Project 1: Infrared Remote Car

Objectives:

1. The students will be able to attach the infrared receiver to the chassis of the car.
2. The students will be able to wire the infrared receiver for power and data collection.
3. The students will be able to Install and import the remote library
4. The students will be able to use the remote to move the car.
5. The students will be able to manipulate the code to increase or decrease the speed of the car.

Time:

1 hour

Introduction:

In this project, the students will add, wire, and program the infrared receiver for movement of the car. This is the first lesson where the students will manipulate the given code in order to make their car move faster or slower.

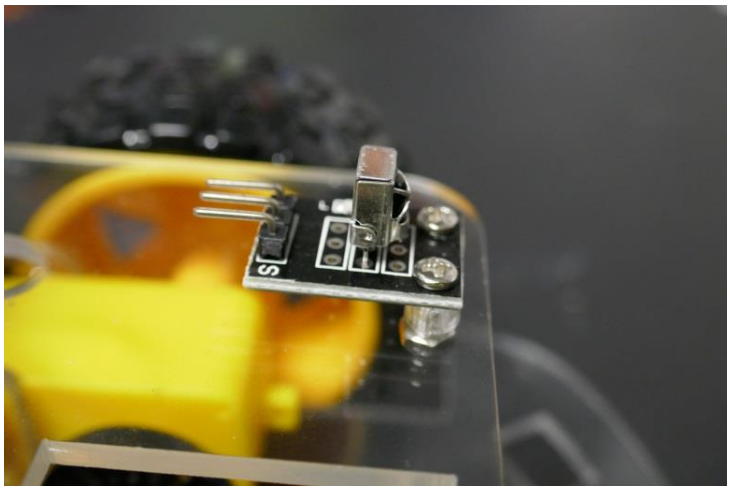
Project 1: Infrared Remote Car

Now that your car is put together and your code is loaded, we will use different sensors to control its movement.

You will need the IR receiver from your sensor parts bin, the IR controller remote from your box (remove plastic tab), 3 male to female wires from the wire bundle, 2-2.5 plastic pillars, screws, and nuts.

Part 1. Installing the Infrared Receiver

A. Attach the IR receiver using to M2.5 pillars, screws, and nuts.
   a. The IR receiver will attach to the upper chassis on the flat end, next to the battery box.
   b. Be sure the 3 prongs on the receiver point inward.
   c. Bend the black receiver to face slightly upward.



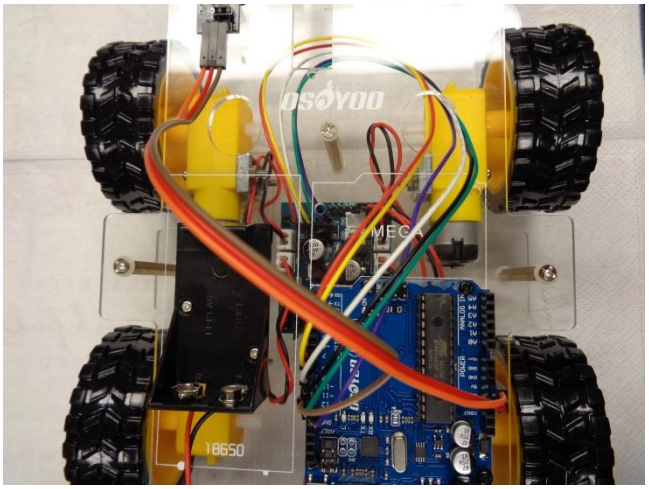
Part 2. Wiring the IR Receiver

A. Attach the three wires to the IR Receiver.
   a. Do not remove any wiring from the previous assembly instructions.
   b. Connect the three female ends to the prongs on the IR receiver:

Uno Board	IR Receiver
GND	-/GND
5V	VCC
D10	S

   i. First we will connect the ground wire. Connect the male end from the prong next to the "-" sign to the Uno board "GND" (This will be located in the section marked Power).
   ii. Next we will connect the power. Connect the male end from the middle prong to the Uno board "5V" (This will be located in the section marked Power).
   iii. Last, we will give the car a way to send and receive data by connecting the wire that is connected to the prong beside the "S" to the Uno board "D10" (This will be in the section marked digital).

Tip: The reason we connect to D10 is that the code in the program is written to this specific location).



Part 3: Loading the Library and Code

A. Download the IR remote library for this project from Arduino.nacase.org.
   a. Click on the file link to begin the download and save to your computer
   b. Once the download is complete, unzip the file or right click—Open With—UnRAR Metro. This will extract the file and save it to your computer.
B. Import the library into Arduino.
   a. Open Arduino IDE

   b. Sketch
   c. Include Library
   d. Add.zip library
   e. Search for the IR Remote file that you downloaded

C. Download the code for this project from Arduino.nacase.org.
   a. Click on the file link to begin the download and save to your computer
   b. Once the download is complete, unzip the file or right click—Open With—UnRAR Metro. This will extract the file and save it to your computer.
D. Connect Uno board to PC with USB cord.
E. Upload the code to Arduino IDE
   a. Open Arduino IDE, select File, Open, then select the downloaded code.
F. Verify your code with the checkmark.
G. Upload your code using the arrow next to the check mark. You will see “Done uploading” when complete. Disconnect the USB cord.

Part 4: Testing your controller

A. Find the controller remote in your box and remove the plastic insert before using.
B. Follow the chart below to control the movement of your car.

IR remote key	Car movement
▲	Go forward
▼	Go backward
◄	Left turn
►	Right turn
OK	Stop

C. Use the remote to send a signal to the IR sensor which moves your car in each direction.

Part 5: Manipulate the code

A. Go back to the code loaded in Arduino IDE.
B. At the end of each section (Forward, Turn left, Turn right, Reverse) you will see the bottom two lines say “SpeedPinL and SpeedPinR.” These control how fast your car will move. You can change these numbers in a range from 50 to 250. The larger the number, the faster the movement.
C. Experiment with the speed of your car. Under the “Forward” code, Change both numbers beside SpeedPinL, and SpeedPinR, to 70.
D. Verify the code using the check mark.
E. Upload the code using the right arrow as you have done before.
F. Set your car on the ground, turn it on, and use the remote to move the car forward.
G. Try manipulating the code again with a larger number.


smartcar-lesson2 | Arduino 1.8.7
File Edit Sketch Tools Help
smartcar-lesson2
IRremote.cpp
IRremote.h
IRremoteInt.h
configuration.h
*/
#include <IRremote.h>
#include "configuration.h"
IRrecv IR(IR_PIN); // IRrecv object IR get code from IR remoter
decode_results IRresults;
/*****motor control*****/
void go_Advance(void) //Forward
{
digitalWrite(dir1PinL, HIGH);
digitalWrite(dir2PinL,LOW);
digitalWrite(dir1PinR,HIGH);
digitalWrite(dir2PinR,LOW);
analogWrite(speedPinL,255);
analogWrite(speedPinR,255);
}
void go_Left(int t=0) //Turn left
{
digitalWrite(dir1PinL, HIGH);
digitalWrite(dir2PinL,LOW);
digitalWrite(dir1PinR,LOW);
digitalWrite(dir2PinR,HIGH);
analogWrite(speedPinL,200);
analogWrite(speedPinR,200);
delay(t);
}
void go_Right(int t=0) //Turn right
{
digitalWrite(dir1PinL, LOW);
digitalWrite(dir2PinL,HIGH);
digitalWrite(dir1PinR,HIGH);
digitalWrite(dir2PinR,LOW);
analogWrite(speedPinL,200);
analogWrite(speedPinR,200);
delay(t);
}
void go_Back(int t=0) //Reverse
{
digitalWrite(dir1PinL, LOW);
digitalWrite(dir2PinL,HIGH);
digitalWrite(dir1PinR,LOW);
digitalWrite(dir2PinR,HIGH);
analogWrite(speedPinL,255);
analogWrite(speedPinR,255);
delay(t);
}