Multi-Functional 4WD Robot Car Chassis Kit

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Abstract:

A rangefinder ARDUINO Bluetooth utility vehicle is a single-chip learning application development system to Arduino microcontroller family atmega-328 core. Complete the hunt, obstacle avoidance, infrared remote control and Bluetooth remote control functions. Package contains a number of interesting programs, and Expansion external circuit module, thereby increasing the car's functionality. Designed to allow users in learning ARDUINO microcontroller can from boring theoretical knowledge

1. Introduction:

ARDUINO Bluetooth multifunctional car B is the upgraded version of A, increasing the I2C1602 liquid crystal display, can see more directly the running state of the car. Bluetooth multifunctional car is a MCU learning and application development system with Arduino single chip atmega-328 as the core, has the functions of line tracking, obstacle avoidance, infrared remote control and remote Bluetooth. This Kit contains a large number of interesting programs, can expense the external circuit module, thereby increasing the ability to develop the MCU system in fun, keep away from the boring theory knowledge in learning ARDUINO MCU.
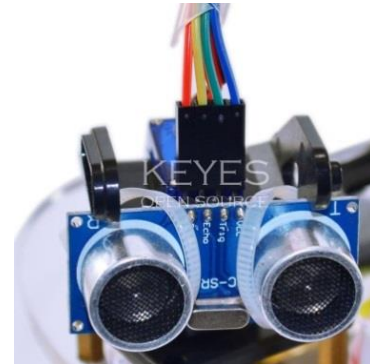
2. PARAMETERS

1, motor parameters: voltage range: 6-9V, reduction ratio of 48: 1 ratio

2, the motor control uses L298N drive module, real isolation with MCU.

3, three groups of line tracking module, detection of the black and white line, higher precision, but also can be used with controlling anti-drop.

4, infrared remote control module, make intelligent vehicle control system.

5, the ultrasonic module makes car obstacle avoidance system.

6, I2C1602 Liquid crystal display makes a primary man-machine interface.

7, Bluetooth wireless module can match the mobile phone Bluetooth remote control the robot.

8, can access the external voltage of 7~12V, can carry a variety of sensor modules, according to your imagination to achieve various functions.

3. EXPERIMENTAL CURRICULAR INTRODUCTION

1. I2C-LCD1602 LCD test

2. Tracking module adjusting test

3. Ultrasonic module test

4. Servo control routine

5. Infrared remote control test-LCD display

6. Bluetooth module test

7. L298N motor driver board test

8. Tracking intelligent car

9. Ultrasonic collision avoidance intelligent car

10. Infrared remote control of intelligent car

11. Arduino Bluetooth remote programmable intelligent car

12. Four in one (search, obstacle avoidance, infrared remote, Bluetooth remote

control) multifunctional program.

4. PARTS LIST

1. 4xGear motor

2. 4xHigh quality tire

3. 4xThe motor retainer

4. 1x100 * 213 * 5 mm organic glass plate

5. 1x100 * 213 * 5 mm organic glass plate

6. 1x L298N motor driver board

7. 1xThe ARDUINO UNO328 panel

8. The ARDUINO sensor extension boards V5

9. 1x holder

10. 1xservo

11. 1xThe ultrasonic module

12. The I2C - LCD1602 LCD

13. Three groups of tracking module

14. The infrared receiving sensor

15. MCU remote control

16. 1x18650 battery box

17. 18650 2 cell batteries
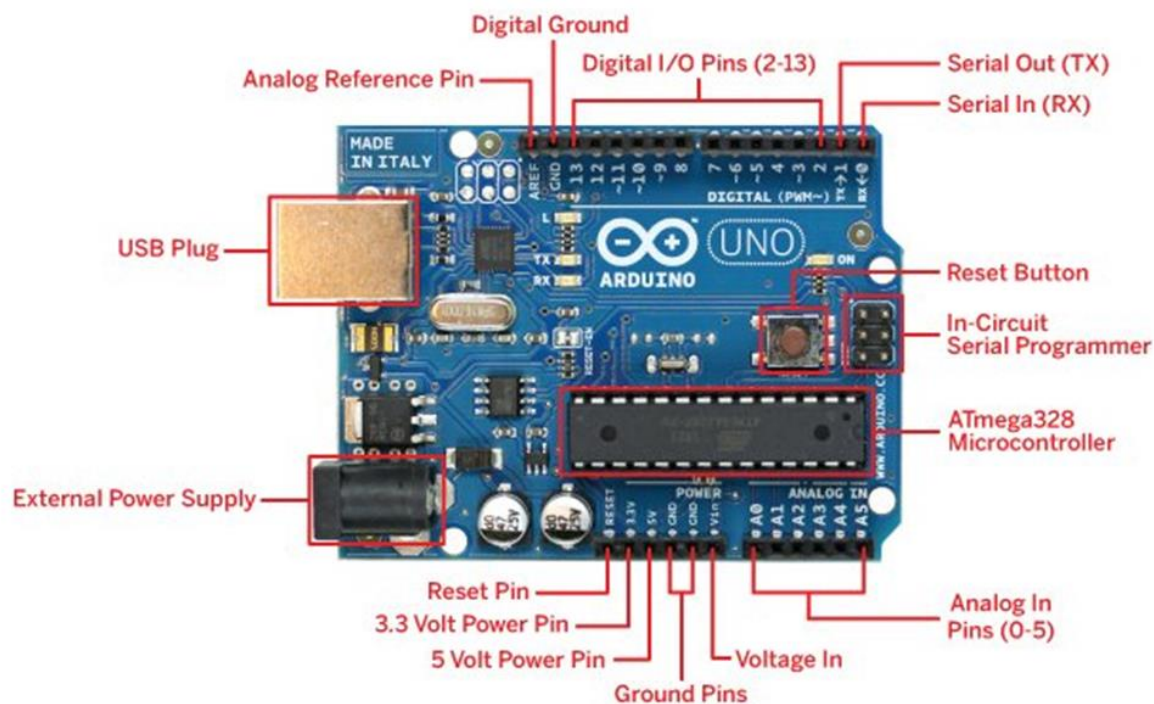
18. 1x18650 charger

19. A Bluetooth module

20. 30xThe DuPont line

21. 1 meters long USB line 1

22. The copper column 6x35 mm, 3x 20 mm, 6x6 mm.

23. 3 MM screw and nut several pieces.

5. The Use of Arduino MCU Board

Arduino derives from an open source hardware platform project in Italy; the platform includes an I/O function with a simple circuit board and a set of application software development environment. Arduino can be used to develop interactive products, such as it can read a large number of switch and the sensor signal, and can control the lights, motors and other every kind of physical device; Arduino can also develop a peripheral device connected to the PC, can at run time with the PC software for communication. Arduino hardware circuit can be welded together, also can buy already assembled module, and program development environment software from the Internet can be free to download and use.
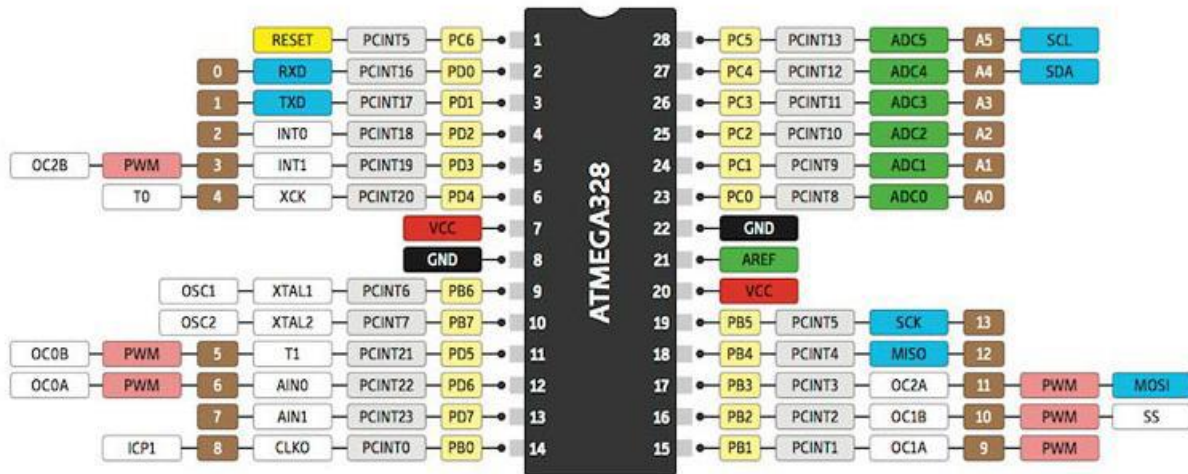
Arduino is an open-source electronic prototyping platform, have a flexible, easy to use hardware and software. Arduino is designed for designers, arts and crafts, amateur, and interactive device for the development of interactive or development environment for people with interest.

6. **Installation and application of Arduino-driven programming**

Frist download Arduino development software web address：

http://arduino.cc/en/Main/Software Download an arduino-0023.zip，unzip it to the computer hard disk.
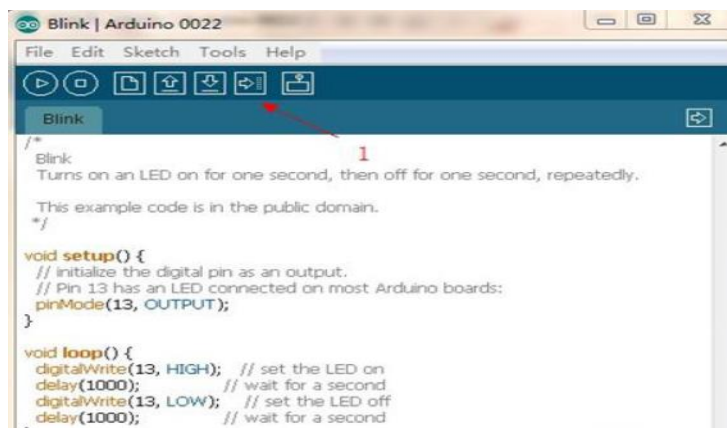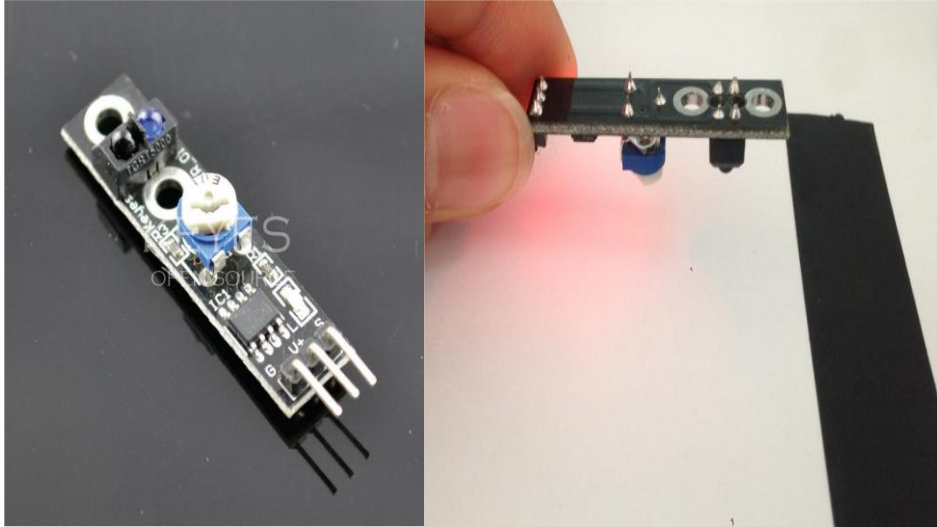

Then Windows will lead us into the "found new hardware wizard" window, select "no" option and click "next" button:

7. Tracking Module Instruction for Use The working principle of the module:

When the black line is found, the sensor output is high; the output is low when do not find the black line.


The adjustable resistor on Module is used to adjust the sensitivity, adjust to the appropriate location, here to teach you how to adjust. Find a piece of white paper, with black tape. Connect the tracking module to the power supply only to VCC and GND. Put the module in the paper about 1CM, swing it between white and black, watching if the red light on the module has a change, if not change, adjust the variable resistor. When the module doesn't encounter the black line, red light is on.

8. Ultrasonic Module Test

The working principle of the ultrasonic, Let's see how it works:
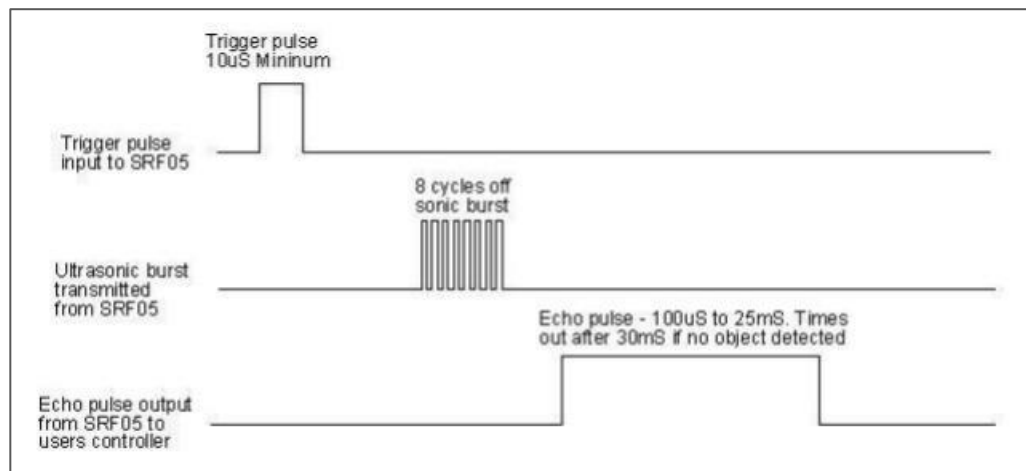
* At first we pull TRIG low, then at least 10us high-level signal to trigger

* After triggering, module will automatically launch 8 40KHZ square waves, and automatically detect signal return

* If the signal return, a high electrical level is output by ECHO, The duration of the high level is the time of ultrasound from the transmitter to the receiver. Then the test distance = high electrical level duration *340m/s*0.5.

* Electrical parameters

Working Voltage：0.5V (DC) Working Current：15mA

Tracing Distance：2-450cm Detection Angle：15 degree

Input the trigger pulse：10us TTL electrical level

Output echo signal: output TTL electrical level（high），Proportional to the range.

9. Servo Motor Control

The servo is a kind of position servo drive mainly composed of a casing, a circuit board, non-core motor, gear and the position detector. Its working principle is to steer gear from the receiver or signal the microcontroller, the interior has a reference circuit, the cycle is 20ms, the width of the reference signal 1.5ms, compares the voltage of DC bias voltage was obtained with a potentiometer, voltage difference output. Through the circuit board IC judge the direction of rotation, and then drives the non-core motor starts to rotate, the power is transmitted to the swing arm through the reduction gear, at the same time by the position detector to signal, whether we've reached the positioning. Applies to those control systems need to angle changing. When the motor speed must, through the reduction gear drive cascading rotary potentiometers,
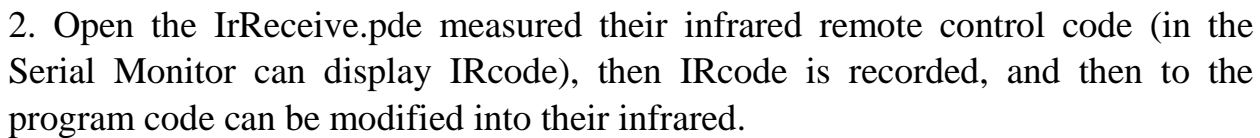

the voltage difference is 0, the motor stops rotating. The rotation angle range of steering gear is 0 degrees to 180 degrees. The rotation angle is regulated by PWM (pulse width modulation) signal duty cycle to achieve the standard, PWM (pulse width modulation) signal cycle is fixed at 20ms (50Hz), pulse width distribution theory should be between 1ms to 2ms, but, in fact the pulse width is from 0.5ms to 2.5ms, angular width and the 0 ° ~ 180 ° should be relatively. It is noteworthy places.

10. The infrared receiving module test

Before experiment, you should know that：

1. The IRremote Library folder into the Arduino libraries directory.

2. Open the IrReceive.pde measured their infrared remote control code (in the Serial Monitor can display IRcode), then IRcode is recorded, and then to the program code can be modified into their infrared.

 3. Bluetooth Serial Module Test

In fact, the Bluetooth serial port, have put Bluetooth serial process, install the drivers, we can regard it as a serial port to use. We talk about the PC machine driven how to install Bluetooth adapter and connect to the Arduino.
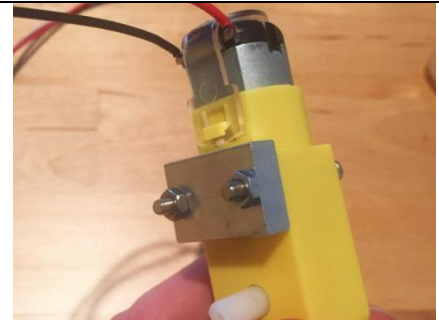
Install the Bluetooth adapter to the USB port on the computer. The dialog box of install the driver will pop up.
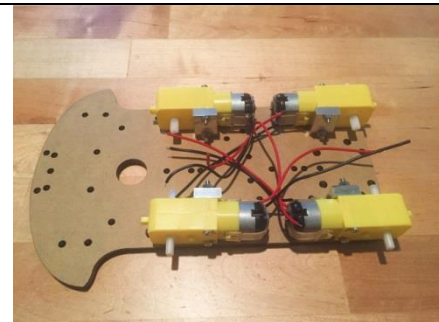
11. HARDWARE INSTALLATION

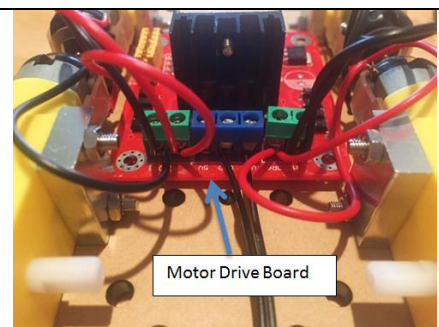|	
To get started, we'll attach the motors and the H-bridge (the card that delivers power to the motors) to the lower part of the chassis.	

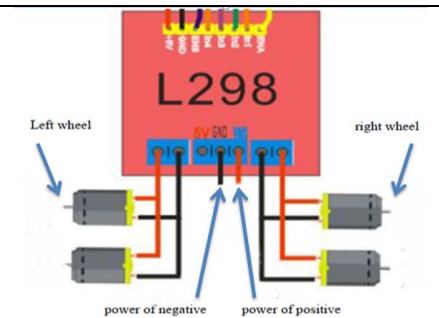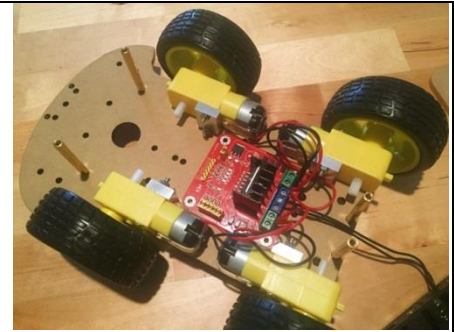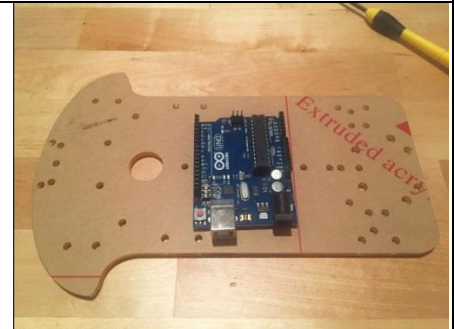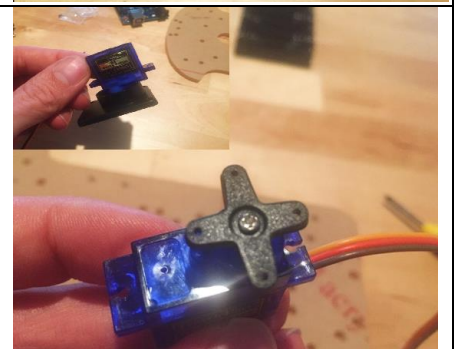|	
1. Motor installation: First, attach the four metal brackets (they're rectangular, drilled blocks of metal) to each motor using two long bolts and two nuts.	
2. Now each motor can be attached to the chassis by using two short bolts in the bottom of each metal bracket. Here's a view of the bottom of the chassis so you can see where the bolts need to be**.**	
3. Fix the motor drive board: fix the motor drive board (the red board) to the chassis**.** Note: It is recommended wait until all of the wires are attached to the H-bridge before doing this.	
Connect the motor cable, Circuit diagram**.**	
4. Fixed and wiring up the power supply (battery box) on the board wiring up the.	

|	
5. Attached the wheels: slide the wheels onto the motor drive shafts, and attach the four copper shafts in the locations show in the picture below (each copper shaft needs one small bolt). This robot is starting to take shape!	
6. Attach the Arduino: Now, set the previous part of the chassis aside and grab the other one which will sit on top. The next step is to attach the Arduino—again, I had to use electrical tape, but you should be able to better secure yours with some bolts and nuts.	
7. The next step requires the micro servo, the black crosspiece, the servo holder (which consists of three black plastic pieces), and some small screws. Use one of the larger sharp screws in the kit to attach the black crosspiece to the micro servo.	
8. Then flip the servo upside down into the black plastic ring of the holder. Make sure that the wires coming out of the servo are facing in the same direction as the longer part of the holder (again, see the image below), and use four tiny screws to secure the crossbar (there are four holes in the holder that align with the holes on the crossbar). Here's what it looks like after it's attached.	
9. Take the other two pieces of the servo holder and snap them onto the servo (there are grooves in the side pieces that match the plastic tab on the servo).	
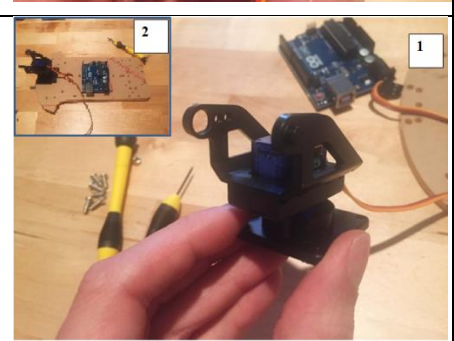
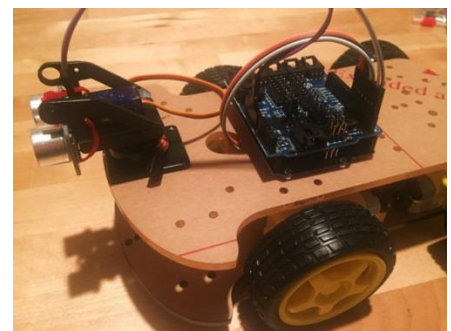|	
10. It's time to give our robot some eyes. Attach the ultrasonic sensor to the servo holder using two zip ties. Whether you connect a sensor shield or not, you'll now need four wires to connect the ultrasonic sensor to the **Arduino**. There are four pins on the sensor, VCC, GND, TRIG, and ECHO. Connect VCC to the 5V pin on the Arduino, GND to GND, and TRIG and ECHO to I/O pins 12 and 13.	
11. Now grab the lower part of the chassis, and connect six jumper wires to the I/O pins of the H-bridge (they're marked ENA, IN1, IN2, IN3, IN4, and ENB). Take note of which color wires are connected to which ports, as you'll need to know later.	
12. Now it's time to start putting this thing together. Grab the upper part of the chassis and set it on top of the copper shafts connected to the lower part, and pull the wires attached to the H-bridge through the hole in the center of the chassis. Connect the six wires to I/O ports as follows: • ENA to I/O port 11 • ENB to I/O port 10 • A1 to I/O port 5 • A2 to I/O port 6 • B1 to I/O port 4 • B2 to I/O port 3	
13. Use four short screws to attach the upper part of the chassis to the copper shafts. Set the six-AA battery holder on top of the chassis (screw it down if you can), attach the 9V cell holder to the Arduino.	
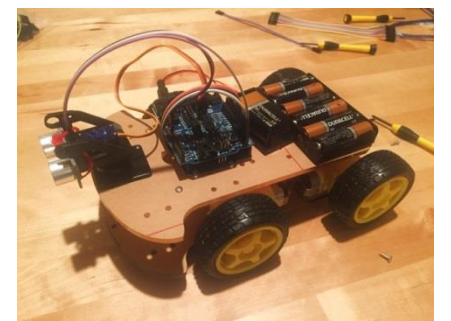
Final shape after finishing the assembly.	

12. Conclusion

1. The use of multiple devices in the compilation of this car.

2. Programming has been all of these devices to fit with each combined.

3. This robot can be used in industry.

4. Also, can be used in military fields or by the civil defensemen to help in the detection of survivors when natural disasters or wars.

5. The possibility of development to add an arm of the car and is programmed to assist in conducting experiments in scientific laboratories.