in the sense of its achievements, experiences it got from its life span, the art it learn, the skill it mastered.AI with Cyborg intelligence is the truth of tomorrow that will enhance the capability of human brain by giving it more senses and strength to firmly place its step in the future . Perhaps the most important point here is that we are considering not merely a physical extension of human capabilities but rather a completely different basis on which the cyborg brain operates in a mixed human, machine fashion. Consciousness is the part of human brain but it will be the revolution if it can be developed in the cultured neural cells.

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