Gladkikh Global Project

IDEAS and SOLUTIONS for fundamental problems of SCIENCE and TECHNOLOGY

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Considered are three projects. In the project “Mechanical Robots”, a control system is discussed, based on techno-genetic code. In the project “Artificial Intelligence Based on N-neuron modules”, the notion of intellectonomy is introduced and its laws are examined. The project “Controlled thermonuclear fusion” mentions the problem of control over thermonuclear fusion reaction, which is proposed to solve by the cybernetic model of the structural unit of substance.

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There are a number of important scientific and technical problems existing that have not been resolved yet. For example:

- The control over the thermonuclear fusion is not secured.
- Two-legged robot is not designed, able to cover a cross-country walk of 100 miles for 10 hours.
- Artificial intelligence is not created yet, which would allow for the dialog between the people and the computers in natural language, so that for a human it would be possible to communicate with machine as comfortable as with another human.

The authors invite you to a great creative work to address these and other problems of modern science and technology.

Artificial intelligence
cannot be devised like a novel
and it is impossible to be proven like a theorem.

The authors aimed to show the ways
of constructing a material bearer
of artificial intelligence.

INTRODUCTION

Konstantin Tsiolkovskiy once said: “The Earth is the cradle of humankind. But it is impossible to stay in a cradle for ever”. His words are especially understandable now, when the plans are announced about the Moon colonization and expedition to Mars.

Which global scientific and technical problems must be addressed for successful exploration of outer space?

1. A highly efficient autonomous energy source is required — a nuclear reactor. Physicists have been working on the problem of controlled thermonuclear fusion for many years. However, till nowadays nobody knows how to **keep** plasma — a substance, warmed up to tens of millions degrees — in a container.

2. The outer space beyond the Earth atmosphere is an extremely aggressive environment for every living being. The machines with the elements of artificial intelligence, a walking anthropomorphic robot (robot-android) among these, could render a great help for the people concerning the exploration of planets. However, despite the partial successes achieved, two-legged robot is not created yet, able of 100-mile cross-country walk for 10 hours. The essence of the problem is “How would a two-legged robot **keep** the equilibrium (balance), striding across a hard terrain of arbitrary relief?”

3. During the establishing of human settlements on the planets, a supercomputer is required able to perform total control over the human habitat, all the machinery, mechanisms, production complexes. Supercomputer should be able to speak human language and monitor the vital activity of each individual. Absence of full-value artificial intelligence is related, apart from technical complications, also to the fact that the problem “How would a machine **keep** to the meaning of a dialogue?” is not resolved. How to stay within the confines of context during the dialogue? What is “meaning”?

These and other important problems are waiting for their solution.

PROJECT No 1. Mechanical Robots. Control Systems Based on the Techno-genetic Code

1.1. Rotating manipulator with three independent arms, each of which has four possible quiescent positions

In order to introduce the term "techno-genetic code" (T-code), we need to describe the so-called three-armed rotating manipulator.

First, we are going to describe one-armed rotating manipulator with four quiescent positions.

Let's consider a cylinder (metal disk), able of rotation, thanks to an engine, relative to the vertical axis *A–A´* that passes through the center ***O*** of the disk (Fig. 1).

Fix — for example, by welding — a metal rod with the length ***a*** to the disk with the center ***O***, so that it would have an inclination of 45° to the vertical axis *A–A´* (Fig. 2).

Assume that the upper point of the rod, $\boldsymbol{O}_1$, can move discretely from point $\mathbf{C}_1$ to point $\mathbf{A}_1$, from $\mathbf{A}_1$ — to $\mathbf{G}_1$, from $\mathbf{G}_1$ — to $\mathbf{U}_1$, from $\mathbf{U}_1$ — to $\mathbf{C}_1$ again in the process of rod rotation, i.e., there are only four points, where the upper part of the rod $\boldsymbol{O}_1$ can be (Fig. 2). We call the above-described construction a one-armed rotating manipulator with four possible quiescent positions.

The top view of one-armed rotating manipulator is represented in Fig. 3. The upper point $\boldsymbol{O}_1$ of rotating manipulator's first arm can take any of four positions: either $\mathbf{A}_1$, or $\mathbf{G}_1$, or $\mathbf{U}_1$, or $\mathbf{C}_1$.

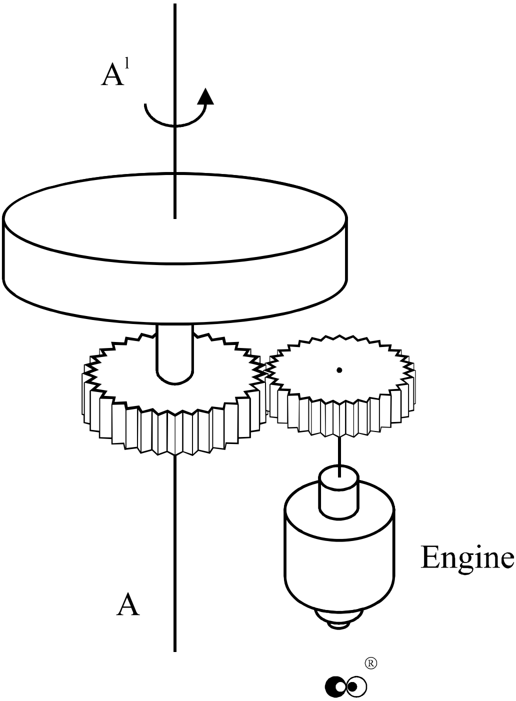

Fig. 1

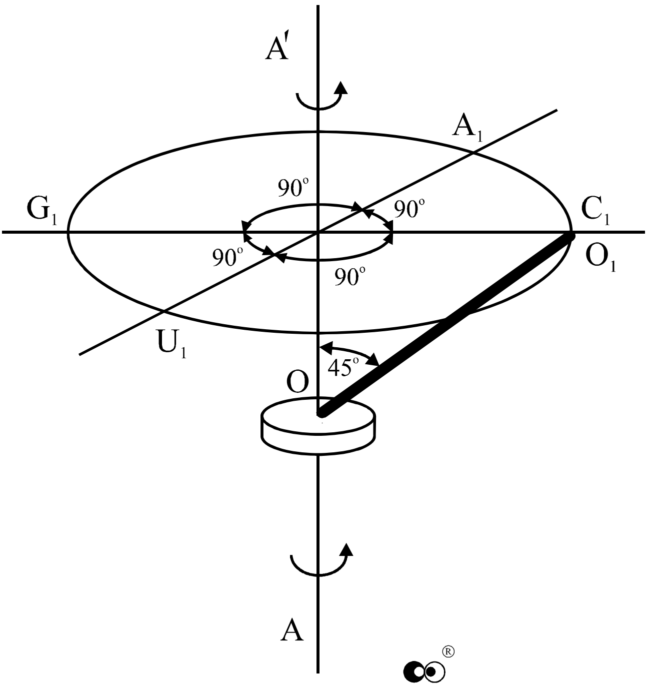

Fig. 2

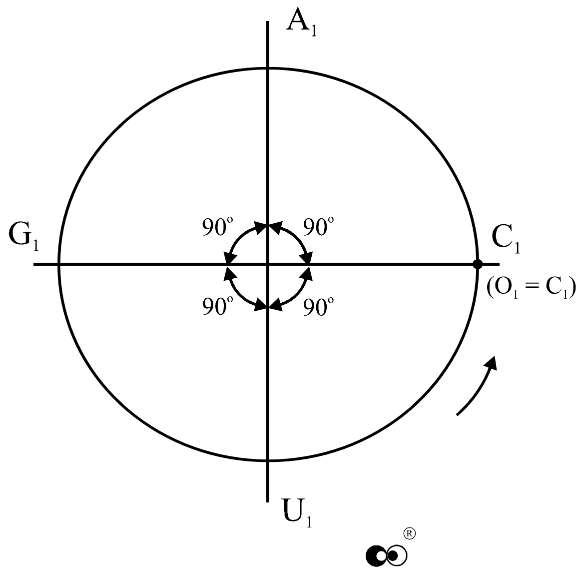

Fig. 3

Furthermore, consider a rotating manipulator (Fig. 4), similar to the one considered above, but with a rod of the length of $\boldsymbol{a}\sqrt{2}$, and put its lower part — the base — to the point $\boldsymbol{O}_1$, so that the new (second) rotating rod would prolong the first. The second rod is the second arm of manipulator, and its independent engine allows for the upper point $\boldsymbol{O}_2$ to move discretely from point $\mathbf{C}_2$ to point $\mathbf{A}_2$, from $\mathbf{A}_2$ to $\mathbf{G}_2$, from $\mathbf{G}_2$ to $\mathbf{U}_2$ and from $\mathbf{U}_2$ — to $\mathbf{C}_2$ again. We will call such construction of two independently rotating rods with the lengths of $\boldsymbol{a}$ and $\boldsymbol{a}\sqrt{2}$ a two-armed rotating manipulator (Fig. 4).

Consider the top view of two-armed rotating manipulator (Fig. 5). When the upper point $\boldsymbol{O}_1$ of the first arm of rotating manipulator is in position $\mathbf{A}_1$, the upper point $\boldsymbol{O}_2$ of the second manipulator's arm, being an extension of the first arm and rotating independently on it, can take any of four positions: either $\mathbf{A}_2$, or $\mathbf{G}_2$, or $\mathbf{U}_2$, or $\mathbf{C}_2$. This situation can be described through the four pairs: $(\mathbf{A}_1\mathbf{A}_2)$, $(\mathbf{A}_1\mathbf{G}_2)$, $(\mathbf{A}_1\mathbf{U}_2)$, $(\mathbf{A}_1\mathbf{C}_2)$, where in the first place of the pair, there is $\mathbf{A}_1$ — the position of the upper point $\boldsymbol{O}_1$ of the first arm of rotating manipulator, while in the second place there is either $\mathbf{A}_2$, or $\mathbf{G}_2$, or $\mathbf{U}_2$, or $\mathbf{C}_2$ — one of the positions, in which the upper point $\boldsymbol{O}_2$ of the second arm of the manipulator can be found. It is not difficult to calculate the total number of points, in which the upper part (point $\boldsymbol{O}_2$) of the second arm of two-armed rotating manipulator can be. Obviously, it is equal to 16. Let us list these points:

$\mathbf{A}_1\mathbf{A}_2$	$\mathbf{G}_1\mathbf{G}_2$	$\mathbf{U}_1\mathbf{U}_2$	$\mathbf{C}_1\mathbf{C}_2$
$\mathbf{A}_1\mathbf{G}_2$	$\mathbf{G}_1\mathbf{U}_2$	$\mathbf{U}_1\mathbf{C}_2$	$\mathbf{C}_1\mathbf{A}_2$
$\mathbf{A}_1\mathbf{U}_2$	$\mathbf{G}_1\mathbf{C}_2$	$\mathbf{U}_1\mathbf{A}_2$	$\mathbf{C}_1\mathbf{G}_2$
$\mathbf{A}_1\mathbf{C}_2$	$\mathbf{G}_1\mathbf{A}_2$	$\mathbf{U}_1\mathbf{G}_2$	$\mathbf{C}_1\mathbf{U}_2$

Finally, take the same rotating rod as the first and the second ones, but with the length of $\boldsymbol{a}/4$, and put its lower part into the point $\boldsymbol{O}_2$ so that the third rotating rod would prolong the second. The third rod — the third arm of rotating manipulator — has, like the first and the second rods, the inclination to the vertical axis $\boldsymbol{A}$–$\boldsymbol{A}'$ equal to 45°. Besides, the third rod has its own engine, independent on others, which allows the upper point $\boldsymbol{O}_3$ of this third arm to move discretely by a circle from point $\mathbf{C}_3$ to point $\mathbf{A}_3$, from $\mathbf{A}_3$ to $\mathbf{G}_3$, from $\mathbf{G}_3$ to $\mathbf{U}_3$, and from $\mathbf{U}_3$ — to $\mathbf{C}_3$ again (Fig. 6).