

Computing Innovation Exploration Guide

Your Tasks

- ☐ Select a computing innovation
- ☐ Explain the beneficial and harmful effects of a computing innovation
- ☐ Describe the data your innovation uses
- ☐ Brainstorm your infographic
- ☐ Reference your sources

☐ Select a computing innovation

A computing innovation is an innovation that includes a computer or program code as an integral part of its functionality. For this project, you will explore a computing innovation of your choice. Your close examination of this computing innovation will deepen your understanding of the big ideas studied in this course.

There have been many computing innovations that have had, are having, and will have, profound impact on our society. Below are a few links to some of the latest innovations,

<https://www.technologyreview.com/2021/02/24/1014369/10-breakthrough-technologies-2021/>

<https://www.itproportal.com/features/top-10-latest-technology-trends-you-must-follow-in-2021/>

https://www.valoremreply.com/post/2021_tech_trends/

In addition to the computing innovations showcased in the links above, we have also explored many more through our weekly Ted Talks. Take some time to explore the computing innovations above, then in the space below indicate a computing innovation you would like to explore further.

What is the purpose of your innovation? (~25 words)

☐ Explain the beneficial and harmful effects of a computing innovation

Computing has global effects – both beneficial and harmful – on people and society.

- Technology enables the collection, use, and exploitation of information about, by, and for individuals, groups, and institutions.
- Widespread access to digitized information raises questions about intellectual property
- The innovation and impact of social media and online access is different in different countries and in different socioeconomic groups.
- Groups and individuals are affected by the “digital divide”. Differing access to computing and the Internet based on socioeconomic or geographic characteristics raises issues of equity, access, and power.

Explain at least one beneficial effect and at least one harmful effect the computing innovation has had, or has the potential to have, on society, economy, or culture. (~250 words)

□ Describe the data your innovation uses

The proliferation of computing has created an enormous amount of data. There is data about everything from sensors that [track whales](#) in the ocean to data about visitors to web sites. Below is a picture of whale tracking.



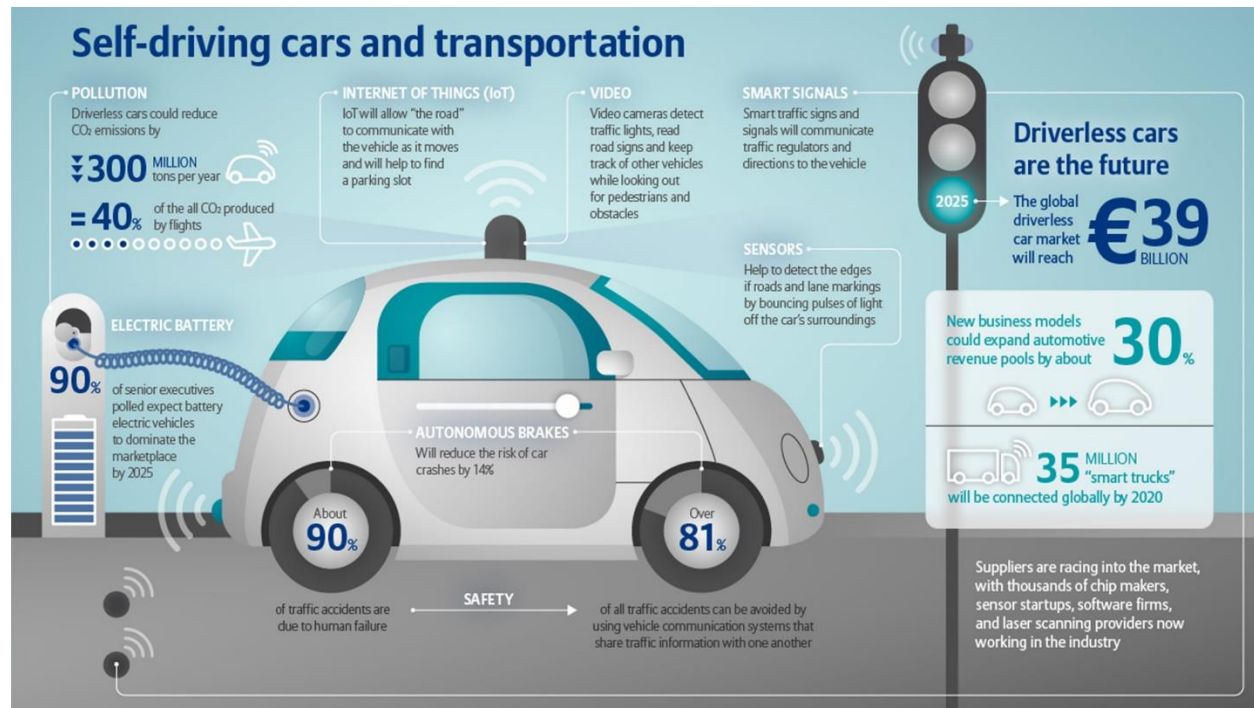
Computers are used in an [iterative](#) and [interactive](#) way when processing digital information to gain insight and knowledge. Iterative means that computers can go through all data in large data sets to filter and clean it. Combining data sources, clustering data and data classification are part of the process of using computers to process information. Interaction means that people can gain insight and knowledge from translating and transforming digitally represented information. Patterns can emerge when data is transformed using computational tools.

Describe the type(s) of data your innovation uses. (~50 words)
Describe in detail how the computing innovation uses or transforms the data to accomplish it's purpose. (~150 words)
Describe at least one data storage concern, data privacy concern, or data security concern related to the computing innovation. (~50 words)

□ Brainstorm your infographic

An infographic is a collection of imagery, charts, and minimal text that gives an easy-to-understand overview of a topic.

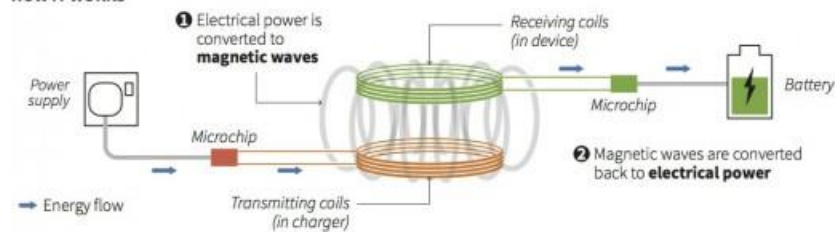
Below are some examples of infographics for different technologies



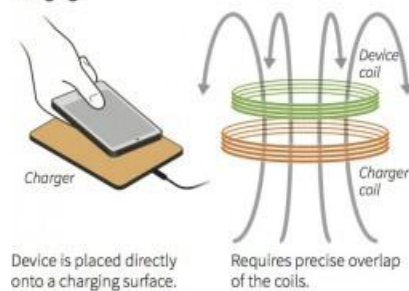
Wireless charging

The two main systems are variations of the same technology: a metal coil inside the device picks up magnetic waves from a transmitter coil in the charging surface.

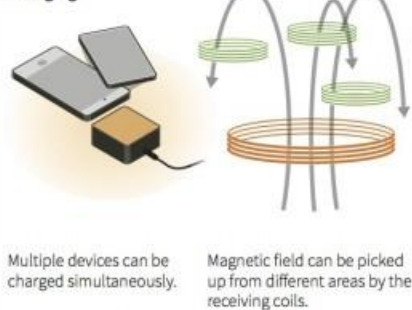
HOW IT WORKS



Inductive charging



Magnetic resonance charging



Sources: Reuters; AWP; Wireless Power Consortium; Power Matters Alliance. NOTE: Charger designs are representational
Staff, 10/09/2014

REUTERS

genetic engineering

new horizons in medicine



more information: www.abpischools.org.uk

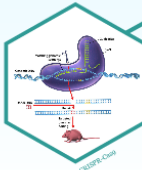
Since genetic engineering (also known as **recombinant DNA technology** or **genetic modification**) was first developed in the 1970s, scientists have discovered more and more ways in which the technology can be used in human medicine. Now techniques, including the gene editing tool known as CRISPR-Cas9, are opening up even more possibilities for us to change the DNA in the cells of bacteria, animals and plants – and potentially change medicine for ever.

Pharming



Microorganisms, animals and plants can be genetically modified to produce medically useful products. These transgenic organisms are already used regularly to produce substances such as human insulin, human growth hormone and blood clotting factors for haemophiliacs.

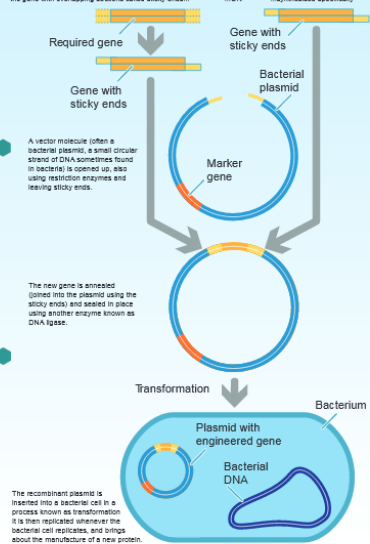
CRISPR-Cas9 technology



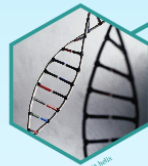
CRISPR-Cas9 is a genome editing tool which is changing the world of genetic engineering fast. It enables scientists to directly remove, add or change sections of the DNA sequence in a living cell. CRISPR-Cas9 is much faster, much cheaper and much more accurate than the traditional ways of editing DNA. Scientists think it has great potential for treating any diseases which involve the genome, including cancers, heart disease and even the high cholesterol levels which are a risk factor for heart disease.

The basic steps in traditional genetic engineering of a bacterium

The required gene is EITHER cut from the DNA of an organism using enzymes called restriction endonucleases which leave the gene with overlapping sections called sticky ends...



Gene therapy



Gene therapy is still in its very early stages. It involves modifying human DNA either to repair or replace a faulty gene. The idea of gene therapy is to overcome the effects of a mutation which cause a genetic disease or tendency to a disease. Progress so far has been relatively slow, although there are early signs of success in treating some childhood leukaemias, HIV/AIDS and muscular dystrophy. The speed and precision of CRISPR-Cas9 gene editing technology gives scientists hope for the future.

Vaccines



Some vaccines are very dangerous to make using conventional methods. Genetically engineered microbes can be used to produce the antigens needed in a safe and controllable way. The use of genetically modified yeast cells to produce a vaccine against the hepatitis B virus has been a major success story.

Xenotransplantation



The DNA of pigs has been modified using recombinant DNA technology so their cells develop without certain genes which trigger the human immune response. Other genes can be added which express human antigens. Work in this area has been slow, partly due to ethical and safety concerns, but interest is growing. Recent successes include German scientists using CRISPR-Cas9 to deliver multiple gene modifications in pigs, greatly reducing the human immune response to the pig cells.

Now that you have explored infographics, you will create an infographic for your computing innovation. The infographic you create must convey the following information,

- The name of your innovation
- The purpose of your innovation
- How your innovation uses data

Feel free to jot down ideas or sketches in the space below:

Brainstorming and notes

☐ **Create your infographic**

Your final infographic should use imagery, charts, and minimal text to give an easy-to-understand overview of your topic. Your final infographic should also be created using technology. Below are some useful tools .

Get creative!

<https://www.canva.com/>

<https://piktochart.com/formats/infographics/>

<https://www.adobe.com/express/>

☐ **Reference your sources**

Provide a list of at least three online or print sources used to create your infographic and/or support your responses to the prompts provided in project guide.

- At least two of the sources must have been created in 2021
- For each online source, include the permanent URL. Identify the author, title, source, the date you retrieved the source, and, if possible, the date the reference was written or posted.
- For each print source, include the author, title of excerpt/article and magazine or book, page number(s), publisher, and date of publication.
- If you include an interview source, include the name of the person you interviewed, the date on which the interview occurred, and the person's position in the field.
- Include citations for the sources you used, and number each source accordingly.
- Each source must be relevant, credible, and easily accessed.

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