Application: Automation

What is automation?

One possible application of programming is automation. In this Project, you will be writing programs to control a humanoid robot that has been designed to automate everyday tasks. But first, what is automation?


Automation is all about using technology to reduce the amount of human input in a process. Technology could refer to both software, like an automated email reply system, and hardware, like a robotic arm in an assembly line.

When we automate a task, we first create an algorithm that describes the actions being performed. We then translate that algorithm into a program that a robot/computer can understand. The robot/computer can then complete the task by following its programming, replacing the need for a human.

Worldwide, a third of all work tasks are carried out by machines and other technology, with estimates that this will grow to a fifty-fifty split by 2025 according to this World Economic Forum report from 2020. However, automation is not only found in the workforce. Tasks that we perform in our everyday lives can also be automated to reduce the chance of making mistakes or freeing up our time for other activities.

The amount of automation in the world is increasing due to advances in technology and growing demand. This demand is a result of the advantages of having tasks automated compared to carried out by a human.
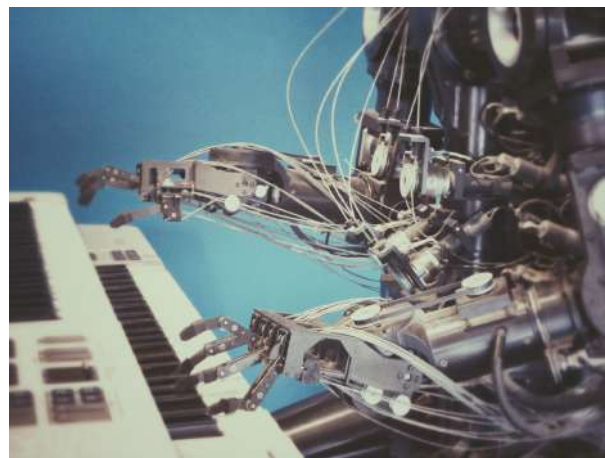
Here are a couple of examples of the advantages of automation:

- Robots, computer programs and other forms of technology are much better than humans at performing "routine" tasks. A routine task is a task that requires a great deal of repetition, performing the same series of actions over and over again without any critical thinking. These tasks can be tedious for humans, leading to boredom and mistakes. A robot, however, never gets bored and, barring mechanical issues, can carry out the same action with much higher precision every time. For example, we may want to determine the maximum number of key presses on a keyboard before it breaks. Doing millions of key presses manually would be awful, but for a machine, there are no objections:
  ▶ Logitech QA Testing on a G710 Keyboard

- Using automation to perform repetitive tasks can free up our time so that we can spend it on more meaningful and creative tasks. Every task we can use technology to perform is one less task that a human needs to perform. Sick of having to go around closing all of your curtains at night? As smart home technology starts to become more affordable, there might become a point in the future where you don't have to!
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What will automation mean for me?

Automation has the potential to change our day-to-day lives for the better, but high costs mean that in the short term, the most significant impacts will likely be felt in the workplace. The jobs that you experience in 5, 10, 15 years from now are likely to be quite different from the jobs available right now. What will these differences include? Predicting the future is hard, but here are a few changes that we think might happen:

- It is doubtful that automation will result in entire jobs vanishing overnight. More likely, certain activities within those jobs will become redundant or replaced by automation, requiring a redefining of what that job entails. Although entire jobs won't vanish overnight, increased efficiency because of automation could reduce the number of people needed to perform a task. If you have ten employees and you can reduce each of their workloads by 10% because of automation, would you keep everyone hired but give them fewer hours each week (10 x 90% work), or would you shuffle around everyone's responsibilities such that one of your employees no longer had any work and could be let go (9 x 100% work)? If you keep everyone employed, would you reduce their pay to make up for reduced hours? Does the cost of the automation impact any of your decisions?

- Routine "low-skilled" jobs are easy to automate because the robot/program has a limited amount of decisions and edge cases to take into account. An example of a routine job is a bank teller or a sewing machine operator. Non-routine "high-skilled" jobs are much harder to automate because they involve a much wider variety of tasks, require more critical thinking and are more likely to run into problems/edge cases. An example of a non-routine job is a groundskeeper or a computer programmer. Therefore, to give people more job security, we want to prepare them for non-routine jobs.

- Even though automation is most commonly associated with physical robotics, automating digital tasks is much easier than automating physical ones. This is because physical robots require dexterity, compliance, strength and control algorithms, whereas digital automation only requires the control algorithm. The result? People whose jobs

involve complicated physical actions are less likely to be replaced than people whose jobs are entirely online.

- Although many routine jobs will be replaced, new jobs will also be created. Somebody will have to design, program and maintain all the fancy new robots. As the day to day lives of people change, so do their problems - new opportunities for innovators to come up with new solutions. If the number of new jobs is less than the number of replaced jobs, unemployment will rise.

- Work may also become more humanised. With routine but necessary jobs being replaced, people may turn to jobs that rely heavily on hard-to-automate things like human emotion and connection.