in passenger carriages, especially in the interior, must be certified, and its characteristics should not exceed the established standards.

Analysis of the properties of materials and the criteria applied to them enables the formulation of requirements for polymeric materials for interior coatings and their reasoned selection.

REFERENCES

1. Chuiev, M. V., & Klymenko, N. V. (2015). Polymer composite materials in the modern world. Publishing House of KNEU.
2. Gibson, R. F. (2013). Principles of composite material mechanics. CRC Press.
3. Kovalchuk, O. I., Stelmashchuk, V. P., & Halagan, N. M. (2014). Technology of polymer materials. Publishing House "Ukrainska Knyha".
4. Petrik, O. V., & Honcharenko, V. H. (2018). Modern polymer composites. Logos Publishing House.

B. Sobchuk, S. Klymenko, N. Kaliberda

THE UNCANNY VALLEY EFFECT OR HOW OUR BRAIN PERCEIVES ROBOTS

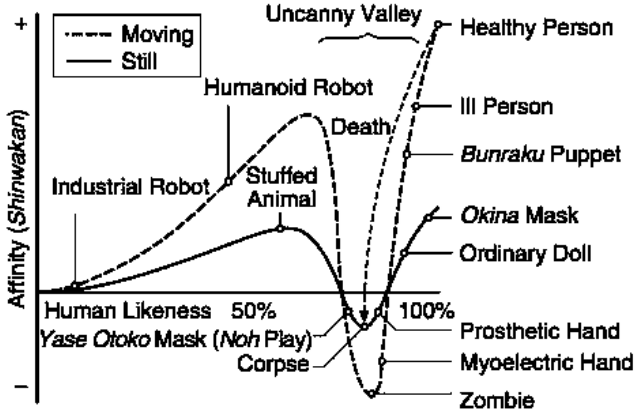

Fig. 1. Masahiro Mori, «The Uncanny Valley», IEEE Robotics & Automation Magazine, 19(2):98-100 (June 6, 2012)

Until now, the phenomenon of the «uncanny valley» has only a practical evidence base rather than a scientific one. The word «valley» here means «cavity, recess, critical point». If this «deepening» is transferred to the graph, it will display the degree of horror that a person experiences when observing anthropomorphic subjects and objects (dolls, masks, robots).

This phenomenon was first noticed and described by a psychiatrist of German origin, Ernst Jentsch. Back at the beginning of the 20th century, he came to the conclusion that the feeling of creepiness and horror is a mental phenomenon that arises when observing something very familiar from an unusual, non-standard perspective, an object that is very

reminiscent of something. Jentsch associated these anxious experiences with uncertainty and misunderstanding whether a lifeless subject or object is animate [2].

Androids, controllable dolls, or photorealistic characters themselves are not always scary. In a static position, they are more likely to cause fear in those who already have corresponding phobias. For most people to experience anxiety, something more serious is needed–behavior or signs that are unusual for a person:

- Facial expressions. Both too active, such as unreasonably bulging eyes or a wide open mouth, and meager or inhibited. In 2014, British scientists used an experiment to test how this works. Children aged 9 to 11 were alternately shown videos of real people and computer-generated faces. Among the latter there were both fully animated ones and those whose eyebrows, foreheads and eyes remained motionless. Children considered characters with partial facial expressions to be especially strange and unfriendly [1]. A completely motionless face can also be read by the brain as an alarm signal if a humanoid creature moves or talks.
- Mechanical speech. Interference, synthetic sound, or echo, as if sounds are coming from a pipe. By the way, the opposite situation may also be true: an insufficiently believable robot with a human voice can also frighten.
- Unnatural movements of the limbs. A sharp rise of the arm, knees that do not bend when walking, a head turning 180 degrees.
- Strange combinations of features. The appearance in behavior or appearance of something characteristic not of a person, but of other creatures.

Some researchers have also suggested that the effect should be called «a cliff» or «wall» rather than «a valley», because the rejection of a humanoid entity occurs abruptly, rather than gradually. Any minor change can make such a character disgusting, after which sympathy for him will fall down as if from a steep cliff.

In the modern world, the concept of the «uncanny valley» relates more to the field of robotics and artificial intelligence. The relationship between man and machine has been developing for decades. Robots have made our lives easier and simpler, saving us from hard and everyday work. In the middle of the 20th century, when the interaction between machines and humans began to manifest itself more and more, scientists considered that it would be more logical to bring the external data of robots closer to human ones.

This is how the first androids turned out. It was assumed that over time it would be almost impossible to distinguish a robot from a living creature, thereby a person would begin to feel sympathy for his own kind.

Thus, the Japanese scientist Masahiro Mori came to the conclusion that in most cases, a robotic machine is perceived by the human user in a very contradictory and wary manner. But in order to reduce this hostility, it is enough to make the external resemblance of robots to humans as close as possible. As it turned out later, the excessive «animation» of androids and extremely realistic appearance also give the effect of rejection.

Mori later noted that the «escalating creepiness» effect reaches its maximum point when the robotic object begins to move [3].

REFERENCES

1. Children's perception of uncanny human-like virtual characters [Electronic resource]. – Access mode: https://www.sciencedirect.com/science/article/abs/pii/S0747563214002015
2. Ernst Jentsch [Electronic resource]. – Access mode: https://www.wikiwand.com/en/Ernst_Jentsch
3. Mori M. The uncanny valley. *IEEE Robotics & Automation Magazine*. V. 19 (2). P. 98–100.

S. Stupak, O. Verba, A. Kutovyi

ETHICS IN THE ERA OF ARTIFICIAL INTELLIGENCE

The modern world is changing rapidly. About 80 years ago people were just starting to create computers, and now development has gained such a pace that it is difficult for an ordinary user to keep up with all the innovations that we see around ourselves: from the approaching ban on internal combustion engines to AI, which can generate text for any query. The development of the latter is growing significantly with each day, and along with this is growing the question of the ethics of using this invention.

The issue of "machine morality" was first developed by science fiction writers. Isaac Asimov should be considered a popularizerin this field [1]. It was him who created the "Three Laws of Robotics" in the short story "Runaround", which he supplemented with a zero rule in the story "Robots and Empire". In general, they are based on the fact that AI should not harm humanity and a specific person, and it