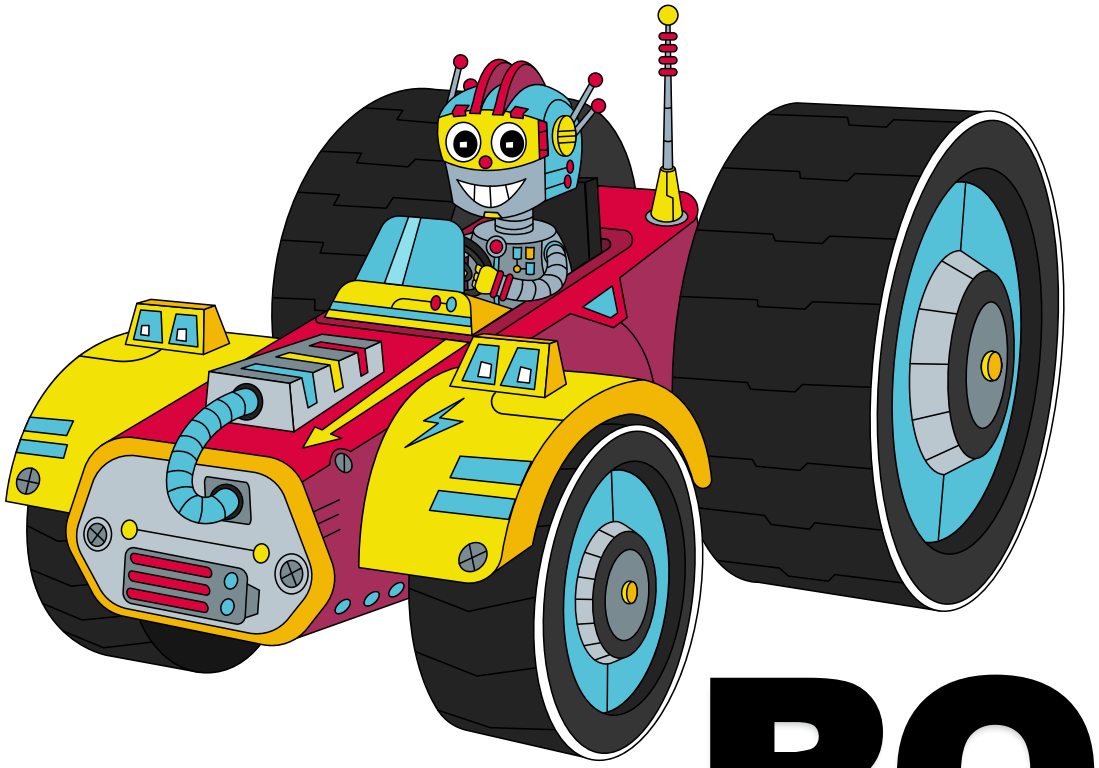


# ROBOWARS!


Laurence Keel

Date: Thursday 26th June 2025

Ealing Design Technology Subject Leaders

www.primarydt.com

# TRAINING OBJECTIVES

- To understand the curriculum requirements for teaching program systems as part of quality provision in design technology.
- To understand the technical knowledge for program systems and how this is taught through units of work in design technology.
- To use Crumble hardware when designing and making products in design technology.
- Understand that program systems can be made simple but used effectively and creatively as part of primary school design technology.

# Section 2: Technical Knowledge

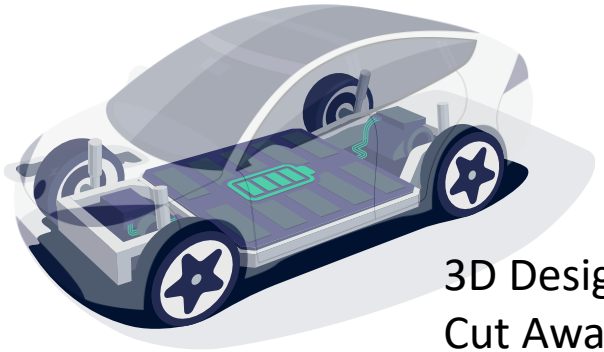
## Professional Development: RoboWars!

# PROJECT OVERVIEW

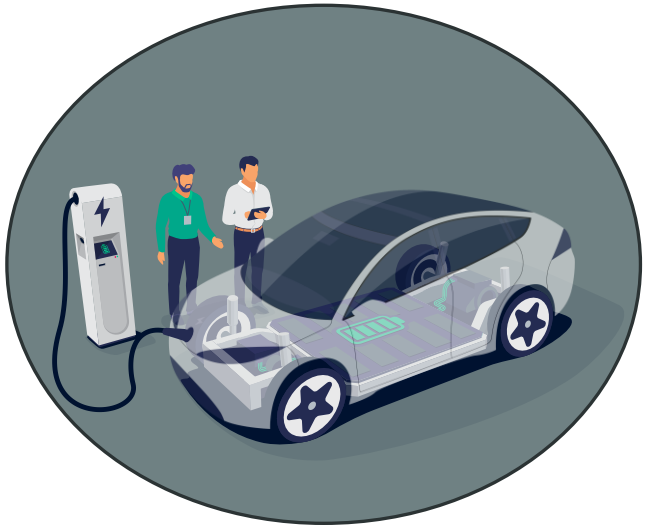
DEFINE the problem or product

**Design Brief:**
**Design and Make a Controllable Robot Buggy to take part in the Class Robo Wars**

PRIMARY DESIGN TECHNOLOGY

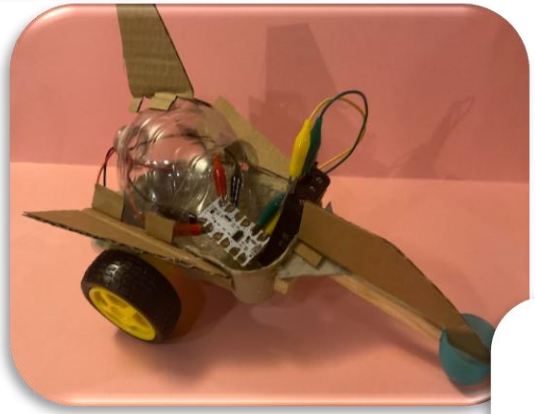
3D Design Drawings
Cut Away Drawings



**Electric cars and understanding the different components of an electric vehicle**

**Elon Musk**

Inventors, inventions and innovators



Creating an Electric Powered Vehicle
- Components
- Cardboard Engineering


Coding and Control

PROJECT OVERVIEW

DESIGNING

DEFINE
the problem or product

# Design Brief:

**Design and Make a Controllable Robot Buggy to take part in the Class Robo Wars.**

PRIMARY DESIGN TECHNOLOGY

# IDENTIFY

## what will make it successful

## Design Specifications:

1. The chassis should be the following dimensions: Length: 160mm, Width: 110mm
2. The chassis design should also include space for the Crumble microcontroller and the battery box.
3. The vehicle must have a flashing light that is capable of flashing red, amber and green.
4. The vehicle must have a push button that starts and stops the vehicle.
5. The vehicle must pass the Test Track tests before being allowed to enter Robo Wars.

LEARNING SEQUENCE

# TEACHING DESIGN TECHNOLOGY: 4 LESSON TYPES

## INVESTIGATE

- Investigating and evaluating existing & similar products.
- Linking real-life products to subject & technical knowledge.
- Researching products.

## FOCUS TASKS

- Acquiring practical knowledge (skills & techniques).
- Learning disciplinary knowledge (design, make & evaluate).
- Linking practical and technical knowledge.

## DESIGN & MAKE

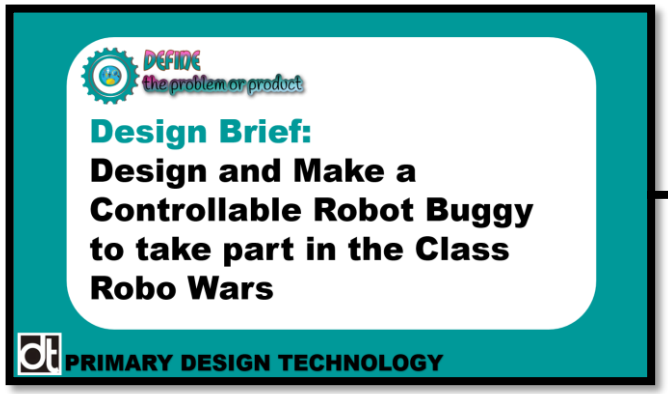
- Applying knowledge to meet a challenge or create a product.
- Applying the disciplinary knowledge of design technology and the iterative process of continuous improvement.
- Applying practical knowledge to use a range of skills, techniques and tools to create a product.

## EVALUATE

- Evaluating the product that has been designed and made.
- Evaluating the process.
- Reflecting (and evaluating) the project.

# INVESTIGATE

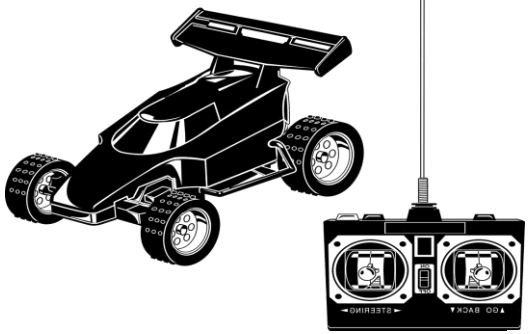
INVESTIGATE




## Deconstruct the Design Brief

Children fully understand what is required of them in the Design & make activity

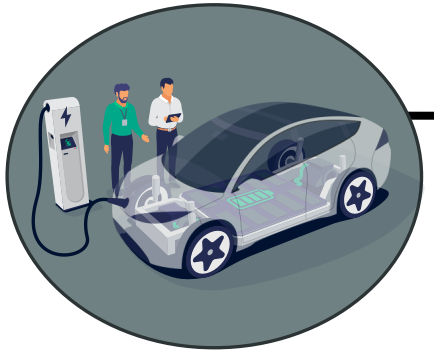

## Investigate and evaluate similar products

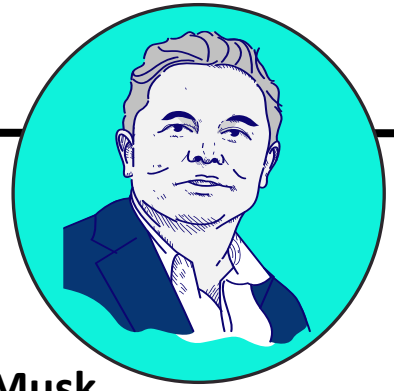


## Real Life & Relevant

There are five main components to an electric vehicle.

- Chassis
- Body
- Electric motor
- Battery
- Control System





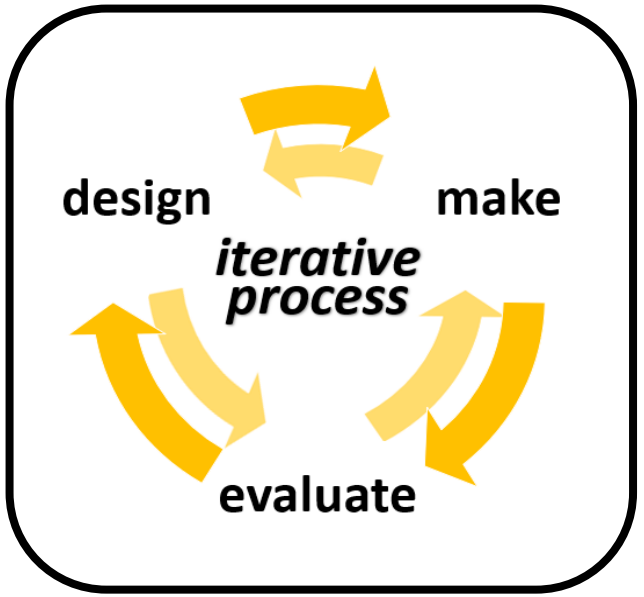
**Elon Musk**

**Electric vehicles, knowing how they work and understanding the different components of an electric vehicle**

INVESTIGATE

**Designing is being creative**

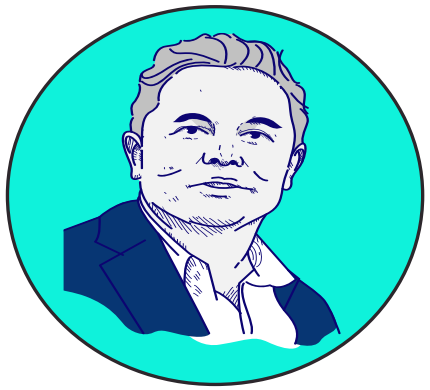
- To solve a problem
- To find a solution
- To develop a product that fulfils a need
- To create a product that people can use




**Why learn about designs and designers?**

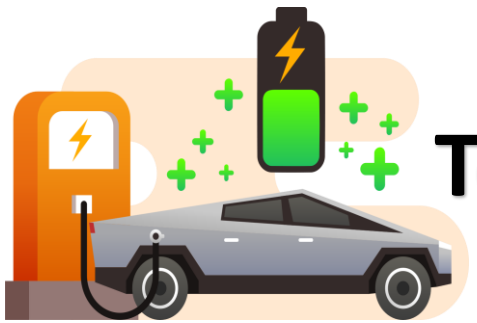
- Study people who are good at the subject.
- Puts the subject into context – real life and relevant.
- Helps children to understand what designers do.
- How design has affected the lives we live today.

# DESIGNS & DESIGNERS



Space X

Starlink



Tesla EV

What was the problem?

What was the need?

What was the solution?

How will people use the product?

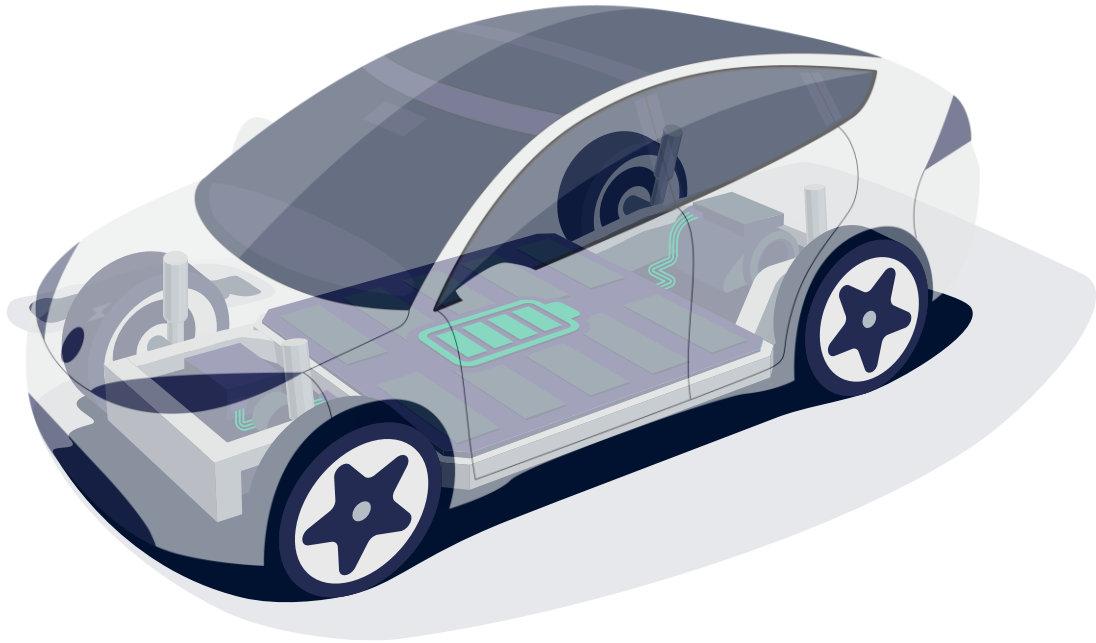
How will this design/product affect our lives?

INVESTIGATE

# INVESTIGATE ELECTRIC VEHICLES

There are five main components to an electric vehicle.

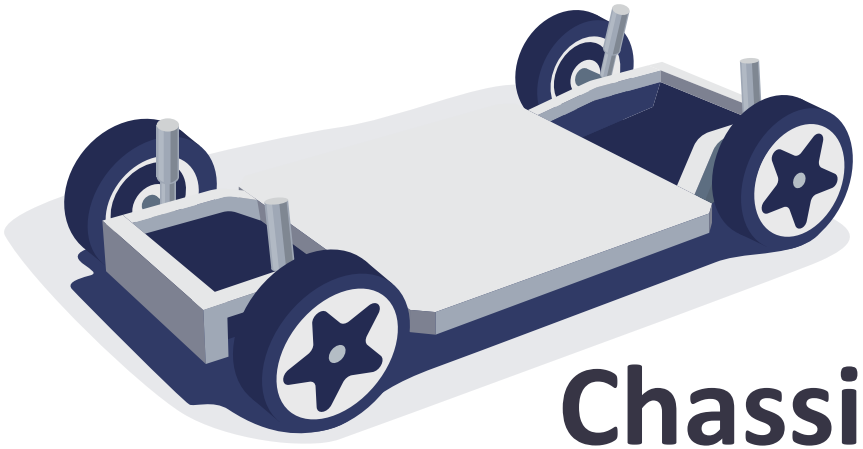
- Chassis
- Body
- Electric motor
- Battery
- Control System



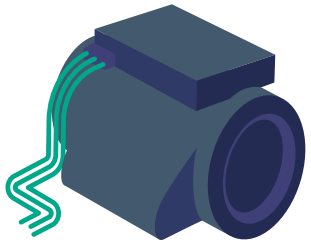
Opportunity to teach children about drawings and diagrams, particularly cut-away drawings when designing in DT

INVESTIGATE

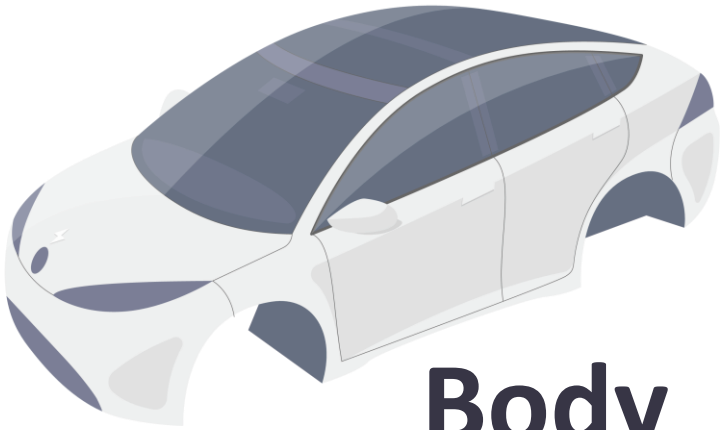
# INVESTIGATE ELECTRIC VEHICLES



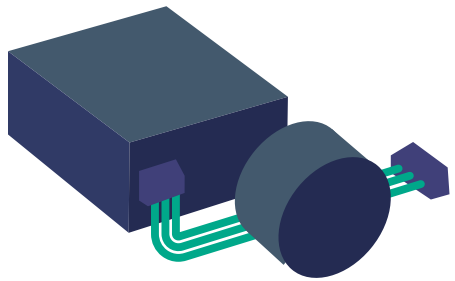
Chassis



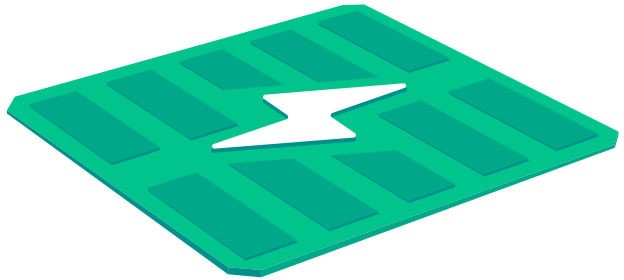
Electric motor



Body



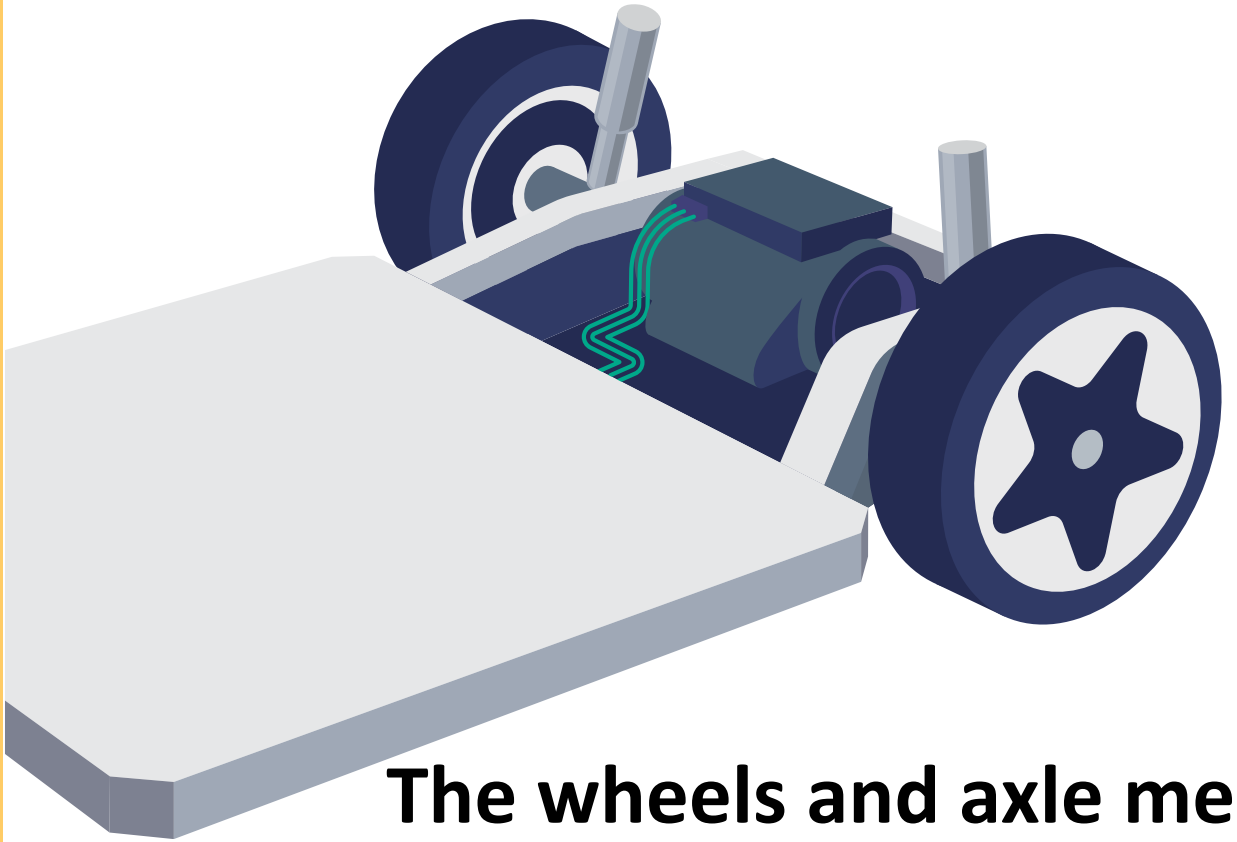
Control system

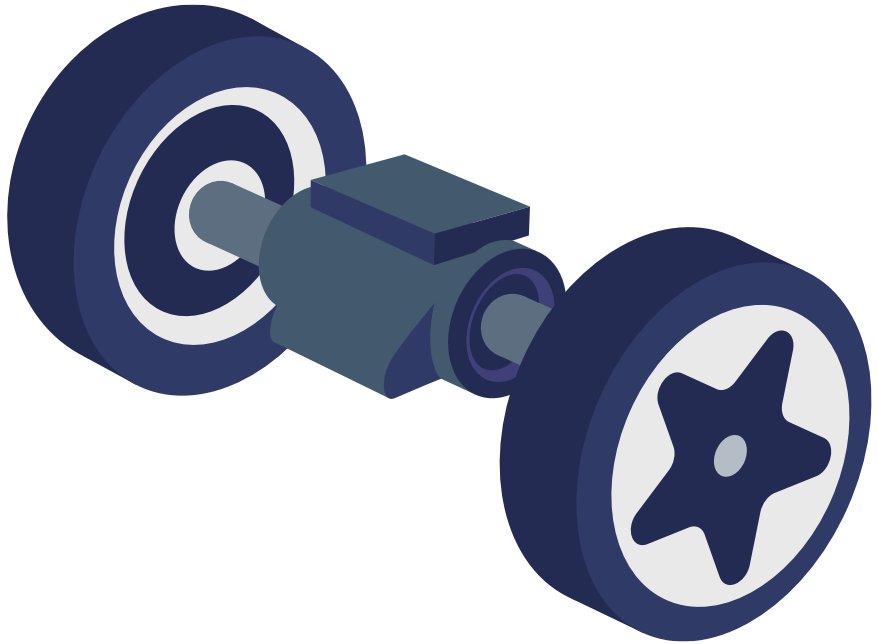


Battery

# CREATING THE CHASSIS

FOCUS TASKS

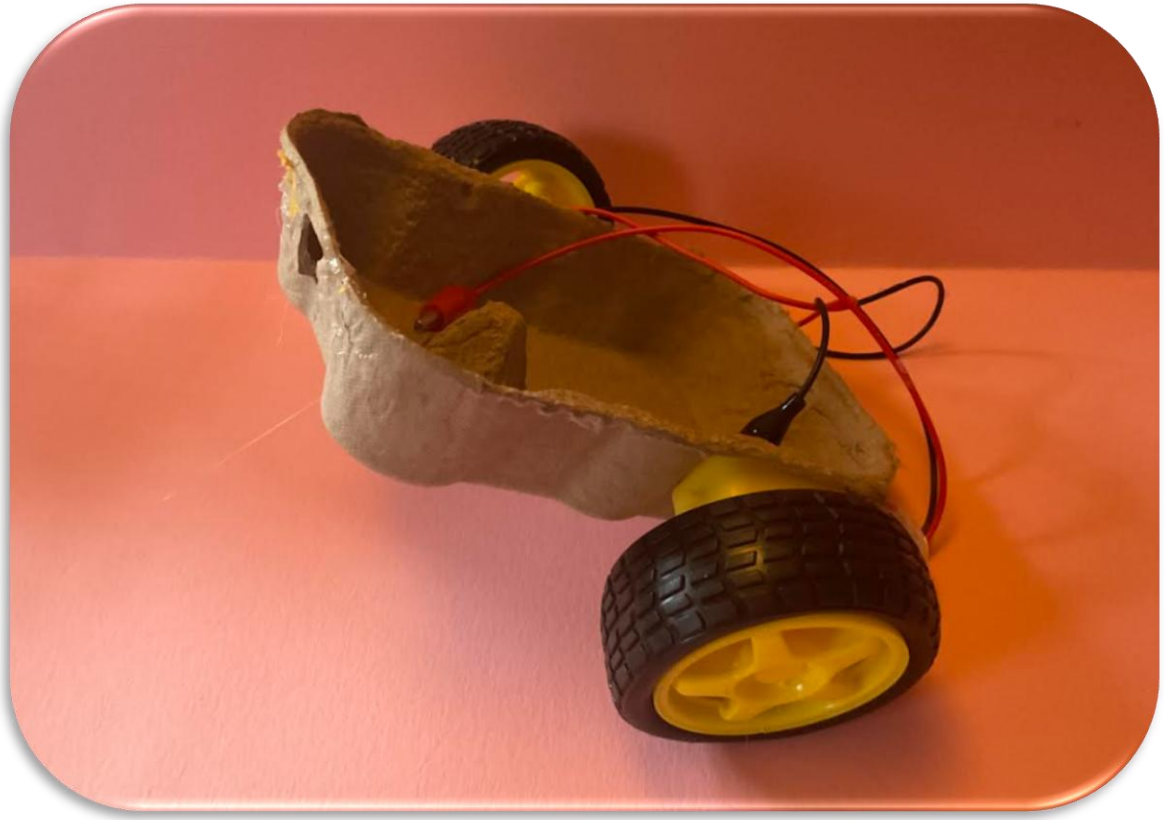




**The wheels and axle mechanism is connected directly to the motor which is fixed to the vehicle chassis.**

FOCUS TASKS

# CREATING THE CHASSIS



IDENTIFY
what will make it successful

**Design Specification 1:**

**The chassis should be the following dimensions:**

**Length: 160mm**

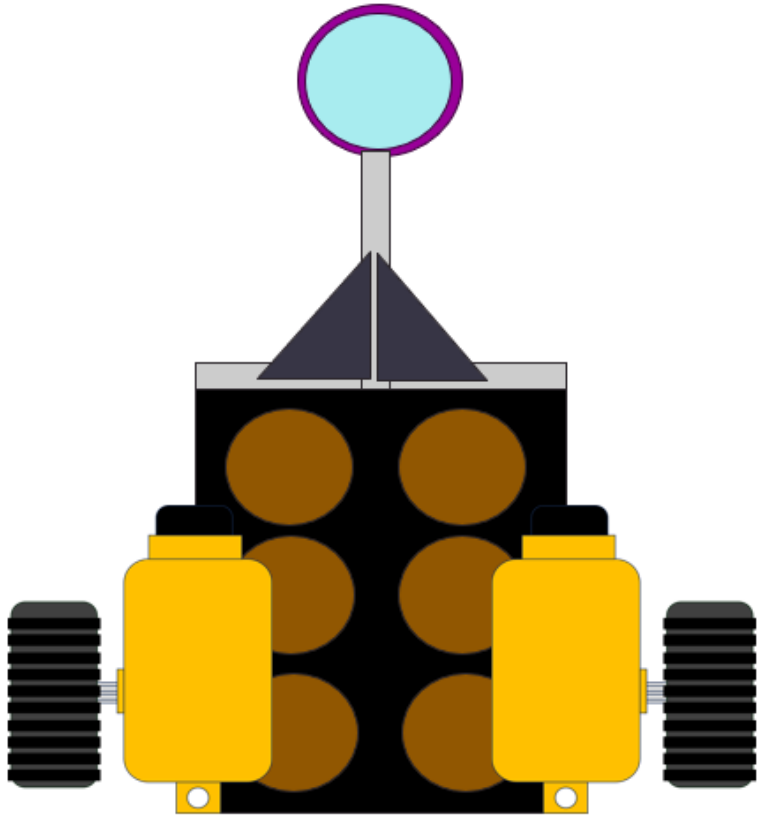
**Width: 110mm**

An egg box is the ideal size for creating the chassis.

Two electric motors with large wheels are attached to the chassis using the engine mounts.

FOCUS TASKS

# CREATING THE CHASSIS

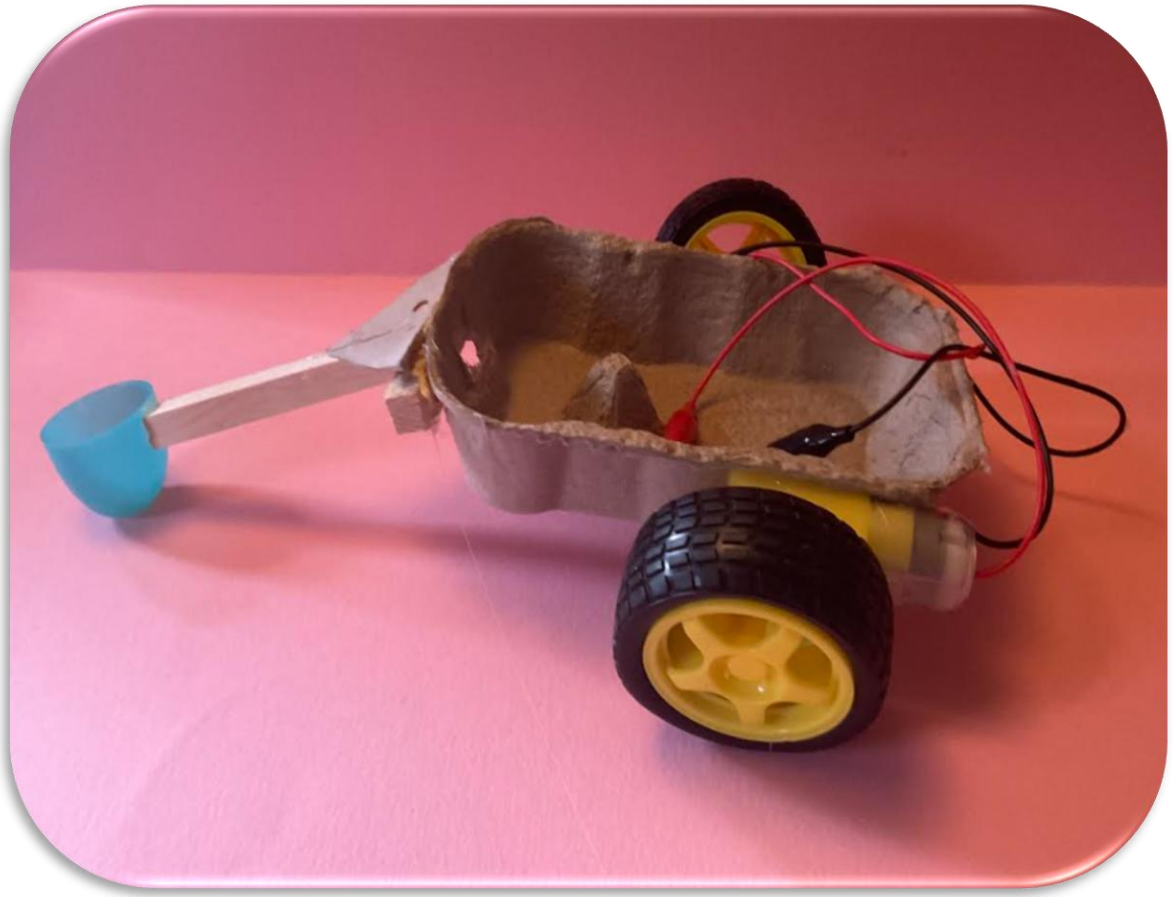


The motors and large wheels provide the movement and direction for the buggy.

To keep it stable, we can add a slider mechanism such as a deodorant lid, ping pong ball or plastic drinks lid.

FOCUS TASKS

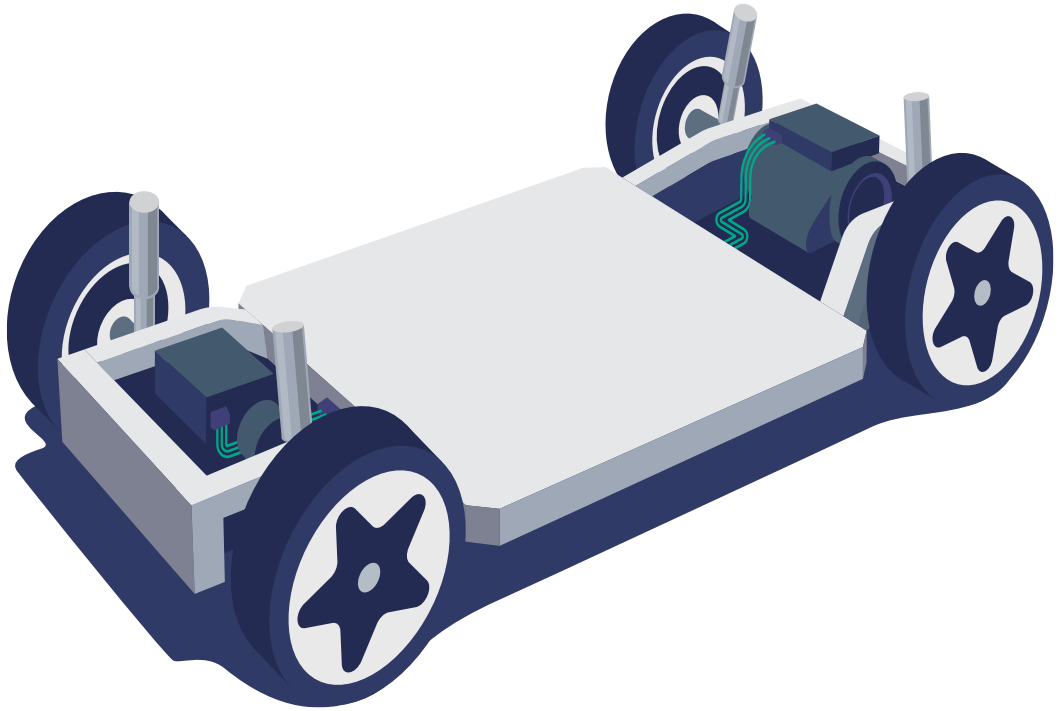
# CREATING THE CHASSIS



The slider mechanism provides stability but slides across the floor allowing the buggy to move in all directions.

A wooden framework is made to create the slider mechanism

# ADDING THE CONTROLLER



IDENTIFY
what will make it successful

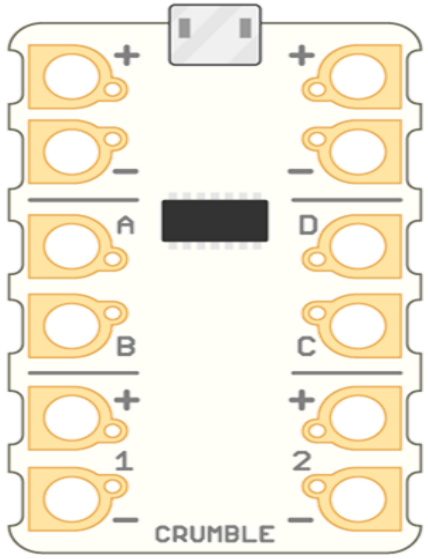
**Design Specification 2:**

**The chassis design should also include space for the Crumble microcontroller and the battery box.**

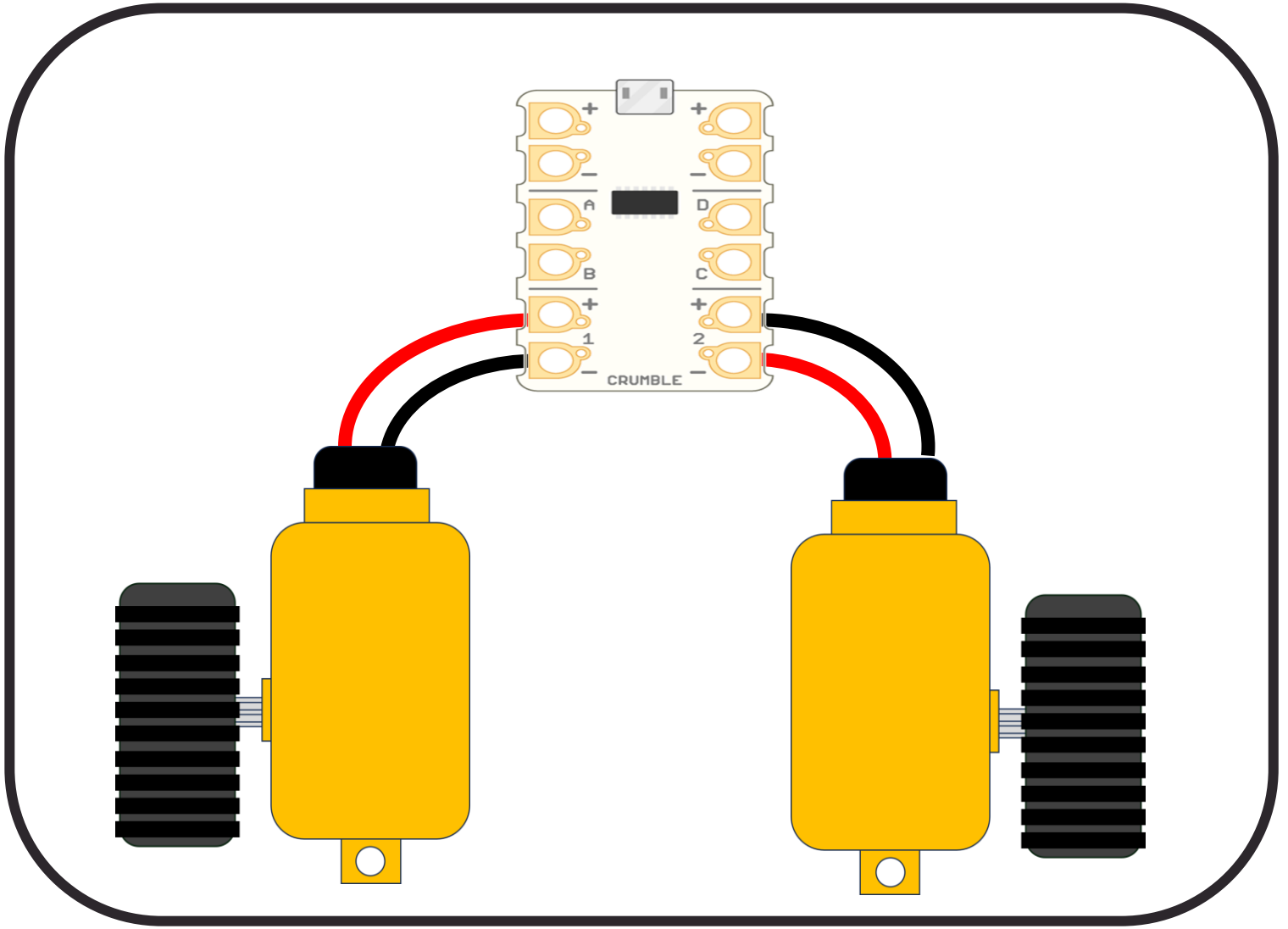
**The controller is the computer system that allows the user to control the electric vehicle.**

FOCUS TASKS

# ADDING THE CONTROLLER

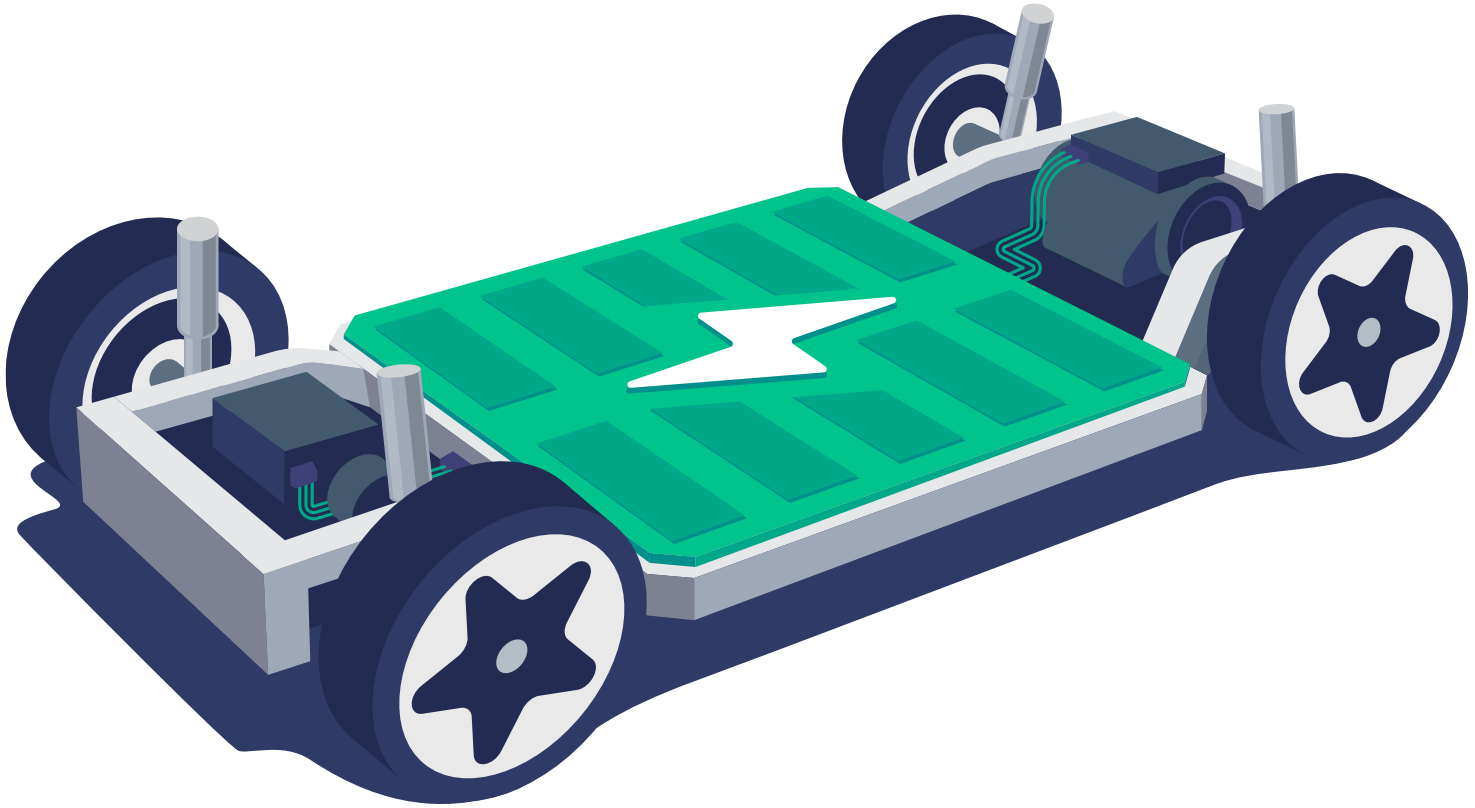



Crumble Controller



FOCUS TASKS

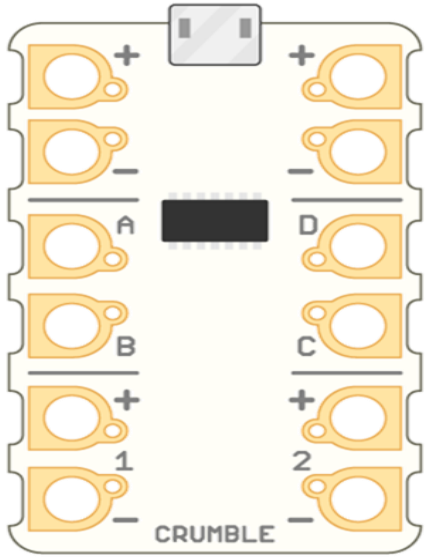
# ADDING THE BATTERY



The battery provides power to the motor. The battery is connected to the motor by electric wires.

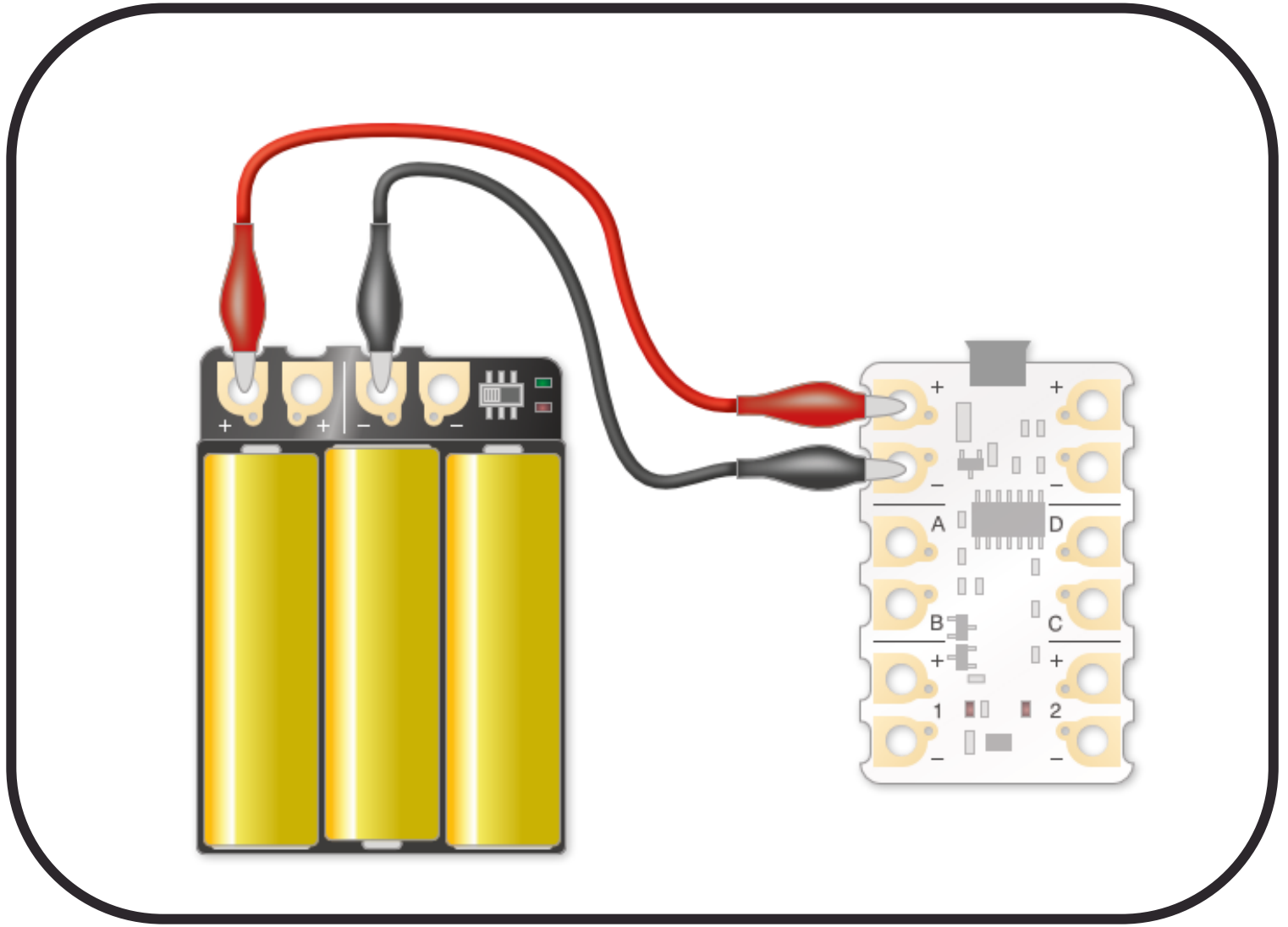
FOCUS TASKS

# ADDING THE BATTERY



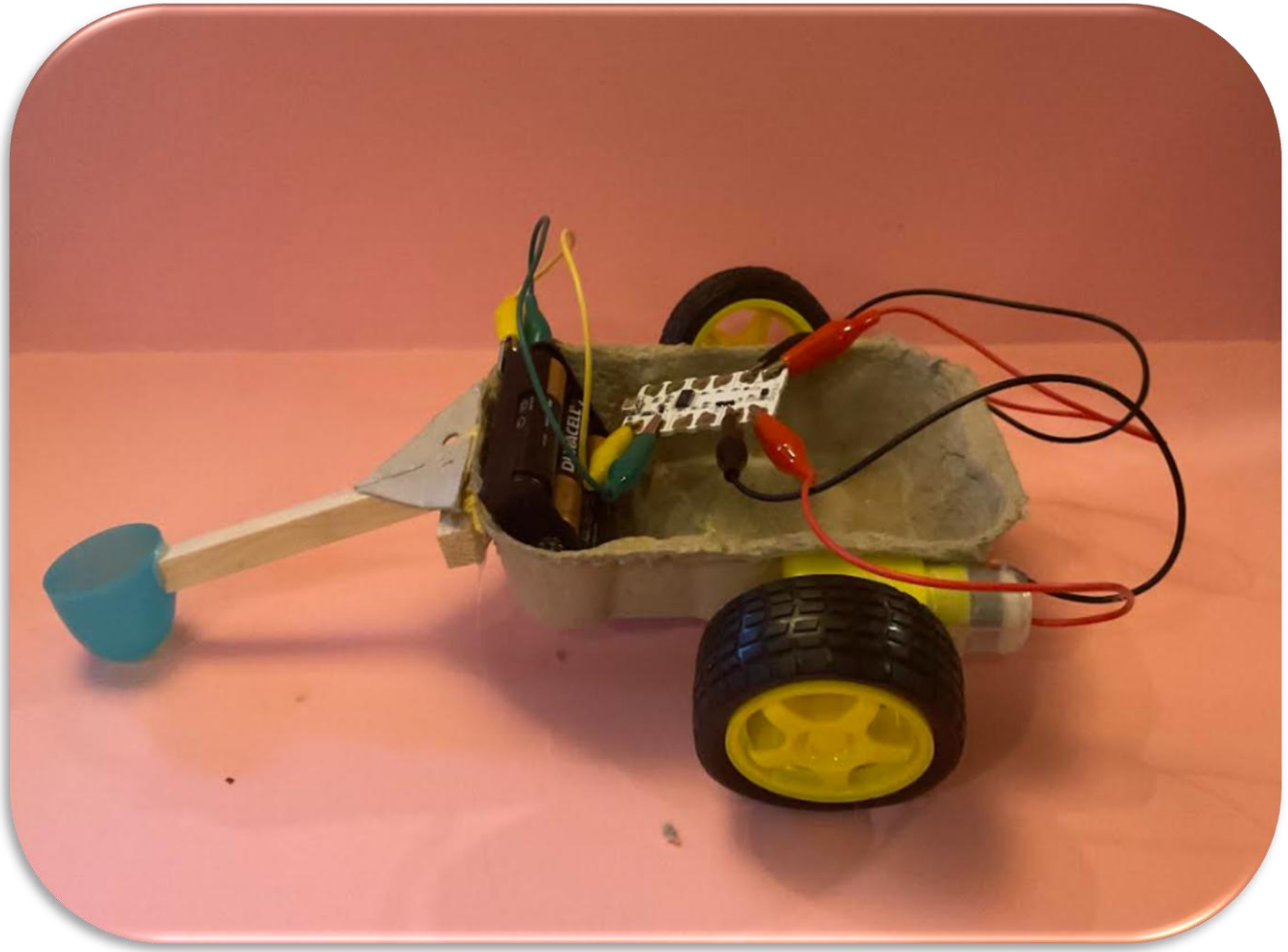

Crumble Controller

**Test the battery pack**
**Check the connection**



# FOCUS TASKS

FOCUS TASKS



4 components of the electric vehicle are now assembled:

- Chassis
- Electric motor
- Battery
- Control system

# FOCUS TASKS

# ADDITIONAL COMPONENTS

FOCUS TASKS

IDENTIFY
what will make it successful

**Design Specification 3**

The vehicle must have a flashing light that is capable of flashing red, amber and green.

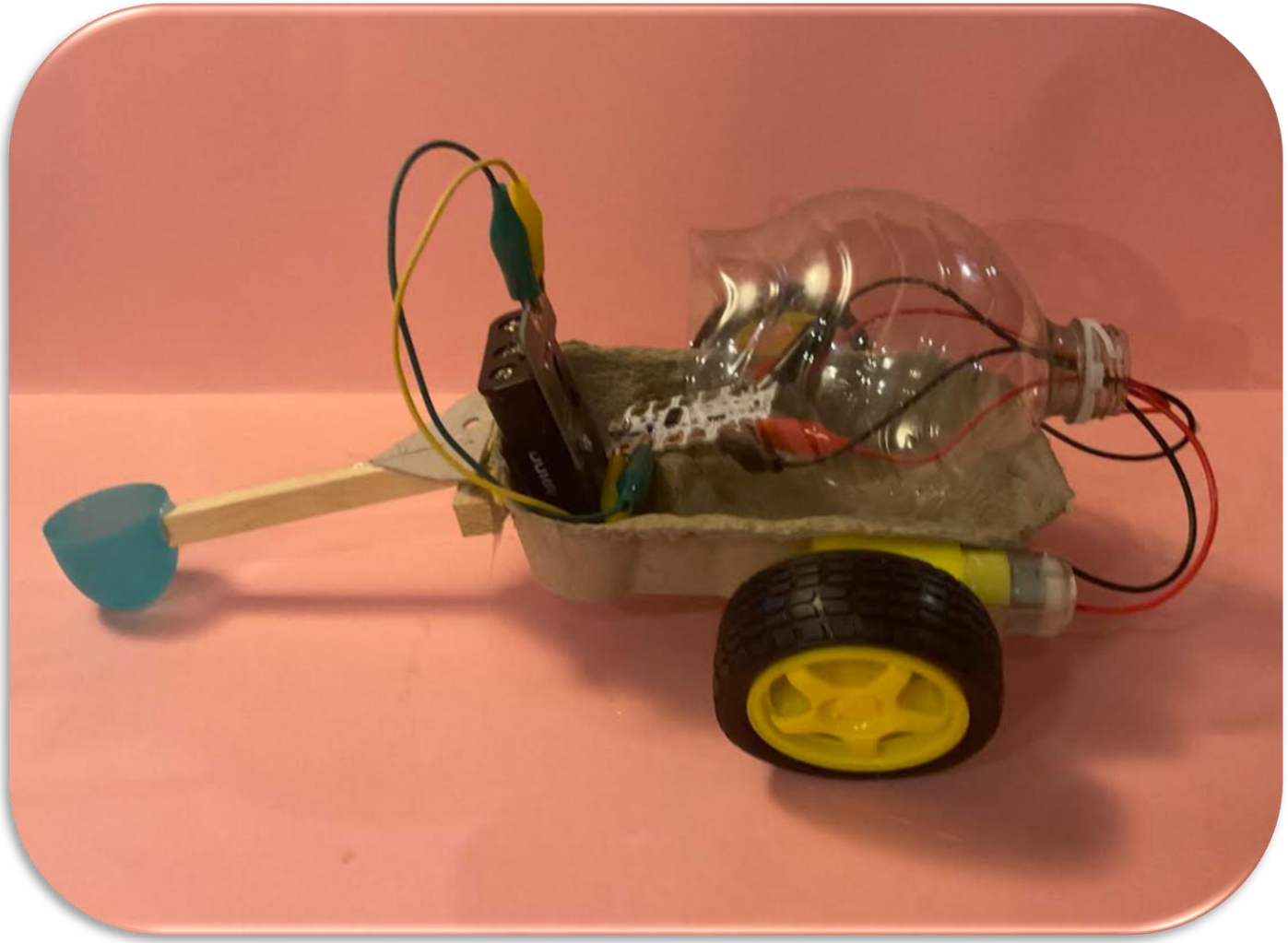
PRIMARY DESIGN TECHNOLOGY

IDENTIFY
what will make it successful

**Design Specification 4**

The vehicle must have a push button that starts and stops the vehicle.

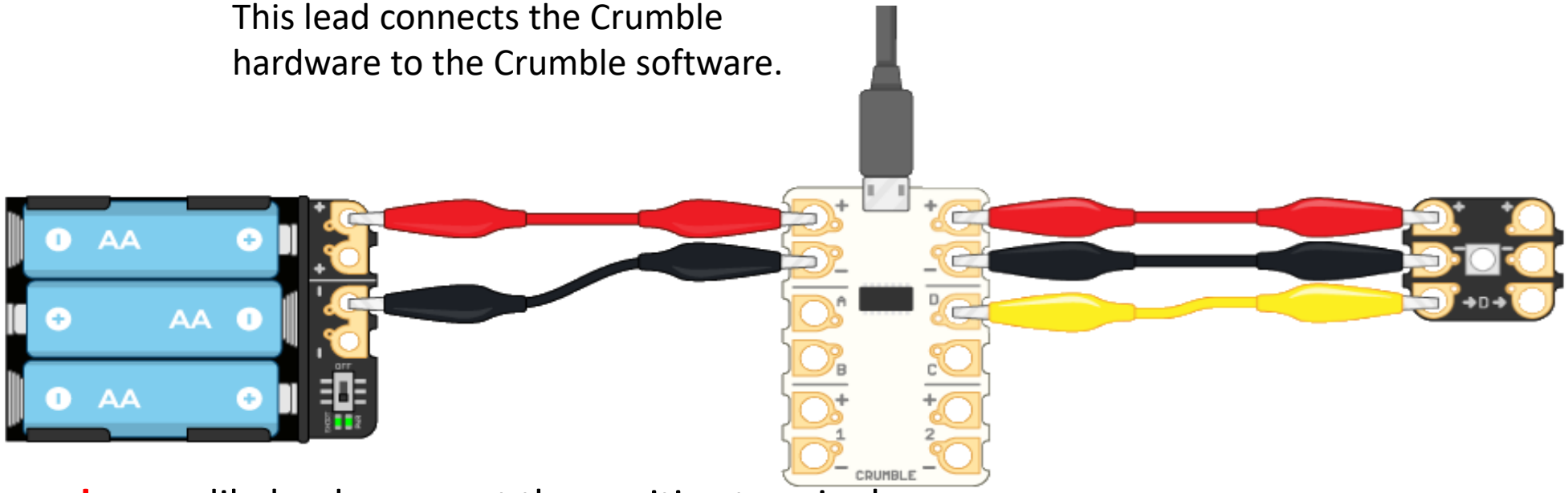
PRIMARY DESIGN TECHNOLOGY



FOCUS TASKS

# CONNECTING A SPARKLE

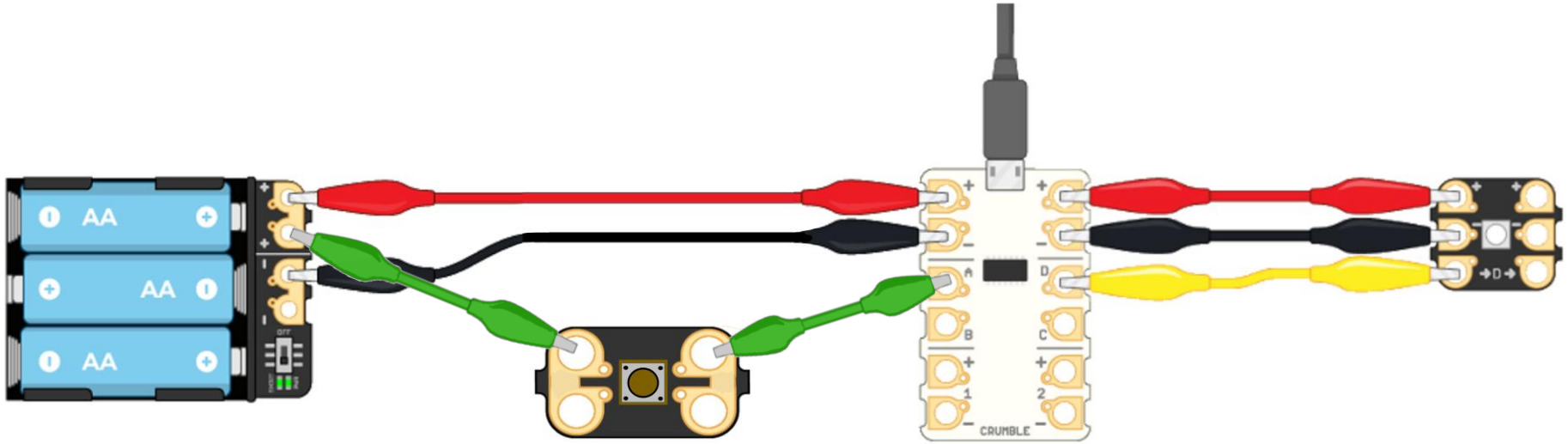
This lead connects the Crumble hardware to the Crumble software.




The **red** crocodile leads connect the positive terminals.
The **black** crocodile leads connect the negative terminals.
The **yellow** crocodile lead connects the D terminals – this allows the microcontroller to control the Sparkle.
**Sparkles are always connected through the D terminal**

FOCUS TASKS

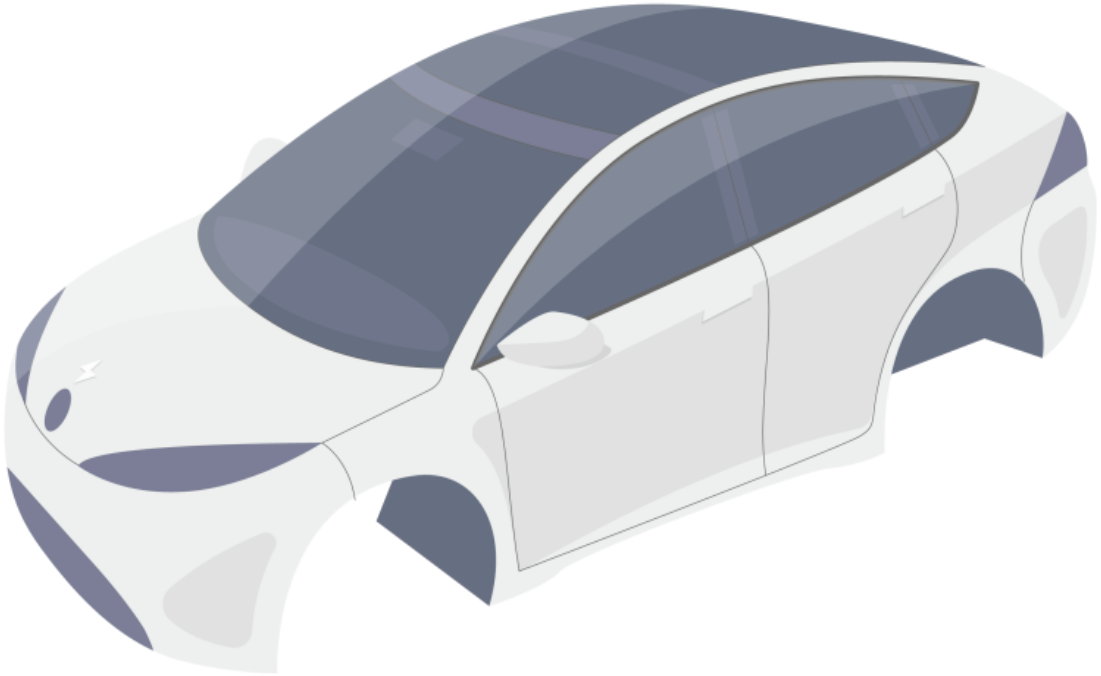
# CONNECTING A SWITCH




The **red** crocodile leads connect the positive terminals.
The **black** crocodile leads connect the negative terminals.
The **yellow** crocodile lead connects the D terminals – this allows the microcontroller to control the Sparkle.
The **green** crocodile lead adds the switch to the system

DESIGN & MAKE

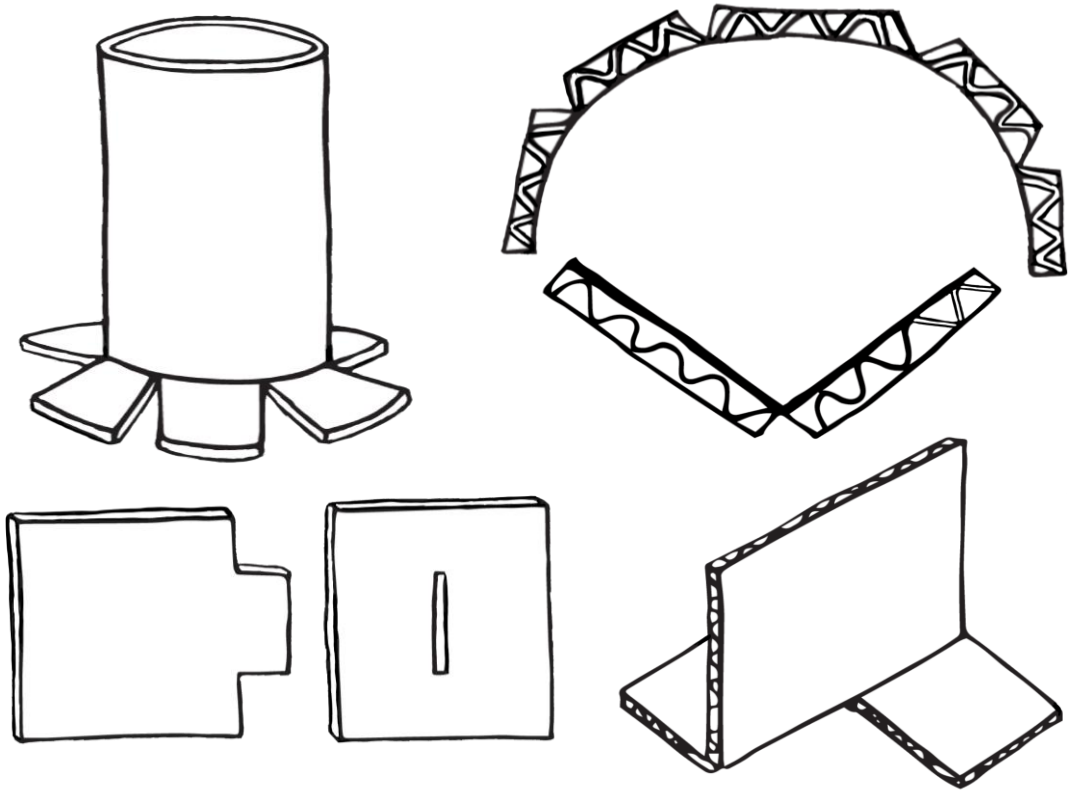
# CREATING THE ROBOWARS



Design and make the vehicle body.
Children creating an authentic product designed by themselves
Children making design decisions.
Creating complex drawing and designs

DESIGN & MAKE

# CREATING THE ROBOWARS

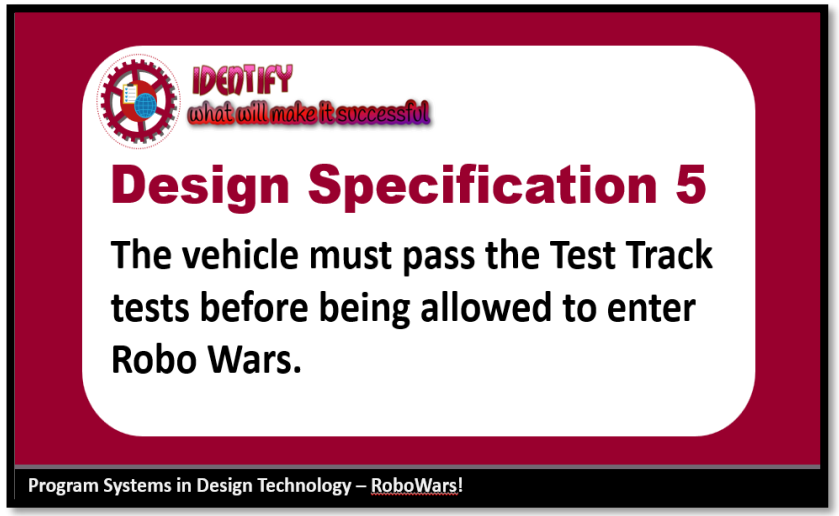


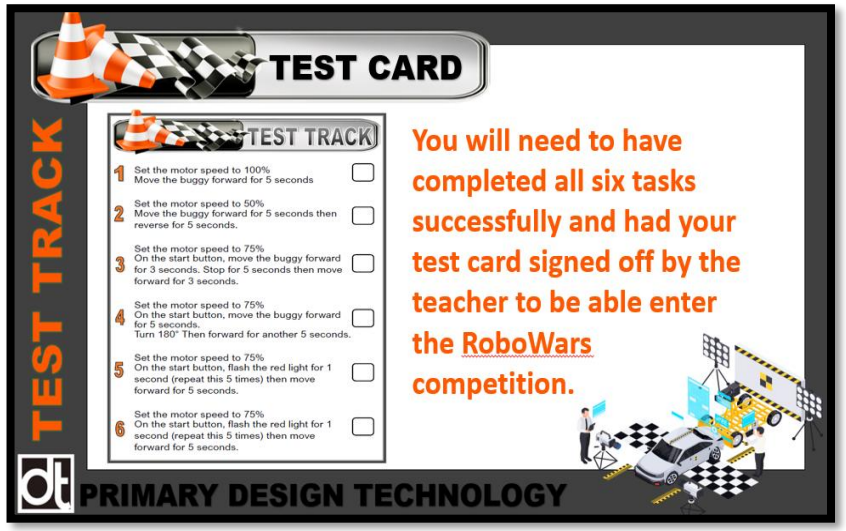
Knowledge retrieval – properties of materials
Knowledge retrieval – structures
Knowledge retrieval – cardboard engineering

# EVALUATE

# EVALUATING THE PRODUCT

EVALUATE




**Are children able to apply their understanding of computing to program, monitor and control their products? (National Curriculum)**

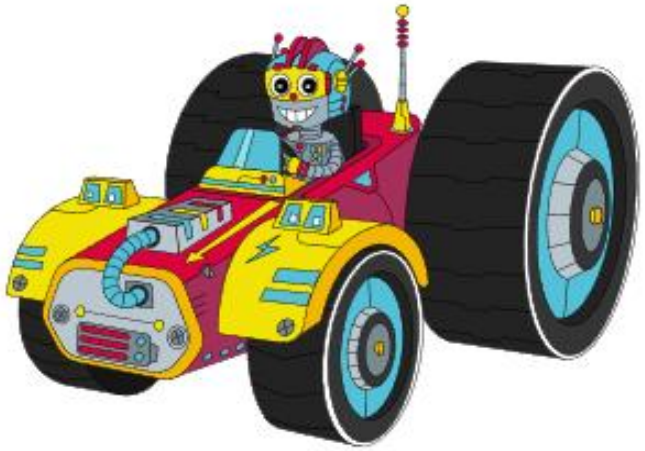
- Does the vehicle respond to the control commands?
- Do children understand block coding used to control their vehicle?

**The iterative process**

- Children test out their vehicle – can they modify, improve their product before the RoboWar battle?

# EVALUATE

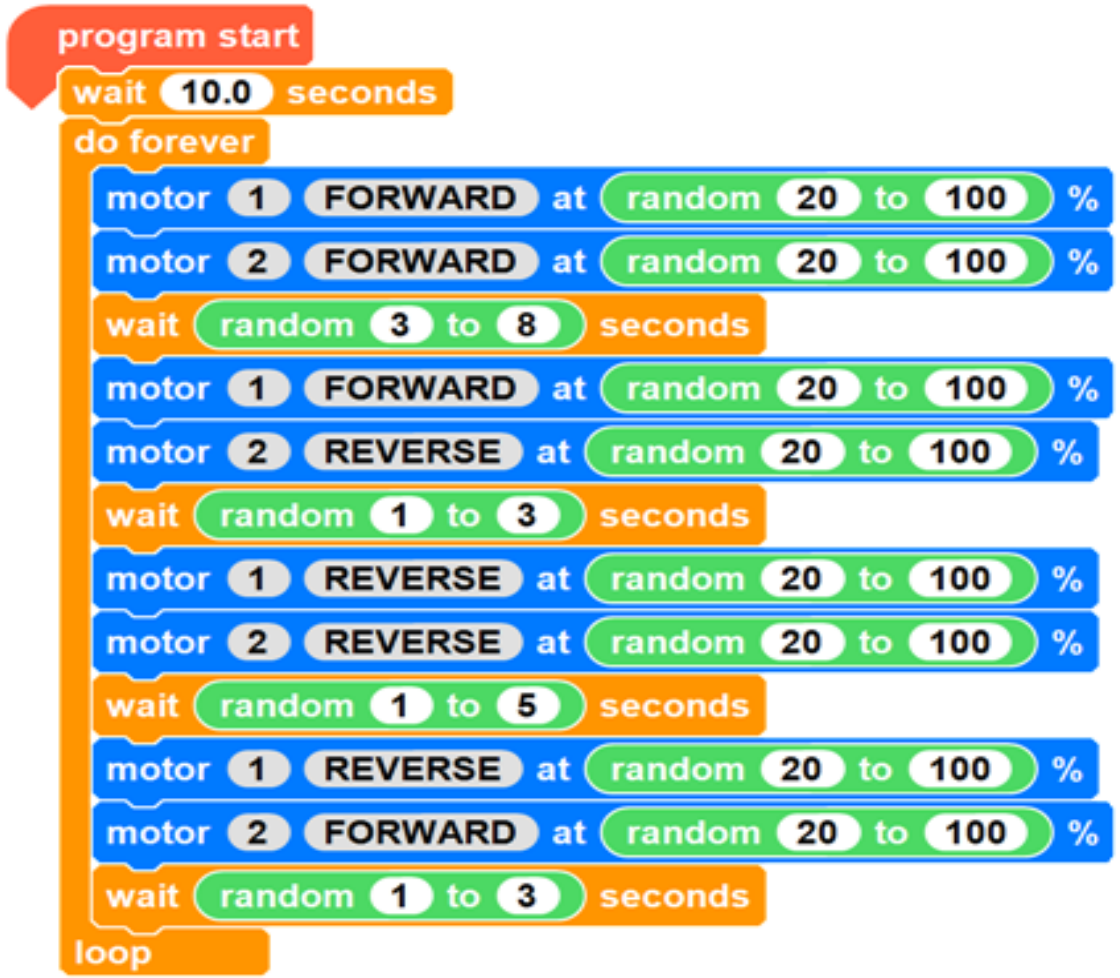
EVALUATE



# LET BATTLE COMMENCE

EVALUATE

# EVALUATE CODING RANDOM MOVEMENT



EVALUATE

# IDENTIFY
## what will make it successful

## Design Specifications:

1. The chassis should be the following dimensions: Length: 160mm, Width:  110mm
2. The chassis design should also include space for the Crumble microcontroller and the battery box.
3. The vehicle must have a flashing light that is capable of flashing red, amber and green.
4. The vehicle must have a push button that starts and stops the vehicle.
5. The vehicle must pass the Test Track tests before being allowed to enter Robo Wars.

EVALUATE

# MARK II PROJECT

Having taken part in the RoboWars…..

- Re-design?
- Where are the weak points?
- Where needs strengthening?

Advanced: Develop own coding for the vehicle.

# EXEMPLAR WORK