Analysis of the scientific properties of the various robot components

How the robot “thinks”, communicates, avoids injuring human beings and what damage to the environment such robots may be causing

The EV3 Mindstorms robot “thinks” using the microprocessor (also known as a central processing unit or CPU) provided in the kit. This component acts as the “brain” of the machine. It is there to “execute and manage” (Techopedia, 2019) the tasks that it has been programmed to do. It computes the information that it receives from the various other components to logically modify its actions to accomplish the given tasks. CPUs are normally made from silicon microchips, as this material is an excellent semi-conductor once a small amount of impurities are introduced to allow electrons to flow into them (How It Works Team, 2012). These chips contain millions of transistors, which act like switches. They receive electrical signals which “tell them whether to conduct or insulate” (Coolman, R. 2014) which Allows or stops the flow of electricity through a circuit. The CPU communicates with the other components through a data bus, in this case a set of wires connecting the components to the CPU (Techopedia, 2019).

The robot avoids injury to human beings through the code that it is programmed with and the use of certain sensors. When coding, our team made use of the provided ultrasonic sensor to detect obstacles (including people), stop and move in another, unobstructed direction. The robot also used a touch sensor as a “failsafe”, which was coded to completely shut down the program if triggered, to ensure that the robot would not cause any physical harm to anyone if the program did not function correctly.

Robots can cause a variety of environmental issues, mainly through their own manufacturing. The factories that build them can help to cause damage such as global warming, air, soil and water pollution and can have a negative effect on human and animal life (Madaan, S. 2019). “It is estimated that about 50% of all pollution is through industrial manufacturing” (Madaan, S 2019). The manufacturing processes cause the release of many gases such as carbon dioxide, methane, sulphur and nitrogen. These not only negatively affect the environment but can also cause the health of humans and animals to deteriorate, with the World Health Organisation saying that “air pollution causes around 2% of all lung and heart diseases, 5% of lung cancers and 1% of all chest infections” (Madaan, S. 2019). The manufacturing process also cause water and soil to become contaminated with dangerous chemicals, radioactive materials and heavy metals. This can cause these pollutants to accumulate in the food and water that humans and animals need to survive and cause further health problems (Madaan, S 2019).

Ultrasonic sensors function by transmitting acoustic sound waves and timing how long it takes for the waves to return to the sensor. They use a use a “transducer”, which is a form of microphone that sends and receives the sound waves (Burnett, R. 2019). The length of time that the wave takes to return determines how far an object is away from the sensor and if no wave returns then the path is clear of obstructions (Wong, J. 2017). “Ultrasonic” is used to describe a sound that has a frequency of above 20 kilohertz (20,000 hertz), which is the upper level of which humans can hear (Reference, 2019). Ultrasonic sound is measured in hertz, which is “a measure of frequency” (Reference, 2019). It is calculated by measuring the frequency of wavelengths per second, for example 20 wavelengths per second is equal to 20 hertz.

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