Football STEAM Goals

1. Tickets Please!

Think about when you, or someone you know, have used a ticket. It may have been when you went to the cinema or theatre. It may have been to collect something, like shopping. Have you ever needed a ticket to travel on a bus or train? It may have even been to gain entry to a football match!

What usually happens when tickets are needed? Are they taken, or are they inspected? Sometimes tickets need to be stamped. Why do you think this is? Sometimes, tickets are stamped with a machine.

Project Briefing

In your Engineering Design Notebook, think about:

- The questions asked in this brief. What are your thoughts?
- Why do tickets need to be stamped?
- How could you create a machine that will 'stamp' the tickets of people attending a football match?

Your Task

Now, it's time for you to change how the local football club admits fans to the stadium. You will become designers and engineers and create a robotic machine that will stamp the tickets of football fans entering the stadium.

Think about:

- What your machine will look like.
- How will you make it raise (to allow for a ticket to be presented) and lower (so that the machine stamps the ticket)?
- Different ways to control a motor.
- Consider other features for your ticket-stamping robot. How will the football fans know when to present their tickets, and when they can remove them from the machine?

Start by discussing all these questions and maybe sketching some ideas in your Engineering Design Notebook.

Build a prototype – this may be just the stamping mechanism using the motor. When this is working as you want it to, incorporate it into your design.

Consider your coding and make sure that your ticket-stamping robot works every time!

Models and Mechanisms for Inspiration

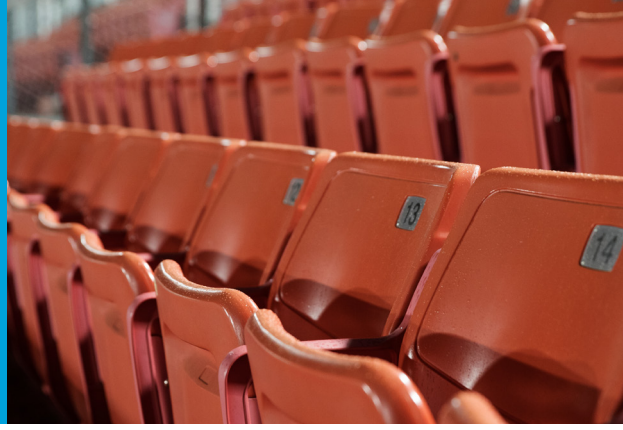
Rubbish Monster Machine

Treehouse Camp

LEGO education

Football STEAM Goals

2. Where's My Seat?



Project Briefing

Think about a situation when you walked into a place with lots of seats. It may have been when you came into the assembly hall with your class. Have you been to a wedding, or perhaps to a football match in a big stadium? It can be quite confusing knowing where to go to find your seat in a big place where there are lots of other people!

What usually happens when you need to find your seat? Are there sometimes people there who might look at your ticket and show you which way to go? How do they do this? Do they take you to your seat or might they point, or gesture in the direction you need to go?

In your Engineering Design Notebook, think about:

- The questions asked in this brief. What are your thoughts?
- Why is it important that people are given help finding their seats?
- How could you create a machine that will direct ticket-holders to their seats?

Your Task

Now it's time for you to help the local football club by making how fans come into the stadium more efficient and clearer, especially for visiting fans who may not know the layout of the seats. You will use your design and engineering skills to create a robotic steward that will direct fans to their seating areas depending on the colour of their tickets.

Think about:

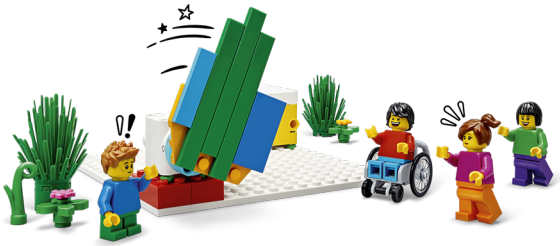
- What your 'robot steward' will look like. It will need to be solid and stable.
- How will you make it 'point' to the left and to the right?
- Different ways to control a motor.
- Consider those fans who may be visually impaired. How might you use other programming features to direct those fans?
- How will the football fans know when to present their different coloured tickets so that the robot steward can then instruct them to turn left or turn right?

Start by discussing all these questions and maybe sketching some ideas in your Engineering Design Notebook.

Build a prototype – this may be just the pointing mechanism using the motor in response to the Colour Sensor. When this is working as you want it to, incorporate it into your design.

Consider your coding and make sure that your robot steward works every time!

Models and Mechanisms for Inspiration



Good Morning Machine

Animal Alarm

LEGO education

Football STEAM Goals
3. Penalty Precision

Have you ever taken, or seen someone take, a penalty kick in a football match? What happens? Is the ball stationary or is it moving? Does the kicker aim for a target? How might they do that? How hard do they strike the ball? Why?

Look at some images or videos of players taking penalty kicks. Look closely at the leg they use to kick the ball with. How does it move before, during and after the penalty?

Project Briefing

In your Engineering Design Notebook, think about:

- The questions asked in this brief. What are your thoughts?
- Is there a connection between how hard a player kicks the ball and how fast (and accurately) the ball travels?
- How could you create a machine that will take effective penalty kicks so a goalkeeper can practise saves?

Your Task

Now it's time for you to help the local football club by making sure their goalkeeper is really good at saving penalties. You will use your design and engineering skills to create a robotic penalty kicker so the goalkeeper can practise their skills.

Think about:

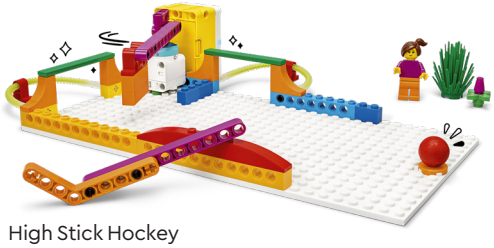
- What your penalty-kicking machine will look like. The base will need to be stable and not wobble over when the 'leg' spins round and kicks the ball.
- How will you investigate the power of the kick? Remember, penalty kicks also need to be accurate.
- Does the starting position of the leg make a difference to how fast and how far the ball travels?
- The shape of the 'foot'. Investigate different solutions to find out which strikes the ball in the best way.
- How might you use other programming features in your creation?

Start by discussing all these questions and maybe sketching some ideas in your Engineering Design Notebook.

Build a prototype – this may be just the kicking mechanism, including the 'leg' and 'foot' attached to the motor. When this is working as you want it to, incorporate it into your design.

Consider your coding and make sure that your robot penalty taker works every time!

Models and Mechanisms for Inspiration



High Stick Hockey

Boat Trip

Mini Mini-Golf

LEGO education

Football STEAM Goals
4. Guard the Goal!

Think back to the last project when you considered penalty kicks. How does the goalkeeper react? What do they do to prepare as the penalty taker is getting ready? Do they move around or stay still? If they move around, why do you think this is? How do they know which way to move, or dive, when trying to save the ball?

Look at some images or videos of goalkeepers saving – or trying to save – penalty kicks. Look closely at their body shape and how they move before and during the penalty.

Project Briefing

In your Engineering Design Notebook, think about:

- The questions asked in this brief. What are your thoughts?
- Is there a connection between a goalkeeper constantly moving and how many goals are scored past them?
- How could you create a machine that will defend a goal so a striker can practise their penalties?

Your Task

The local football club needs your help again! They loved your penalty-taking robot. It really helped their goalkeeper. Now, they need something so that their players can practise taking penalties. You will again use your engineering skills to design and build a robotic goalkeeper so that everyone can practise scoring goals!

Think about:

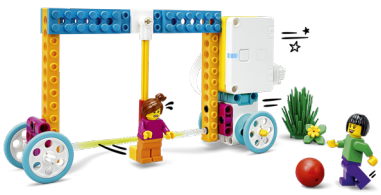
- What your goalkeeping machine will look like and how it will behave. You will need to build a goal and a goalkeeper.
- Will the whole machine move to make it tricky for the kickers, or will the goalkeeper move inside a stationary goal? Or both?!
- How might your machine move? Will the movements be the same and uniform, or will the kickers be left wondering what will happen next?
- How might you use other programming features in your creation? Can you incorporate the Light Matrix? Can you make your robotic goalkeeper perform the same actions over and over?

Start by discussing all these questions and maybe sketching some ideas in your Engineering Design Notebook.

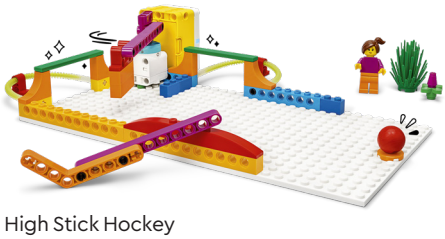
Build a prototype – this may be just the movement mechanism, which could be the goal, or the goalkeeper attached to the motor. When this is working as you want it to, incorporate it into your design.

Consider your coding and make sure that your robot goalkeeper works as you want it to!

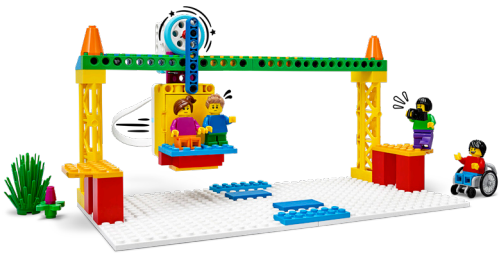
Models and Mechanisms for Inspiration



Winning Goal



High Stick Hockey



Cable Car

LEGO education

Football STEAM Goals
5. Cheering Crowd

Have you ever been to a sports event, or seen one on television? When do spectators usually celebrate? When a goal is scored, or something brilliant happens, how do the people in the crowd react and move? Do they sit or stand? Do they interact with each other? Are celebrations usually quiet or might you hear particular noises?

Look at the images of celebrating sporting spectators. Can you imagine the atmosphere?

Project Briefing

In your Engineering Design Notebook, think about:

- The questions asked in this brief. What are your thoughts?
- How might crowd reactions effect the players on the pitch?
- How could you create a model of a cheering crowd that springs into action when a goal is scored?

Your Task

You will need to use all of your design, building, engineering and coding skills to recreate an amazing, cheering crowd. Imagine how you and your friends might react if your football team scored a goal or won a game. How might you jump, twirl and cheer!

Think about:

- What your cheering crowd model will look like and how it will behave.
- You will need to build mechanisms so that the minifigures from the SPIKE™ Essential set move around.
- How you might set your cheering crowd model off. Will you use the Colour Sensor to detect the red ball and trigger the celebration, or might you consider a different solution?
- Will you use one or two motors? Will you make use of the Light Matrix, the Display coding blocks or the sound?

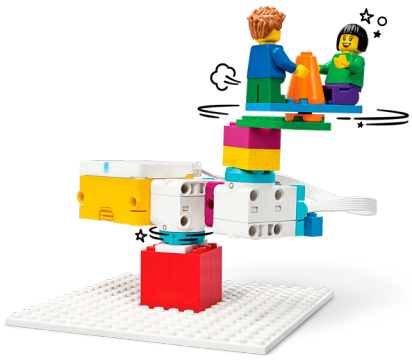
Start by discussing all these questions and maybe sketching some ideas in your Engineering Design Notebook.

Build a prototype – this may be just the movement mechanism with some minifigures attached. When this is working as you want it to, incorporate it into your design.

Consider your coding and make sure that your cheering crowd works as you want it to!

Models and Mechanisms for Inspiration

Classic Carousel



Twirling Teacups

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