4. Young, A., & Sauter, M. B. (2020). 21 Most Important Inventions of the 21st Century. Retrieved October 24, 2021, from https://247wallst.com/special-report/2020/01/06/21-most-important-inventions-of-the-21st-century-2/5/

ROBOT WITH A DIGITAL WORM BRAIN

Yana Leta

Institute of Physics and Technology,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Imagine that you are a neurologist and live in 2030. In the morning, when you wake up, the robot butler brushes your teeth while the 3D printer prints the disposable clothes for you for the day ahead. You happily sit down in your self-driving electric car to travel to your computerized laboratory. Today is the big day: you are running a human brain simulation on a supercomputer for the first time. You turn on the machine, download the software and press "Start".

Applause among your colleagues. This thing works! Each simulated neuron behaves exactly as you would expect from the present. The champagne is open, grandiose plans have been made, and there are lively discussions about the healing of all possible brain diseases. In the evening you feel tired, so you decide to turn off the simulation and drive home. But when you want to close the program, a text message appears on the screen: "Please do not turn off, I am too young to die!"

Suppose that the computer will be able to simulate the human brain with an accuracy of 1:1, will it be possible to communicate with it? What if he even develops the most real consciousness? These questions are so difficult to answer that even humble philosophers have nothing to say.

The microscopic nematode worm C. elegans should act as a mediator in the dispute. These individuals, only one millimeter long, are male and also bisexual. They can be found almost everywhere. This worm emphasizes the exact number of cells in its body. Each individual has exactly 302 neurons. The number of cells remaining in the body is also constant – 959 cell nuclei in hermaphrodites and 1031

in males. Perfect prerequisites to become the first living thing fully recreated on a computer.

The Open-Worm-Project is an open-source project designed to simulate a fully functional C. elegans worm on a computer. The animal is digitally recreated, cell by cell, in the hope that the virtual worm will behave in the digital environment like a real one. The biggest problem here is the animal brain. Although the connection between individual brain cells is already well understood, will a simulated worm behave exactly like its real prototype? To test this, the worm's digital brain was fed to a futuristic high-tech machine: a Lego robot. Perhaps someday we will be able to fit a digital human brain into a robot, as we did with the C. elegans brain.

It is small in size, white and grey and has three wheels, two of which are steerable. The robot is equipped with sensors that transmit sensations to a computer, where the worm's digital brain is simulated. If a robot gets in the way, it detects an obstacle using the echo sounder and sends the information to the data center. The neural connections that C. elegans normally use to control its muscles were digitally connected to the two wheels of the robot. After launching, this little robot began to behave like a worm.

It moves forward when its power sensors are activated. When the robot hits an obstacle, it stops, turns around and runs away. Amazingly, a robot was never programmed to do what it was supposed to do. Nobody taught the digital worm to move towards the stern. Instead, his simulated brain developed this behavior on its own.

If you can simulate a simple worm brain that behaves, at least in part, like a real one, why not create something more?

Will we ever be able to fit a digital human brain into a giant Lego robot and walk the streets with it?

Is it killing to take apart a robot with a human brain inside if you want to build a Lego castle from its bricks? It is not so easy to give a correct answer to this question. But perhaps our friend from Lego in a couple of years will be able to express his own opinion on this matter.

Reference:

Moder M. (2019). Genetics for breakfast. *Scientific life hacks for everyday life*, 40-41.

AUTONOMOUS HOUSE

Kateryna Liakhova

Institute of Energy Saving and Energy Management,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

Ukrainian startup "Autonomous House" is a thirst for freedom.

Every year the number of people on the globe grows. The question is not only "where do people live?" The question of whether there are enough resources on Earth to ensure the comfortable living of mankind is very important. The idea of saving resources has also become very fashionable today. This includes the reuse of things and substances. Ten years ago, a house independent of electricity, sewage and water supply was considered science fiction. And now it is the result of the work of Ukrainian enthusiasts. A completely autonomous house is a product of the Ukrainian startup Haus.me. The Ukrainian team is developing the latest engineering ideas for detached houses. The founder of the Ukrainian startup Haus.me is Maxim Gerbut.

The use of traditional gas and coal has a greenhouse effect and is very harmful to the environment. Experts from the International Energy Agency predict a doubling of global energy consumption by 2030. So, it is time to find new energy-efficient solutions, including in construction. The first prototypes of such houses appeared in Germany, Canada and the United States. The house is made using frameless technology of composite fiberglass, stronger than steel. But it is much lighter and more elastic. It also has good thermal insulation and seismic resistance. A wall that is 23 centimeters thick retains heat like a brick wall that is 9 meters thick. The house has a tank for 2 tons of water generated from the air. The water filtration system uses reverse osmosis to provide housing with drinking water. Additionally, water supplies can be replenished by a special installation that condenses moisture from the air. The