

08 - Automatic Production Line

Automatic Production Line



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 linkage structure;
2. Learn and master chain drive;
3. Try to design the structure individually.



Automatic Production Line



Focus

Automobile manufacturing is a huge and complex system engineering. Automated car production line can greatly reduce production cycle and cost. The automatic production line can automatically complete the work of welding and installation according to the specified procedures or instructions, improve production efficiency, improve the safety of the production process, and reduce the consumption of raw materials and energy in the production process.

Exploration

Modern automobile manufacturing line, mainly composed of transport structure for movement and mechanical arm for installation and manufacture.

1. How do realize the automatic movement of goods?

Tips: We can use chain drive as the moving mechanism for the production line.

2. How to realize the working cycle of mechanical arm?

Tips: we can use the characteristics of the periodic movement of the linkage structure, and build the mechanical arm to process the items on the conveyor belt.

3. Expansion: To ensure the safety of production, it is necessary to stop the operation of the equipment when someone approaches. We can use the combination of infrared sensor and touch sensor for double switch control.

Automatic Production Line



Creation

1. Use 110 beam, square beam, chain wheels and caterpilla to build conveyor belt;
2. Use closed loop motor for drive power;
3. Use 12 half high bevel gear and 20 half high bevel gear to build vertical drive structure;
4. 110 beam, 24 straight tooth, 8 straight tooth;
5. Wheels, 110 beams, 70 beams, 50 beams to build mechanical arm;
6. Controller.

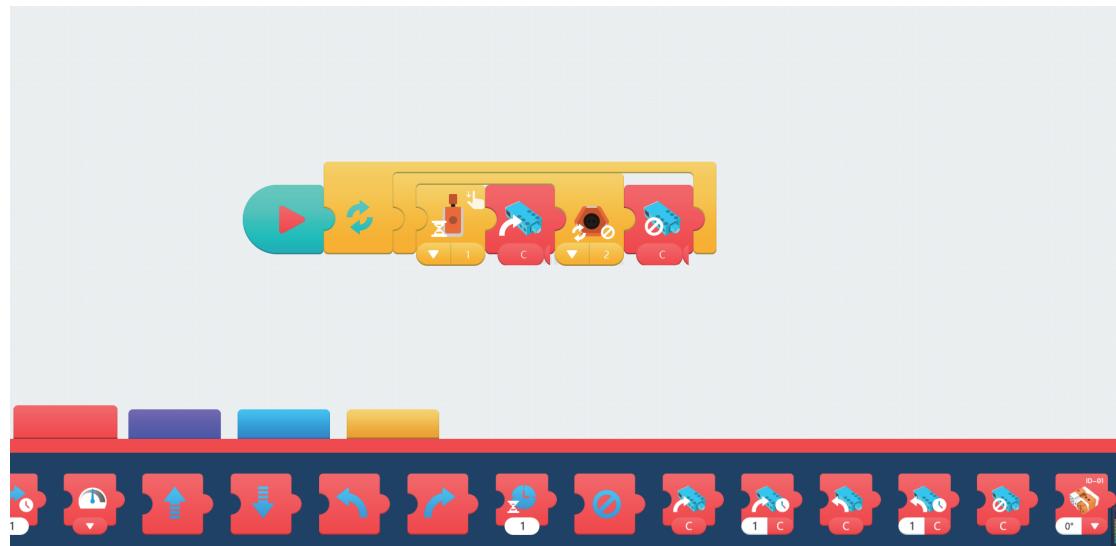
Programming

This lesson is about actuator control, students need to learn actuator control, sequential structure and loop structure.

With APP programming, explore the working principle difference between two different motor startup modules.

Extension: Add infrared and touch sensors based on existing structures.

Using the conditional loop module, when the infrared sensor does not detect obstacles, waiting for the touch sensor to be pressed, if the touch sensor is pressed, start the motor. If there is an obstacle near the infrared sensor, break the loop and turn off the motor.



Automatic Production Line

Evaluation

1. What are some of the common drive modes?

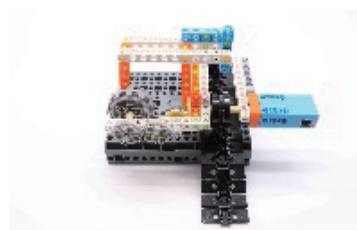
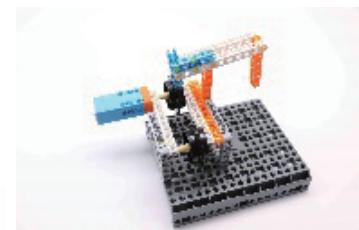
Most common drive modes are gear drive, chain drive, belt drive.

2. Among the gear drive, chain drive and belt drive, which has the lowest drive efficiency?

Belt drive has the highest loss, thus it has the lowest drive efficiency.

3. Expansion: what sensor did we use to ensure production safety? How we achieved it?

We used infrared sensor to detect if there is any one approaches the production line, if someone approaches, it will trigger the production line to stop.



Show

Demonstrate automatic production lines and explain core knowledge related

Key Point 1: There are a variety of drive structures in this lesson, including chain drive and linkage structure.

Key Point 2: Explain the programming logic and the actuator control mode.

Key Point 3: Application of infrared sensor and touch sensor. Use the touch sensor as startup device and use the infrared sensor as the safety switch.