

## Automation – Machines Building Machines

### Teachers Notes

**Main focus of activity:**

- To develop an understanding of what automation is and how it has impacted society.

**Learning objectives:**

- To create a control system to perform a specific task.
- To understand what datalogging is and carry out some.

**Links to curriculum aims:**

- **Computing:** design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- **Computing:** use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- **Computing:** use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- **Science:** are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

**Activity outline: Discussion and background**

Use the 13 – Automation: Machines Building Machines resource page

If possible show the children the clip from 'Star Wars: Attack of the Clones' where C3PO walks into a droid factory and exclaims, "Machines building machines? How perverse!"

Discuss the idea that production and efficiency drove computer development for commercial reasons from the 50s and onwards. Ensure the children understand that one of the biggest impacts that technology has had on the everyday person's life is through the automation of many jobs that traditionally took human endeavour to solve or perform.

From the earliest computers, that were designed to carry out the millions of calculations needed to build a power station (as in the case of the Harwell Dekatron), to the latest automated factories and warehouses that utilise robots to perform functions 24 hours a day.

The advantages of these new computerised technologies are improved productivity and greater profits for businesses. Give an example, such as when a person in the far north of Scotland buys one of the last packets of spaghetti in his local Tesco supermarket, the moment it is scanned at the checkout (computerised!), it shows up on the store's inventory as being down by one and almost out of stock. The computers holding the stock responsibilities at the head office somewhere in the south of England register they need a new box of Spaghetti sent to that store. It sends a message to the computer handling the ordering, which then sends a message to the central warehouse (which might be in the Midlands) for a box of spaghetti to be placed on the next delivery truck and is delivered the next day.

The system is now far more streamlined - quick and efficient. The company don't risk someone going to a different store as their store has run out, and the customer is happy as whenever they go to the supermarket it has what they need.

At this point see if the children can see any downsides to this use of control technology and the automation of factories. Show them a photograph of an assembly line before automation with robots and one after - do they notice how few people are needed? Lead them to thinking about the manufacturing industry and how the result is we do not need as many people to build products or to manage warehouses etc.

### **Possible Activities:**

**Activity 1:** Literacy - Debate about automating a factory. Children take on the roles of different people involved: large factory owner, shareholder, consumer, politician, worker, local small businessman in competition. Debate pros and cons of automation. Each person's argument should reflect their situation – how automation would affect them.

**Activity 2:** Art & Design/Science & Technology - Design a 'robot' that could automate something the children do that they wish they didn't have to. Ensure it is fully labeled and a full description of how it would work - sensors etc. The children then present their inventions to a panel in a 'Dragon's Den' style pitch. They have to justify why this task should be automated and how their design would solve the problem.

### **Plenary:**

Can they think of any jobs that should never be automated – why? Justify?

Can they think of any jobs that are not automated but should be – why? Justify? What might stop it being possible?

### **Possible Extension/independent or homework learning activity:**

Can the children find any data anywhere on the impact on job numbers or production volume due to automation – make statements based on their findings. Consider who produced the findings – can it be trusted to be impartial? Is it a quote from a trade union wanting to protect jobs, or a business wanting to justify cutting jobs? Relate to the difficulty in trusting research sources and the need for good research.

### **Resources**

#### **Videos and Web Links:**

- BBC Learning Zone - The Social Effects of Automation – very good clip – including some good footage of old banking computer (ERMA) but has the Bitesize revision branding:  
<http://www.bbc.co.uk/learningzone/clips/the-social-effects-of-automation/4400.html>
- Article about Canon factory going fully automated: <http://singularityhub.com/2012/06/06/canon-camera-factory-to-go-fully-automated-phase-out-human-workers/>
- Fantastic selection of videos of automated factories doing everything from building cars to flipping pancakes: <http://singularityhub.com/2010/02/11/no-humans-just-robots-amazing-videos-of-the-modern-factory/>
- Telegraph newspaper article about the automation of farming:  
<http://www.telegraph.co.uk/earth/agriculture/farming/9780938/Robots-will-be-farming-within-40-years.html>