

# MATHEMATICS IN CAREERS

Investigation - Food industry and coding

**Key career focus for this investigation:** Software engineer, coding, information technology

**Related career areas:** Food industry



## THINKING ABOUT CAREERS

- Brainstorm information technology professions you can think of where maths is frequently used. Use <https://joboutlook.gov.au> to explore information technology related career pathways that include use of mathematics. *How is maths used in these scenarios? What maths is used in these scenarios?*
- This task focuses on how maths is used in designing a product that automates or optimises a process or product related to food.
- Explore careers such as software engineer, robotics engineer, to discover how maths is used in these. For a more extensive list of careers related to this task, with a maths / science focus, refer to the table at the end of the task and explore the maths used in these jobs.

## MATHEMATICS IN EVERYDAY LIFE AND CAREERS

### Mathematical focus for this investigation

- Using formulas to solve problems
- Using authentic situations to apply knowledge to solve real world problems
- Implement algorithms

Scientists including information technology professionals use various formulae and algorithms. They apply their mathematical thinking and problem-solving skills in various situations. In this case specifically designing a product that automates or optimises a process or product related to food. Many people use various formulae and algorithms every day. For example, cooking recipes, long division and using a computer search engine all utilise algorithms. An algorithm is a well-defined set of instructions designed to perform a particular task or solve a type of problem. Anything that follows a set of specified instructions is an algorithm.

Brainstorm and share scenarios where this mathematics may be used in information technology professions to solve problems.

# MATHEMATICAL INVESTIGATION

## FOOD INDUSTRY AND CODING

### INVESTIGATION BACKGROUND

Like most other process industries, food companies are finding ways to improve productivity throughout the plant with the use of factory automation. Whether it be in the actual processing of the food or the packaging of the food, automation is everywhere in today's modern food plants.

### SOME PRE- INVESTIGATION TASKS

1. Download the TI-Nspire™ CX II CAS Student software from <https://education.ti.com/en-au/software/search>
2. Complete the 10 minutes of code for TI-Nspire™ CX II CAS technology, the link is <https://education.ti.com/en-au/activities/ti-codes/nspire/10-minutes>

### YOUR INVESTIGATION

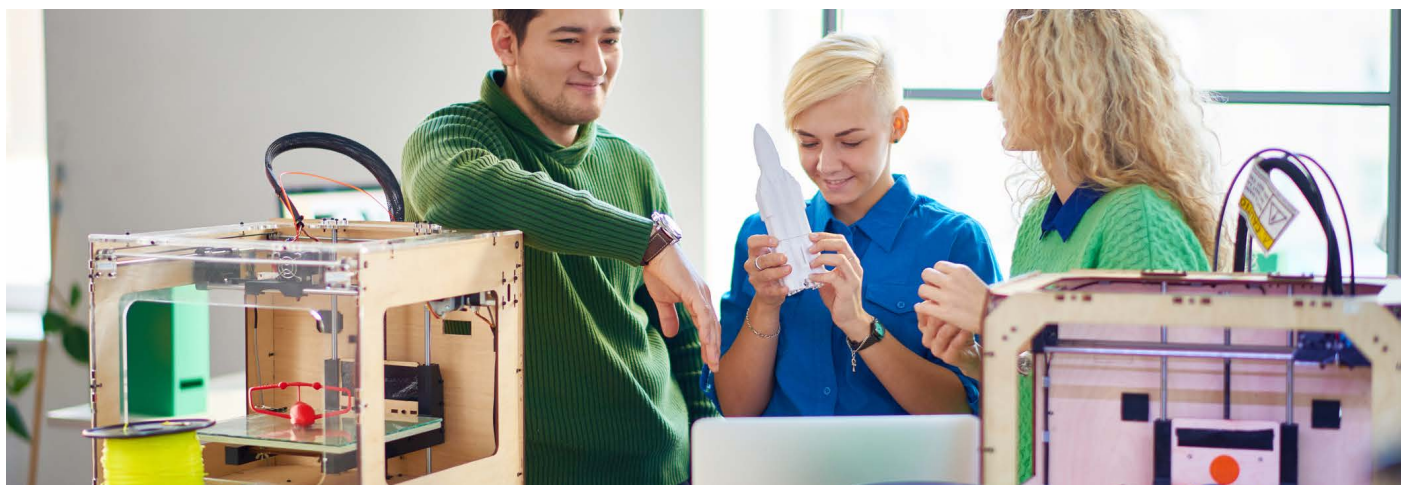
Design a product that automates or optimises a process or product related to food, then use coding to demonstrate how the product works.

#### Prompts

- Watch the clips below for some ideas.
- Explain what your product does, how it works who it will benefit and how.
- If you have access to TI technology, use TI technology to build a model of the solution. Alternatively, another form of technology to build a model of the solution.

#### Glossary

- Code is a system of words, letters, figures, or other symbols substituted for other words, letters, etc., especially for the purposes of secrecy.
- In communications and information processing, code is a system of rules to convert information — such as a letter, word, sound, image, or gesture — into another form or representation, sometimes shortened or secret, for communication through a channel or storage in a medium. (Wikipedia)
- Coding is what makes it possible to create computer software, apps and websites. Your browser, your OS, the apps on your phone, Facebook – they're all made with code.
- Coding - a process by which algorithms are represented and implemented (VCAA)



# MATHEMATICAL INVESTIGATION FOOD INDUSTRY AND CODING

## REFERENCE MATERIAL

- Basic coding using the TI, other CAS or a coding program

- A few YouTube clips:  
Industry Certified Robotic Automation for the Food Industry  
[www.youtube.com/watch?v=OSNpvcfcmug](https://www.youtube.com/watch?v=OSNpvcfcmug)

Latest Automation Technology for the Food Industry  
[www.youtube.com/watch?v=oUjCeLeKYSs](https://www.youtube.com/watch?v=oUjCeLeKYSs)

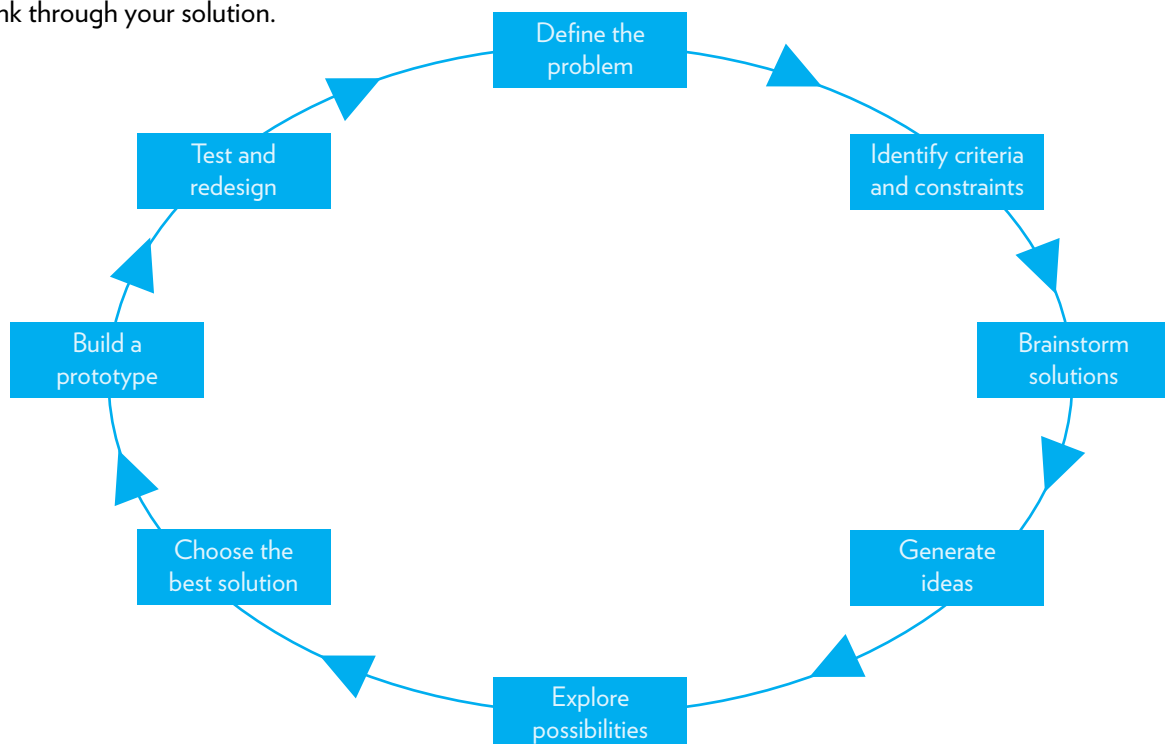
Extreme Fast Automatic Food Processing Machines Modern Food Processing Technology  
[www.youtube.com/watch?v=FN4pBXEkyy8](https://www.youtube.com/watch?v=FN4pBXEkyy8)

- What to avoid:

I Love Lucy: A Colorized Celebration - 'Job Switching' clip  
[www.youtube.com/watch?v=K3axU2b0dDk](https://www.youtube.com/watch?v=K3axU2b0dDk)

- A general coding one *Granny was a hacker*: <https://youtu.be/fYAZNUisrek>

The Engineering Design Process (diagram below) may be a helpful tool in developing your teams' ideas and helping you think through your solution.



The following TI link will be of assistance in writing the code and creating the model:

<https://education.ti.com/en/activity/detail%3Fid%3D218AEDB86CBB4305B2120FAEF4E09812>

# MATHEMATICAL INVESTIGATION FOOD INDUSTRY AND CODING

## CAREERS RELATED TO THIS INVESTIGATION

### ARTIFICIAL INTELLIGENCE SPECIALIST

Career description	Key skills required	More information
<p>An artificial Intelligence Specialist develops computer systems that use big sets of <u>data</u> to perform 'intelligent' tasks: think visual perception, understanding natural language, reasoning and decision making. <u>Machine learning</u> is one way of building such systems based on providing the computer with examples of what it should do, and let it figure out (learn) how to do it. An artificial intelligence specialist may for example:</p> <ul style="list-style-type: none"> <li>• Work in medicine, improve medical diagnoses</li> </ul>	<ul style="list-style-type: none"> <li>• Scientific method</li> <li>• Reasoning and problem solving</li> <li>• Analytical thinking</li> <li>• Creative thinking</li> <li>• Coding and computer programming skills</li> </ul>	<p><a href="https://careerswithstem.com.au/what-is-artificial-intelligence/">https://careerswithstem.com.au/what-is-artificial-intelligence/</a></p>

### SOFTWARE ENGINEER

Career description	Key skills required	More information
<p>Software engineering is a branch of computer science that includes the development and building of computer systems software and applications software.</p> <p>Careers include:</p> <ul style="list-style-type: none"> <li>• IT Consultant</li> <li>• Game developer</li> <li>• Web designer</li> </ul>	<ul style="list-style-type: none"> <li>• Coding and computer programming skills</li> <li>• Competent software development skills</li> <li>• Good communication</li> <li>• Precision and attention to detail</li> </ul>	<p><a href="https://careerswithstem.com.au/science-careers-list/">https://careerswithstem.com.au/science-careers-list/</a></p>

### CYBER SECURITY SPECIALIST

Career description	Key skills required	More information
<p>The job of a cyber security specialist includes:</p> <ul style="list-style-type: none"> <li>• Identify instances when a customer/client has been attacked but doesn't know it</li> <li>• Other cyber security measures.</li> <li>• How industries (eg. Banks) can better prepare for the cyber security threats they'll be facing in future (eg. five years).</li> </ul>	<ul style="list-style-type: none"> <li>• Analysis and representation of data</li> <li>• Reasoning and problem solving</li> <li>• Scientific method</li> <li>• Software development</li> <li>• Analytical thinking</li> <li>• Creative thinking</li> <li>• Technical skills</li> </ul>	<p><a href="https://careerswithstem.com.au/profiles/cba-daniel-lekic/">https://careerswithstem.com.au/profiles/cba-daniel-lekic/</a></p>

# MATHEMATICAL INVESTIGATION

## FOOD INDUSTRY AND CODING

### CAREERS RELATED TO THIS INVESTIGATION

#### GAME DEVELOPER

Career description	Key skills required	More information
Creates, designs and develops computer games.	<ul style="list-style-type: none"> <li>Scientific method</li> <li>Communication</li> <li>Creative thinking</li> <li>Graphics, art</li> <li>Coding and computer programming skills</li> <li>Problem solving</li> </ul>	<a href="https://careerswithstem.com.au/profiles/niamh-fitzgerald/">https://careerswithstem.com.au/profiles/niamh-fitzgerald/</a>

#### ROBOTICS ENGINEER

Career description	Key skills required	More information
<p>A robotics engineer will design and develop robotic equipment. They construct, configure, test, and debug robots and robotic systems. Careers include:</p> <ul style="list-style-type: none"> <li>Robotics technician</li> <li>Robotics software engineer</li> <li>Toy designer</li> </ul>	<ul style="list-style-type: none"> <li>Scientific method</li> <li>Collaboration and communication</li> <li>Thorough understanding of electrical wiring and computer software engineering.</li> <li>Proficient with computer-aided drafting (CAD) software to create accurate drawings and schematics.</li> </ul>	<a href="https://careerswithstem.com.au/profiles/mahonri-owen/">https://careerswithstem.com.au/profiles/mahonri-owen/</a>

#### SITE RELIABILITY ENGINEER

Career description	Key skills required	More information
Companies such as google employ site reliability engineers. A site reliability engineer, is responsible for the effortless performance of products like for example, Google Photos.	<ul style="list-style-type: none"> <li>Scientific method</li> <li>Coding</li> <li>Reasoning and problem solving</li> <li>Analytical thinking</li> <li>Creative thinking</li> </ul>	<a href="https://careerswithstem.com.au/profiles/anna-emmerson/">https://careerswithstem.com.au/profiles/anna-emmerson/</a>

#### OTHER RELATED CAREERS TO EXPLORE

<https://careerswithstem.com.au/future-tech-jobs-in-australia/>

<ul style="list-style-type: none"> <li>Data scientist</li> <li>App developer</li> <li>Data engineer</li> <li>Cloud engineer</li> </ul>	<ul style="list-style-type: none"> <li>Automation consultant</li> <li>Blockchain developer</li> <li>Machine learning engineer</li> </ul>
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**For an overview of digital technologies being a priority industry and sector, visit:**

<https://djpr.vic.gov.au/priority-industries-sectors/digital-technologies>



# MATHEMATICAL INVESTIGATION FOOD INDUSTRY AND CODING

## CAREERS ACTIVITIES

### THE 10 BEST RATED JOBS OF 2021

Rank	Career	Median salary	Projected growth
1	Data Scientist	\$98 230	33%
2	Genetic Counsellor	\$85 700	21%
3	Statistician	\$92 270	35%
4	Medical Services Manager	\$104 280	32%
5	Mathematician	\$110 860	33%
6	University Professor	\$80 790	9%
7	Operations Research Analyst	\$86 200	25%
8	Information Security Analyst	\$99 730	31%
9	Actuary	\$111 030	18%
10	Software Engineer	\$110 140	22%

Data from [Careercast.com](https://www.careercast.com).

Select one of the careers, from either of the tables above, that interests you and find out:

- What are the tasks involved in this career? What may a typical day look like?
- What level of education or qualifications do you need to do this career?
- What are some other similar or related careers?
- What mathematics skills would be used in this career?
- Where does the career you have selected, to investigate, rank according to careercast.com?
- How many people in Australia are currently employed in this career (or field)?



# MATHEMATICAL INVESTIGATION FOOD INDUSTRY AND CODING

## INDUSTRY PARTNER

This project was produced collaboratively between The Mathematical Association of Victoria (MAV) and Texas Instruments

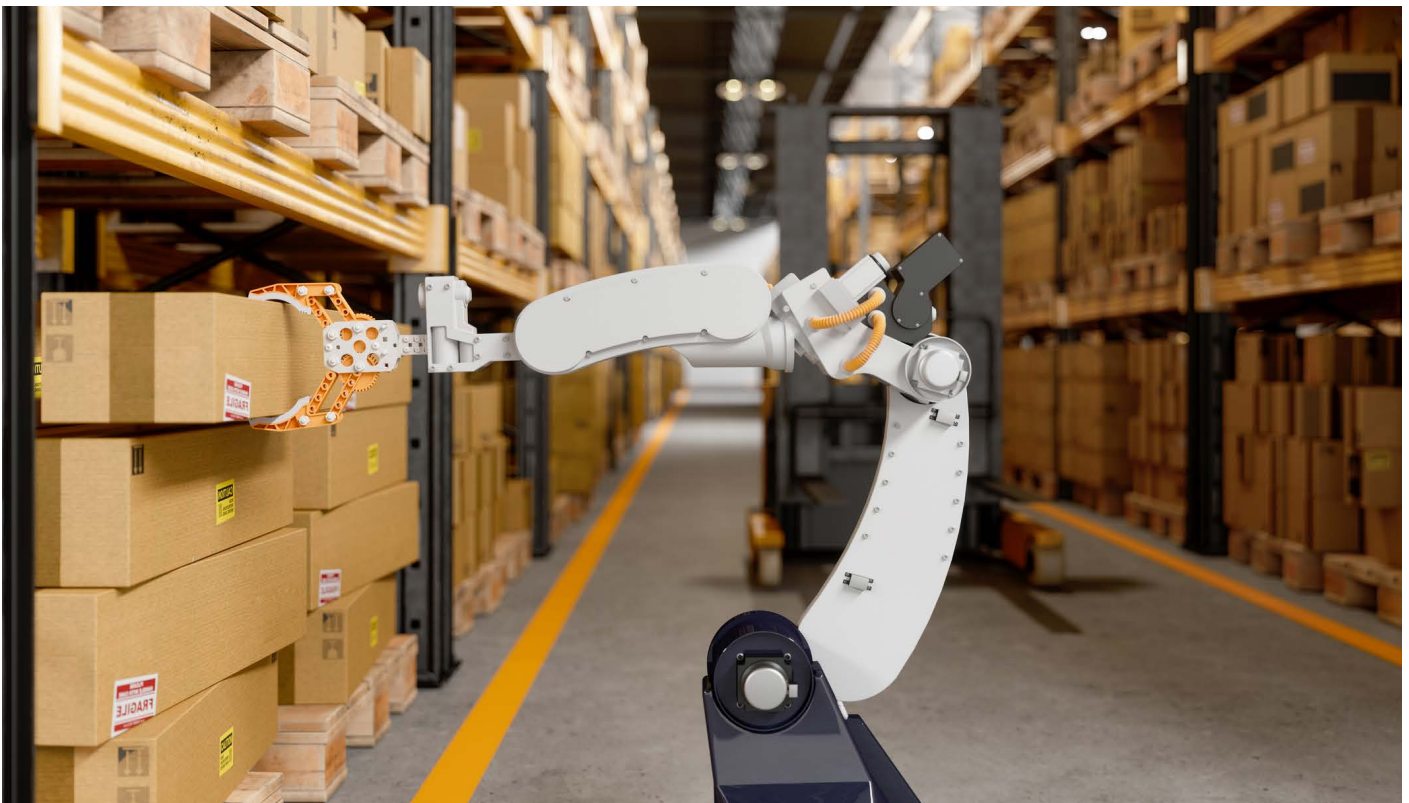
TI has for decades, operated with a passion to create a better world by making electronics more affordable through semiconductors.

We have operated with a passion to create a better world by making electronics more affordable through semiconductors. We were pioneers in the transition of the world from vacuum tubes to transistors and then to integrated circuits (ICs) – and we've been advancing IC technology and the ability to reliably produce ICs in high volumes for decades. Each generation of innovation builds upon the last to make technology smaller, more efficient, more reliable and more affordable – making it possible for semiconductors to go into electronics everywhere. We think of this as Engineering Progress. It's what we do and have been doing for decades:

- The object-detection capability used in a \$20 million military radar system from the 1980s is now possible using a \$20 radar chip in automobiles everywhere to increase vehicle safety and reduce collisions.
- Home automation systems that cost tens of thousands of dollars 20 years ago are now only hundreds of dollars. Today, these systems are more accessible to homeowners and are making homes safer, more convenient and more energy efficient.
- Technology that previously was only used in expensive factory robotic systems is affordable enough to be integrated into home appliances, making common household tasks, like vacuuming, easier and more convenient.

Our passion to create a better world by making electronics more affordable through semiconductors is alive today as we help our customers develop new applications, particularly in the industrial and automotive markets.

[www.ti.com/about-ti/company/what-we-do.html](http://www.ti.com/about-ti/company/what-we-do.html)



# MATHEMATICAL INVESTIGATION FOOD INDUSTRY AND CODING

## FURTHER CAREER REFERENCES

### Australian Jobs Report 2021

[www.nationalskillscommission.gov.au/australian-jobs-report](http://www.nationalskillscommission.gov.au/australian-jobs-report)

An overview of trends in the Australian labour market to support job seekers and employment service providers, career advisers, those considering future training and people interested in labour market issues.

### Business Victoria Future Industries

<https://business.vic.gov.au/grants-and-programs/future-industries>

Future Industries is about supporting investment in high-growth industries through industry excellence and development projects, including establishing collaborative networks and building supply chain readiness capabilities.

### Career Education

[www.education.vic.gov.au/school/teachers/teachingresources/careers/Pages/default.aspx](http://www.education.vic.gov.au/school/teachers/teachingresources/careers/Pages/default.aspx)

Career Education teaching resources to help teach students to make informed career decisions and equip themselves for the world of work.

### CEAV Online Learning Resources

<https://ceav.vic.edu.au/media/250615/careers-in-the-construction-technology-industries-student-resource.pdf>

Designed to enable students to attend a virtual Industry Immersion Experience, these online resources will help students discover more about Victoria's priority growth industries and give them the opportunity to reflect on their skills, interests and undertake career planning and exploration.

### Jobs Victoria

[www.jobs.vic.gov.au](http://www.jobs.vic.gov.au)

### JobOutlook

[www.joboutlook.gov.au](http://www.joboutlook.gov.au)

Relevant and current labour market trends and career information.

### MyFuture

[www.myfuture.edu.au](http://www.myfuture.edu.au)

A database of over 600 careers.

### National Careers Institute

[www.dese.gov.au/nci](http://www.dese.gov.au/nci)

The National Careers Institute (NCI) ensures Australians have access to reliable and accurate careers information, resources, and support.