

1. **Ada Byron
Lovelace**

Early notions of computer programming

- First computer algorithm to calculate a sequence of the Bernoulli-numbers with an engine
- She was the first computer programmer.
- She wrote code/algorithms

2. **Alan Turing**

- Alan Turing, was a mathematician, logician, cryptanalyst, and computer scientist

Turing machine

- He gave a formalisation of the concepts of "algorithm" and "computation" with the Turing machine, which can be considered a model of a general purpose computer
- It was a machine, that was theoretically able, to solve any problem that can be translated into simple logical steps

Colossus

- Was a set of computers developed by British codebreakers at Bletchley Park
- Has been used to decipher Lorenz cipher (not Enigma)

3. **Alexander
Graham Bell**

Telephone

Experiments:

- As a teenager, Bell experimented with the larynx of a dissected sheep which was attached to a bellows.
- Bell experimented with the vocal cords of his dog to recreate human sounds

Transmission of acoustic signals:

- The acoustic signal at the sender is first changed into a electric signal and at the receiving end the electric signal is changed back into an acoustic signal.

- First approach: It was an electric wire stretching out from a battery and connected to a single tuning fork. By switching the battery on and off, he could make the tuning fork hum in various ways.

- Final version: You speak into a tube which is connected with a bowl filled with acid water (acid makes the water conductive). The water quivers (zittert) from your uneven air blasts, changing the resistance inside the wire.

- An exact copy of the uneven pattern is sent to the receiver.
- The first telephone had a problem with the distance. Thomas Edison improved it by attaching a stronger battery, which pumped a more steady electric signal through the wires.

4. **Cyrus Field
Edward
Whitehouse
William
Thomson**

Transatlantic Telegraph

- Transatlantic telegraph cable under the ocean
- Problems with fixing the cable (too deep water)
- Problems with clear signal transmission
- Problems with thin insulation of the cable (signal dispersed)
- Problems with the weight (the cable snapped)

Design of Whitehouse/ Field:

- Three layers: each was as thin as possible to save weight. There would be a thin copper at the center, a thin layer of rubbery insulation around that and finally a casing of iron to protect the cable from ripping off.
- Field was a businessman and financier (investor)

- When the first message was transmitted it took a long time and the signal was not clear.
- Whitehouse (chief engineer) tried to send stronger currents through the cable, with an even bigger battery.
- The cable heated up, the insulation melted and the system short circuited

Design of Thomson:

- Much thicker insulation
- Believed at the invisible force fields, which Faraday discovered
- Whitehouse was fired, and Thomson took over and rescued the whole endeavour

5. Guglielmo Marconi	Radio telegraph system. <ul style="list-style-type: none"> - Introduction of the Radio Music Box (radio waves, on different wave lengths). - Broadcasting - National brands became more popular to shoppers - Local sports teams increasingly attracted a nationwide fan base - The cult of celebrity (Hollywood stars) - Hitlers propaganda: The larger the mass of men to be reached, the lower its purely intellectual level will have to be set
6. Heinrich Hertz	Electromagnetic Waves <ul style="list-style-type: none"> - Based on Maxwells predictions - Proved the existence of electromagnetic waves - Hertz oscillator was divided in two parts: The first was a transmitter, where an electric spark jumped back and forth between shiny metal balls. The second part, the receiver, was a hanger.(Kleiderbügel)
7. James Maxwell	Electromagnetic force fields <ul style="list-style-type: none"> - He discovered that the force fields were actually made of two parts: an electric part and a magnetic part - Electromagnetic waves travel through the space by the speed of light
8. JJ. Thomson	Electron <ul style="list-style-type: none"> - Torn-off bits (electrons) roll forward inside a wire, creating an electric current
9. John Bardeen / Walter Brattain / Chels Shockley	Semiconductor <ul style="list-style-type: none"> - Material: silicon - Before there were only two materials: conductors (most metals, alkalis) and insulators (plastic, ceramic, rubber, paper) Transistor <ul style="list-style-type: none"> - Transistors are smaller than vacuum tubes and they do not need as much energy - One of the first applications was an improved hearing aid - Cell phones - Weather satellites / spy satellites - GPS - Digital cameras - Solar Cells - Email and Internet - Credit Cards
10. Joseph Henry	Electro Magent <ul style="list-style-type: none"> - coil of wire, wrapped around a piece of iron, attached to a battery - a type of magnet in which the magnetic field is produced by an electric current
11. Michael Faraday	Electromagnetic force fields <ul style="list-style-type: none"> - While observing a rainbow, he thought, that even if the space seemed empty, something was there. - He proved that magnetic force fields existed. - As long as he moved the magnet in the vicinity of the wire, he created an electric current <ol style="list-style-type: none"> 1. Magnet moves back and forth through wire coil 2. An electrical current is generated
12. Overview	<ol style="list-style-type: none"> 1. Wires: Electro magnet, telegraph, telephone, lightbulb 2. Waves: Radio waves 3. Wavemachines: Radio, radar 4. Computers: Turing machine, transistor

13. **Reginald Victor**

**Jones / Cox / Arthur
Harris**

- Jones: He realized that the Germans have a functional radar system as well
- Cox: His experience as an amateur radio operator, qualified him to disassemble the Würzburg radar.
- Harris: He ordered area bombings on German cities, to kill as many people as possible.

Chaff

- A large number of aluminium stripes, were dropped from an airplane to confuse the radar operators.
- Acted as a flurrying cloud, sending back an immense number of electric pulses, which would confuse enemy radar with false signals.
- they knew the ideal wavelength of the radar and were therefore able to work out the ideal size for the chaff.

Hamburg firestorm

- The aircraft attacked Hamburg at night. First they used Chaff. Later, they bombed the city.
- The ground melted and they had no chance to escape. There was a huge chain of explosions

14. **Samuel Morse**

Telegraph

- turn on the battery and a current ran down the wire, the electromagnet powered up, and it pulled the castanet (Klapper) toward itself. You heard a click when the switch turned back. Later they replaced the castanet with a bell.
- they had to agree which arrangements of click represent which letters.

Globalization

- synchronize information instantly
 - time synchronization
 - no horseman were needed anymore
 - millions of farmers were forced to take on last names to enlist for taxes.
 - movement of armies were coordinated with telegraphs
 - newspapers started to retrieve information of foreign correspondents
 - diplomats negotiated with telegraphs
 - more jobs were available
 - train schedules got more accurate
 - people were able to make the arrangements to move to other countries (Europeans to America)
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15. **Thomas Edison** **Lightbulb**

Problem:

- No one knew how to heat up the metal so long that it glows white, but without melting.
- The filament did not last long
- 0. Try: natural gas
- 1. Try: platinum lamps (very expensive)
- 2. Try: Nickel wires (burned out too fast, too bright) --> filament (Glühfaden)
- 3. Try: Surrounded with vacuum (no oxygen, nothing burns)
- 4. Try: Cork and Cotton threads
- 5. Try: Bamboo fibers (geometrically parallel fibers)

He used bamboo as a filament that would glow for much longer and created a vacuum around it with a glass sphere in order to prevent oxygen from facilitating (erleichtern) the burning process

Benefits:

- The lightbulb made it possible to work longer and more exactly, especially through the night. These inventions were a huge increasing factor for the economy and the lifestyle. (part of the industrial revolution)
- It changed the daily pattern. Working hours didn't depend on natural day light anymore. (shift work)

Electric Motor

- Imagine a clock with just a single long minute hand, which toggles between the three o'clock and nine o'clock position, because of an electric magnet (110 times a second)

Benefits:

- land prices were high, so it made sense to build vertically. (changed the cityscape) -> Electric elevators helped to build that way.
- electricity was also used for amusement parks and many other places (leisure time)
- Electricity was also used for small machines, helping in domestic work (cleaning, carrying, washing -> dish washers, washing machines)
- electric streetcar made commuting more efficient, which impacted on urban development etc. (more commuters = densification of the city center)

16. **Watson Watt** **RADAR: Radio Detection And Ranging**

- To radio waves the human body is invisible, because the electrons are generally held pretty tight
 - The atoms in iron or aluminium are more loosely constructed. Therefore the signal is reflected.
 - It was possible to detect enemy airplanes.
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