Lesson 11 Smart Assistant

Scene lead-in

In our lives, we sometimes see the disabled who have lost the use of some part of their body for various congenital or acquired reasons. Some of the actions we can perform easily, such as handling goods, typing, writing and walking, may be relatively difficult for them, so we can try to use advanced technology to develop smart tools to make their lives more convenient.

1 What problems do the disabled encounter in their lives?
2 What motivational stories do you know about the disabled? How do they overcome them?

Knowledge class: Science and technology changes life

In the past, most of the artificial limbs we have encountered in real life only have the aesthetic appearance, without the sensing function. However, with the development of science and technology, it is no longer a dream for the disabled to have "flexible" limbs like able-bodied people.

Dean Kamen, an inventor funded by the Defense Advanced Research Projects Agency (DARPA), has developed a robotic arm called "LUKE" to help disabled soldiers returning from the battlefield to restore their confidence. The current "LUKE" can simulate about 100 tactile sensations in the brain, which connects the patient's remaining nerves and creates an information cycle with the electrode controller implanted in the muscle, and converts it into tactile signals recognizable by the brain.

People's cognition of objective things starts from feelings, and feelings can be generated because of the existence of sensory receptors! For example, when a lemon acts on our sensory organs, we recognize its color and shape visually, taste its sour taste through gustation, sense its delicate fragrance through smell and feel the slightly rough skin of the lemon

What other wearable smart devices do you know? Please communicate with your classmates!

The design and development of a smart robotic arm was not achieved overnight, and required a lot of knowledge and skills, so it is even more difficult to make it a human assistant. So how exactly does a smart robotic arm become a human assistant? Today, let's use the magician's robotic arm to simply simulate this process!

What can a disabled person do if he doesn't want to get up to unplug his phone charger without any help from others? A device that can pull out the charger regularly is required to prevent overcharging. In the previous lesson, we have already learned something about programming. Thus, we can design a program by using DOBOT Blockly to serve the function of regularly unplugging the charger with the robotic arm. Discuss with your classmates and think about the following questions:

1 What are the necessary features for a program to unplug the charger on time?

_____

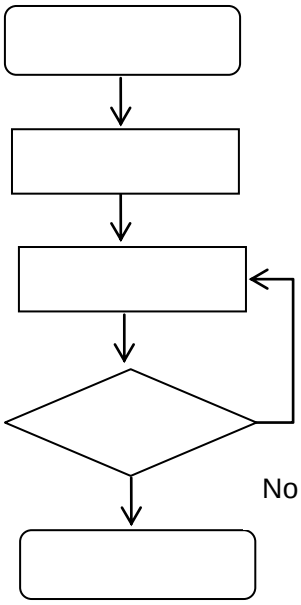
2 What are the key points of program design?

_____

3 How do we achieve the timing function?

_____

After understanding the basic implementation of the program for unplugging the charger on time, please draw the flow chart of the program implementation.



Basic Flow Implementation for Unplugging the Charger on Time

Creative design

Project practice: unplugging the charger on time

Project requirements: unplugging the charger on time with the robotic arm by compiling a program through DOBOT Blockly

Project score: 1 Project completion (70%)

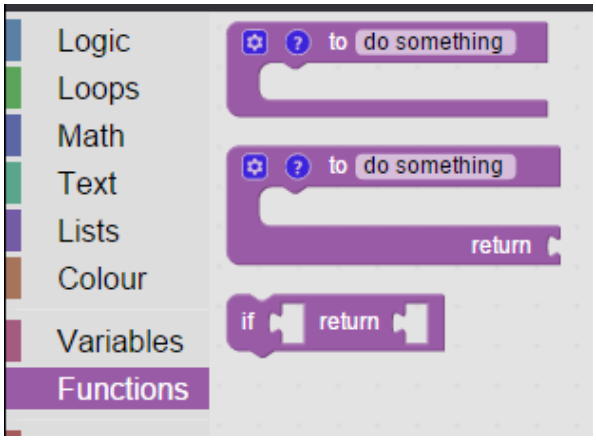
2 Project completion time (15%)

3 Independent study and team cooperation (15%)

Step I: installation of the gripper kit

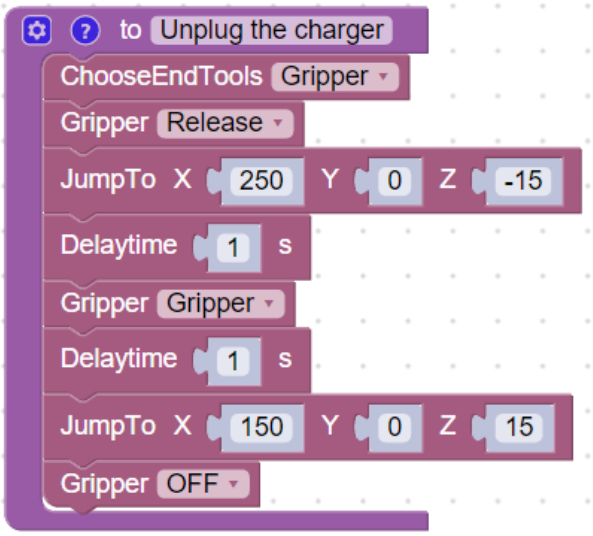
Step II: definition of "charger unplugging" function

Charger unplugging is an action to be performed in the program of unplugging the charger on time. The action steps of unplugging the charger are defined as a function and then called in the main program. As shown in the following figure:



Enter the name of the function to be defined in the "Charger Unplugging" input field: because the function mainly serves the function of unplugging the charger, we call it "Charger Unplugging" and pull in the action of the robotic arm and other functional modules required for unplugging chargers to complete the definition of a function.

The action required to unplug the charger is not complicated. The program example is shown in the following figure:

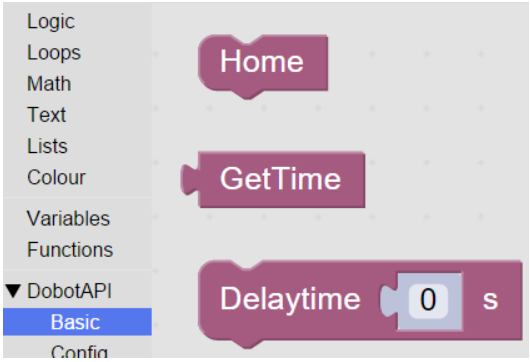


After compiling the function, clicking on the "Function" classification will display a "Charger Unplugging" function module, which can be called directly by us in the main program. Thus the charger unplugging action can be accessed by directly pulling in the module, without repeatedly writing the charger unplugging action module every time.

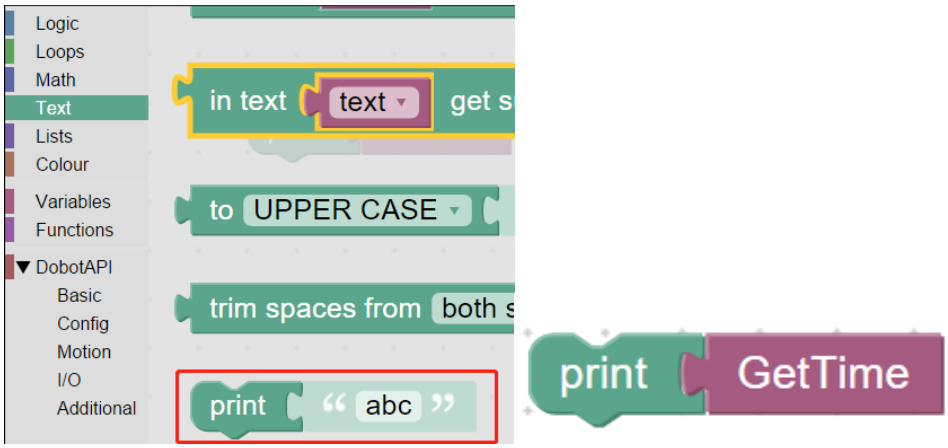
Custom "Charger Unplugging" Function Module

Step III: acquisition time and timing

The most basic requirement of the program for timing execution is to obtain the system time and compare the time elapsed with the current time. We can find _ function modules of acquisition time in the basic classification of DobotAPI, as shown in the following figure:



We can use the print module to display the value of acquisition time to understand the time format obtained by this module (as shown in the following figure).



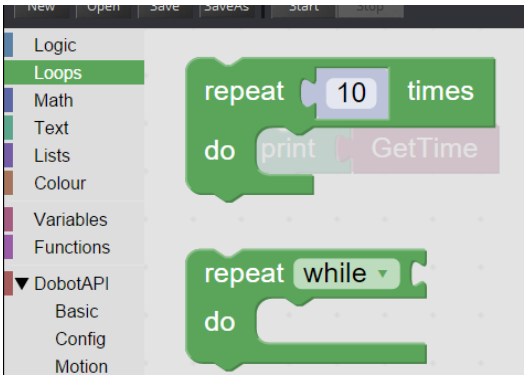
Step IV: judgment of the execution time

The most difficult point in executing the program to unplug the charger is how to judge the execution time. There are several time points, such as start time, time elapsed, execution time and current time.

We first define a variable as "start time" and assign it through the acquisition time module at the beginning of the program. Second, since the format of the acquisition time is seconds, the time duration we perform timing is expressed in seconds. Define a variable as the "timing seconds" and assign the corresponding seconds after how many seconds it takes to execute the program. For comparison, define another variable as "execution time", and then calculate the time the program needs to execute, with execution time = start time + timing seconds. Third, define another variable record "current time" to reflect the current time in the process of program running. The implementation logic of the program is to compare the current time with the execution time in the running process. If the current time is less than the execution time, return to continue the comparison, while if it is greater than the

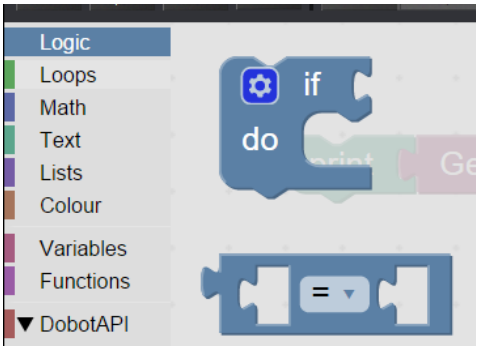
execution time, stop the comparison and unplug the charger.

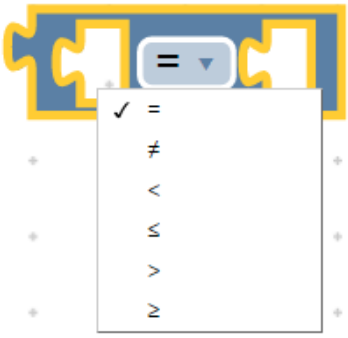
To judge whether the current time reaches the time elapsed, it is necessary to continuously conduct loop comparisons when the current time has not reached the execution time, until the current time is greater than or equal to the execution time. Here we will use a new functional module – a while/until loop module in loop classification:



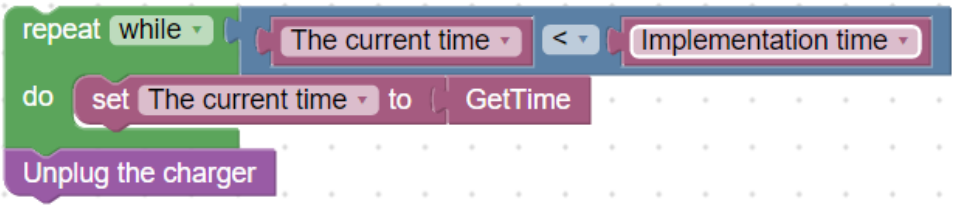
We can assign a current time before the beginning of the loop, and then set it in loop body. When the execution time is greater than the current time, the new current time is continuously assigned, and then the size of execution time and current time is compared. Once the execution time is less than or equal to the current time, step out of the loop body to execute the function of pulling out the charger.

To judge the size relationship between two values, we need to use the comparison module in logic classification to select the logic relationships between two values through the drop-down list, including equal to, greater than, less than, greater than or equal to, less than or equal to and unequal to.

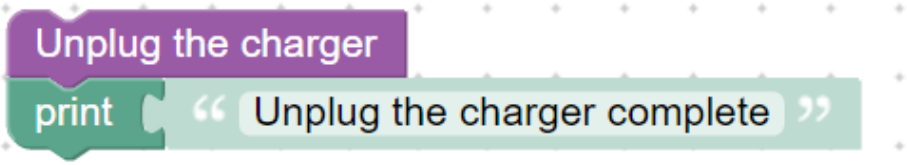




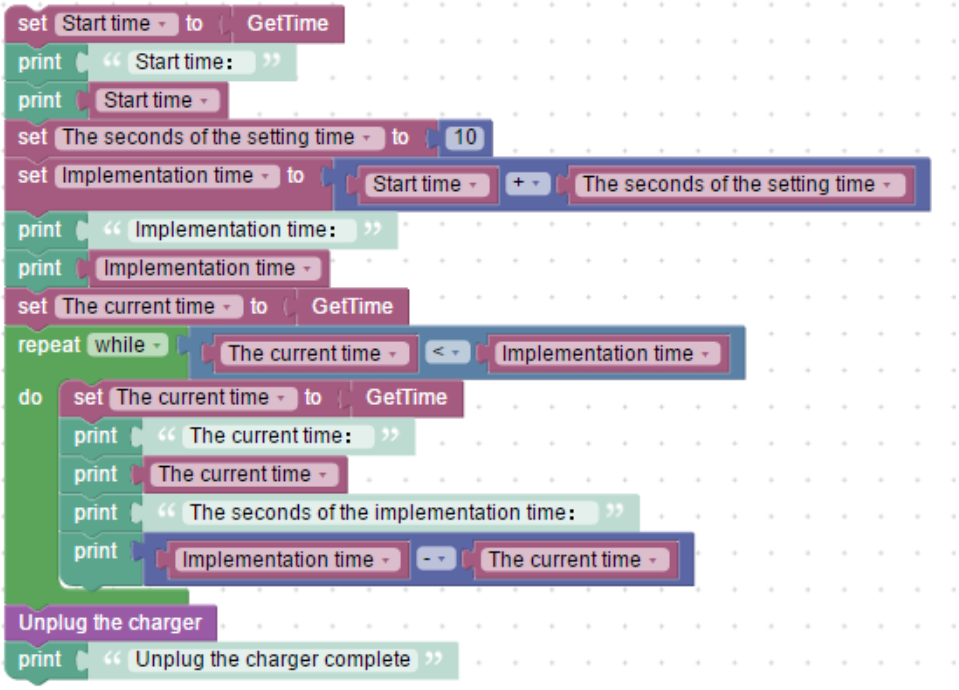
A specific program example for logically judging whether to reach the execution time circularly is as follows:



In order to more intuitively reflect the running process of the program and understand the parameters for comparison of the loop body, we can add a printing module to the program to print the variable value, as shown in the following figure. When the program ends, a statement of "end of program" is printed, so that it is clearer which step the program is currently running, and the reasons are found out more efficiently and legibly when the problem occurs, which is a common method for us to debug programs.



A full program example is as follows:



What are the problems encountered during programming? How best to solve them?

Problems:

_____

_____

Solutions:

_____

_____

Knowledge sharing

Show students the robotic arm for unplugging the charger regularly, and make a brief description.

Comprehensive evaluation

Sum up the learning contents of the class, and evaluate it.

Evaluation method	Evaluation phase	Evaluation contents	Evaluation criteria		
			3 Excellent	2 Good	1 General
Self-evaluation	**Creative design**	• Be able to install gripper kit expertly.			
	Creativity	• Be able to complete programming.			
	Ability to solve problems	• Be able to run the robotic arm to complete the task of unplugging the charger according to the task requirements.			
	Engagement	• Actively participate in group activities and undertake one's group tasks.			
	Team collaboration	• Be able to collaborate with each other in task operation.			

Expansion of skills

The arrival of the Internet of Things makes our life more convenient, and intelligent wearable devices are one example of how the Internet of Things can improve the lives of the disabled. Have you heard of the Internet of Things? Discuss your impression of the Internet of Things and what problems it can solve with your classmates.

I think the Internet of Things is _____,

The Internet of Things can _____.

As the name implies, the Internet of Things refers to an Internet where tangible things are related to each other, namely, a technology of connecting things via network ("Internet of Things"), hereinafter referred to as IOT. At present, IOT technology has begun to enter our lives. By connecting mobile phones to televisions (TVs), the photos and videos stored on the mobile phone can be seen on the TV, and the files from the mobile phone can also be printed immediately. Moreover, Internet of Things technology is not limited to this simple operation: more complex functions can be autonomously judged and executed by this technology. For example, when a lighting device senses that no persons are in a home, the device will send the information to the electric heater, and then the electric heater that has received this information will be automatically shut down, so as to reduce power

consumption and prevent fires. It will no longer be necessary to return home due to “forgetting” or “uncertainty” about whether devices have been turned off.

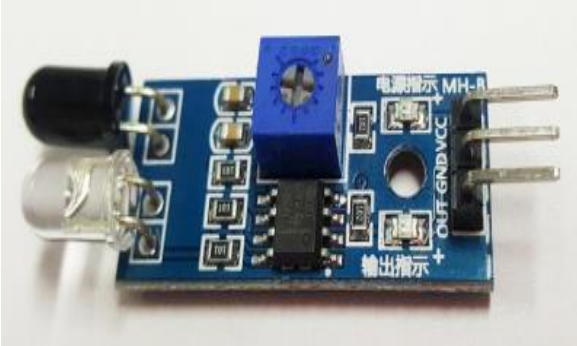
It is estimated that there are about 1.5 trillion objects all over the world, but only around 10 billion objects are connected to the network. According to relevant reports, by 2020, there will be 50 billion objects connected to the network. With the continuous development and improvement of this technology, the "hyperlink world" will come in the future.

So, how is this high-end technology achieved? It relies on sensor technology, which is also one of the core technologies of the Internet of Things. Sensor technology is a technology that enables the rapid connection of objects to changes in the surrounding environment at any place and time. A sensor is a device converting temperature, pressure, speed and other information into electrical signals. Sensors are also divided into different types, depending on the different information to be detected. Observe the following pictures, and discuss the names, functions and application fields of objects in the pictures with your classmates.

Name:

Function:

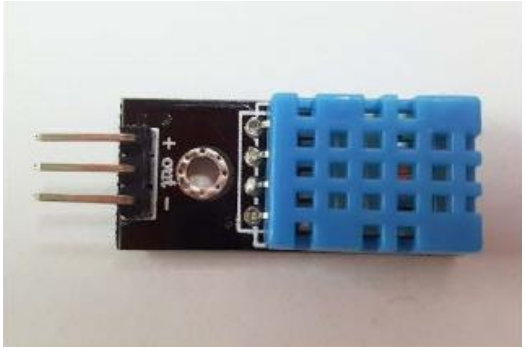
Application field:



Name:

Function:

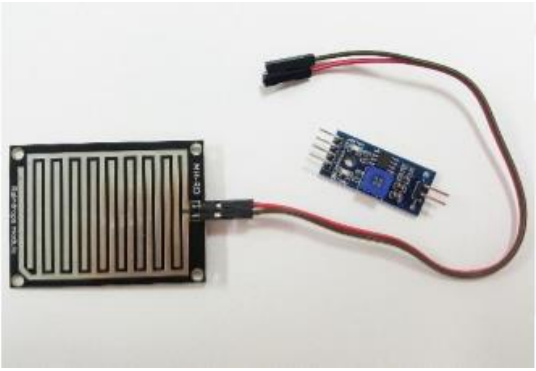
Application field:



Name:

Function:

Application field:



Name:

Function:

Application field:

Observe the objects in life and think about it. What equipment after installation can make living objects become intelligent? What functions can you add?

Object name	Necessary equipment	New functions

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0 820 820 081
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Technologie Services
Zi du Gavé
42330 Saint-Galmier
Fax : 04 77 94 55 14
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Et toujours la possibilité d'établir des devis, de commander et de suivre vos commandes/factures en ligne.