

02 - Drilling Machine

Basic Teaching Information

Teaching facility	AI Module 1s	Teaching mode	Project-based learning	Class duration	90 minutes
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Teaching Objectives:

1. Learn to decompose complex mechanism into different parts and complete each part;
2. Learn worm gear, gear deceleration, gear acceleration and planetary gear;
3. Help students to build flow control logic mindset;
4. Comprehensive application of learned knowledge.



Focus

Wells played an important role to the development of human civilization. Before well appeared in human lives, humans lived close to water, and can only live at places where there was surface water or spring water. The invention of wells has expanded the range of human activities. So how does the water in the well come out?

Do you know how the drilling machine works? How does modern technology help people solve the problem of searching water resources?

Exploration

The drilling machine controls the lifting of the drilling frame through the lifting device. When the drilling frame works towards the ground, the high speed rotating drill can drill out the well on the ground.

1. How do build a lift-able drilling frame?

We used u-shaped beam to decelerate when in vertical drive, used fixed large gears to form a planet carrier for lifting.

2. How to make high-speed rotation of the drill?

We can use dual motor control and gear acceleration to speed up the drill.

Creation

This lesson consists of two parts: lifting structure and drilling structure

1. Using square beam combined with closed-loop motor to build the power base of lifting structure
2. Installation of worm gear to control frame lifting
3. Using the second closed-loop motor, so that the big gear can drive the small gear to achieve the drill acceleration
4. Connecting the frame to the worm gear structure
5. Extension: Install touch sensor as control switch

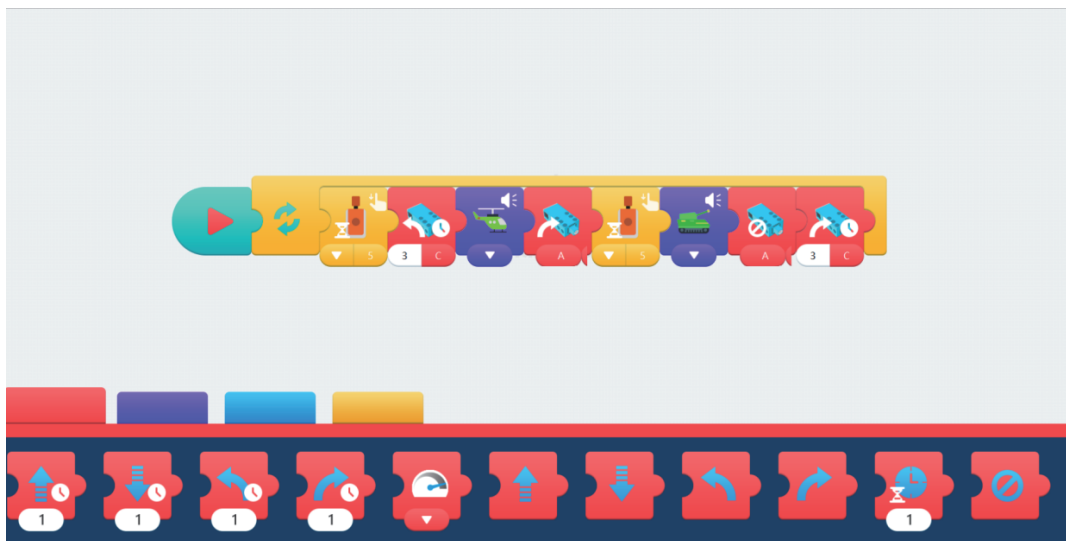
Programming

Through the flow control, realize the lifting of the drilling machine, and then start the drilling device.

This lesson is about dual-actuator precise control, students need to master the skills in actuator control, sequential structure and loop structure

Accurate analysis of the task execution process, by the touch sensor control, when the touch sensor is pressed, start the motor, the drilling frame rises after the prompt sound, then the drill rotates.

When the touch sensor is pressed again, turn off the drill bit and retract the drilling frame.



Drilling Machine

Evaluation

Q: How many drive structures were used in this project?

A: 4 drive structures: vertical drive, deceleration gear drive, planetary gear drive, acceleration gear drive

Show

Demonstrate the project.

Key point 1: Comprehensive usage of worm gear. Understand the characteristics of worm gears and planetary gear structure.

Key point 2: Explain the programming logic, explain the actuator control method and dual motor control process.

