Trần Lê Nhật Huy – 20146494

Lớp Kĩ thuật robot sáng thứ 6

HOMEWORK 1

**Why Bill Gates wrote:” A robot in Every home: The Robotic future”, read the article and prove it**

The aforementioned article provides the readers with Bill Gates’s prediction of the future of robots and the problems that must be tackled along the way.

He began by highlighting how similar the two industries are. The first similarity that he mentioned was how the products of both industries are slowly getting more powerful and compact. And how they are/will be more prevalent in households than their predecessors, not just limited to major companies or governmental departments. Mr. Gates anticipated that robots would have an impact on society similar to how computers evolved from research labs to home offices. The second similarity was the challenges facing the robotics industry. Similar to the absence of common standards or platforms in the computer industry during the 1970s, there is no standard operating software that would enable cross-device compatibility for popular application programs to execute.

Making robots that can perceive and respond to their surroundings more rapidly and precisely as well as the high cost of hardware are further difficulties. Both of these problems are being alleviated by decreases in the cost of processing power as well as cheaper hardware.

Despite the predicament, experts everywhere are trying to solve these problems. Microsoft, Bill Gates’s software company, was also lending a hand by creating software tools to simplify the process of writing robotics programs that could work with different kinds of hardware. Two notable technologies from the software tools that the author mentioned are concurrency and coordination runtime (CCR) and decentralized software services (DSS). The former technology deals with the problem of simultaneously processing sensors’ data and controlling the motors, a challenge known as concurrency. By providing a library of functions, robot developers can utilize the power of multicore and multiprocessor system to solve the problem of concurrency. The latter technology can help simplify the writing of robotics applications by allowing different processes to run independently from each other. These processes can be run on different computers, separated from the robot itself, which can help make robots smaller and lighter.

In conclusion, by comparing the robotics industry to the computer industry, by showing the roadblocks that robot builders must face and some of the ingenious solutions, Bill Gates’s vision of “the robotics future” is proven to be coming to every home and changing the world along the way.

**Write a report on a robot of your choice. Discuss all relevant characteristics of the robot.**

ASIMO is a humanoid robot created by Honda in 2000. It has the height of a 9 year-old child (130cm) and weighs 54kg. The original robot power source comes from a 51.8V lithium-ion battery with an operating time of one hour. The brain of the robot is a three-dimensional processor created by Honda itself.

ASIMO is created with the goal to people with their everyday tasks at home. That’s why the robot is designed with its height being in the range between 120cm and the height of an adult so that it can easily reach door knobs and light switches. Basically, the robot can do what a child human can, from walking, climbing stairs, speaking, dancing, shaking hands…. It can also recognize moving objects, postures, gestures, its surroundings, sounds and faces. It has 2 cameras in its head to track moving objects and determine their distance and direction. This is how it is able to recognize a person and follow that person. It also has a microphone and speakers to help it listen, speak and follow voice commands. For its navigation, engineers have equipped the robot with different sensors, from ultrasonic sensor to find obstacles, to ground sensor which consists of one laser sensor and one infrared sensor. The laser sensor can scan the ground to help the robot get its bearings. The infrared sensor is used to detect floor markings and where it is supposed to move.

To conclude, ASIMO is a humanoid robot that can do what a child can to help people with their everyday tasks in their home. In order to achieve that goal, the robot is equipped with a lot of sensors so it can navigate its environment, remember human faces, and follow voice commands.

**How many degrees of freedom does a car moving on parking lot have? An elevator? A train? An airplane?**

|  |  |
| --- | --- |
| **Vehicle** | **Degrees of freedom** |
| Car moving on parking lot | 3 |
| Elevator | 1 |
| Train | 1 |
| Airplane | 6 |

**What is BioMimetics? BioRobotics? Humanoid robot? Geminoid? Android?**

* BioMimetics is the emulation of the models, systems, and elements of nature for the purpose of solving complex human problems.
* BioRobotics is an interdisciplinary science that combines the fields of biomedical engineering, cybernetics, and robotics to develop new technologies that integrate biology with mechanical systems to create machines that imitate biological systems.
* Humanoid robot is a robot resembling the human body in shape.
* A geminoid is a humanoid robot that closely resemble humans from appearance, voice to the ability to express emotions through facial expression. It can be remote-controlled or pre-programmed.
* An android is a humanoid robot or other artificial being often made from a flesh-like material. It can look, speak or act like a human to a certain degree.