Final project write up_ Andy Ma

Project brief

Thanks to the 3 month course, I can build a more interesting object with mechanical structure and Arduino coding. For the final project, I did a movable robot arm which can be remote controlled by bluetooth. In addition, it can be a toy to promote the interaction between 2 people and kill time.

Therefore, the whole manipulation of the robot arm is designed to test the collaboration of two users, one of them remote controls the vehicle under the robot arm to make it:

Move forwards/ back/ left/ right/ stop
Move back
Turn left
Turn right
Stop moving
Spin the robot arm clockwise and anti-clockwise
Stop spinning the robot arm

The other user control the robot arm to make it:

Lift and drop down
Pick small objects

How to build the project

The main challenges of this project could be:

1. Bluetooth modular control
2. Mechanical structure of the robot arm
3. Make the vehicle turn left/ right, especially under the heavy weight

Bluetooth modular control

Primarily, there are two bluetooth modulars on the market, HC-06 and Bluefruit. But which one is most suitable for my project? I got the answer (**Bluefruit Uart friend**) from some tech blog and interview. Let's compare them first:

HC-06

Pros: It is bluetooth modular which has 4 pins on it (VCC, GND, TXD, RXD). That means it just takes 2 write pins of Arduino Uno and I can control more objects through it.

cons: The related control-panel apps only support android system.

Bluetooth Uart friends

Pros: Its control-panel app supports iOS system, which is much easier to get.

cons: It takes at least 7 pins in arduino uno, but other pins are enough for using.

Mechanical Structure of robot arm

To figure out the construction of the robot arm, I took time to do desktop research, including ABB, KUKA, and some hacker's blog. Then I drew each parts out in illustrator and made by laser cutting.

Make the vehicle turn left/ right, especially under the heavy weight

In the first 2 weeks, I feel frustrated about this. Then I took 3 actions to figure it out:

1. Remove the rubber tires of 4 wheels.
2. Decrease the distances between the wheels.
3. Bought 4 more powerful DC motors.

Accurate schematic

The schematic files have been uploaded to the link below:

https://github.com/xiaodongma0217/Mechatronics_Andy_2017/tree/master/FinalProject/Schematic

Parts list

DC motor *5
Servo motor *5
Arduino Uno *2
Bread board *2
Bluefruit Uart friend *2
H-bridge *2
Wheels *4
9V battery *2
Bluefruit app for iOS *2
Iphone *2
Laser cut mechanical parts

Project photos

The project photos have been uploaded to the link below:

https://github.com/xiaodongma0217/Mechatronics_Andy_2017/tree/master/FinalProject/Photos

Short video

The project video has been uploaded to the link below:

https://github.com/xiaodongma0217/Mechatronics_Andy_2017/tree/master/FinalProject/VIDEO

Code

The code has been uploaded to the link below:

https://github.com/xiaodongma0217/Mechatronics_Andy_2017/tree/master/FinalProject/Code