Discover an alternative and user-friendly platform to control multiple MINDSTORMS robots

Interfacing LEGO MINDSTORMS robots with Raspberry Pi is made easy thanks to the Ch MINDstorms Controller (CMC). The C-STEM Center at UC Davis has developed C-STEM Studio with CMC to provide a simple-to-use platform for 4- to 19-year-old students to learn Computing, Science, Technology, Engineering, and Maths with LEGO MINDSTORMS NXT and EV3 robots.

Combining LEGO MINDSTORMS and Raspberry Pi offers the opportunity for creativity in building and programming.
CONTROLLING LEGO MINDSTORMS ROBOTS

/* Control multiple robots simultaneously using the CMindstormsGroup class*/

#include <mindstorms.h>

CMindstorms robot1, robot2, robot3, robot4;
CMindstormsGroup group;

double radius = 1.1; // radius of the wheels (inches)
double trackWidth = 4.54; // track width of the robots (inches)

/* add the four robots as members of the group */

group.addRobot(robot1);
group.addRobot(robot2);
group.addRobot(robot3);
group.addRobot(robot4);

group.driveDistance(5, radius); // drive robots forward 5 inches

group.turnLeft(90, radius, trackWidth); // turn robots left 90 degrees

group.driveDistance(10, radius); // drive robots forward 10 inches

Connecting to your MINDSTORMS robot(s)

Connecting to your MINDSTORMS robot is simple with the C-STEM software.

Open C-STEM Studio and launch the Ch Mindstorms Controller. Ch Mindstorms Controller can connect with both EV3 and NXT robots. Simply press the Scan Robot button, then add the robots that are found to the list on your robot manager. Follow the instructions on screen to pair the robots with your Raspberry Pi, and add the robots you want to work with. Do make sure that the robots are turned on and have Bluetooth enabled.

Once the robots have been scanned and added to the list, select the ones you would like to connect to and press Connect. Robots to which you are connected will have a green dot next to their names.

Controlling your MINDSTORMS robots

Once you are connected to your robot, the CMC offers many options for control.

Real-time control

Using the Motion Control panel, you can rotate individual motors continuously, move motors by given angles, and drag and drop motors into a desired angle. You can also set the speed of each motor at any time.

Monitor sensor data

Use the Sensors panel to monitor the sensors attached to the robot. You can set sensors to different modes, and the values from the sensors will update automatically.

Educational features

In the other panels we introduced some educational features, designed to help students learn mathematical concepts. For example, in the Vehicle Control panel, a student controls a robot configured as a vehicle. Students can set the vehicle’s wheel size and speed, and drive the vehicle by distance, by angle, or by time. The robot then drives as programmed, and a graph of distance versus time is plotted. With these features, students can learn about number lines, linear relationships, and the concept of pi.

Program robots in C/C++ interpreter Ch

To program the robots, you need to keep them connected in the controller, then open ChIDE and start programming. You can program up to seven robots, which is hard to do using other platforms.