

# Design My Dream Car

Tong Wu

December 8, 2019

## 1 Introduction

This is a Python program which builds a car model using three different model techniques, including Polygonal Meshes, Subdivision and L-system. The car model which I have built is the one that I have made with my own hands. This car got the second prize in the 14th Zhongkong Cup Robot Competition. The model built by the program is saved in a file of obj format.

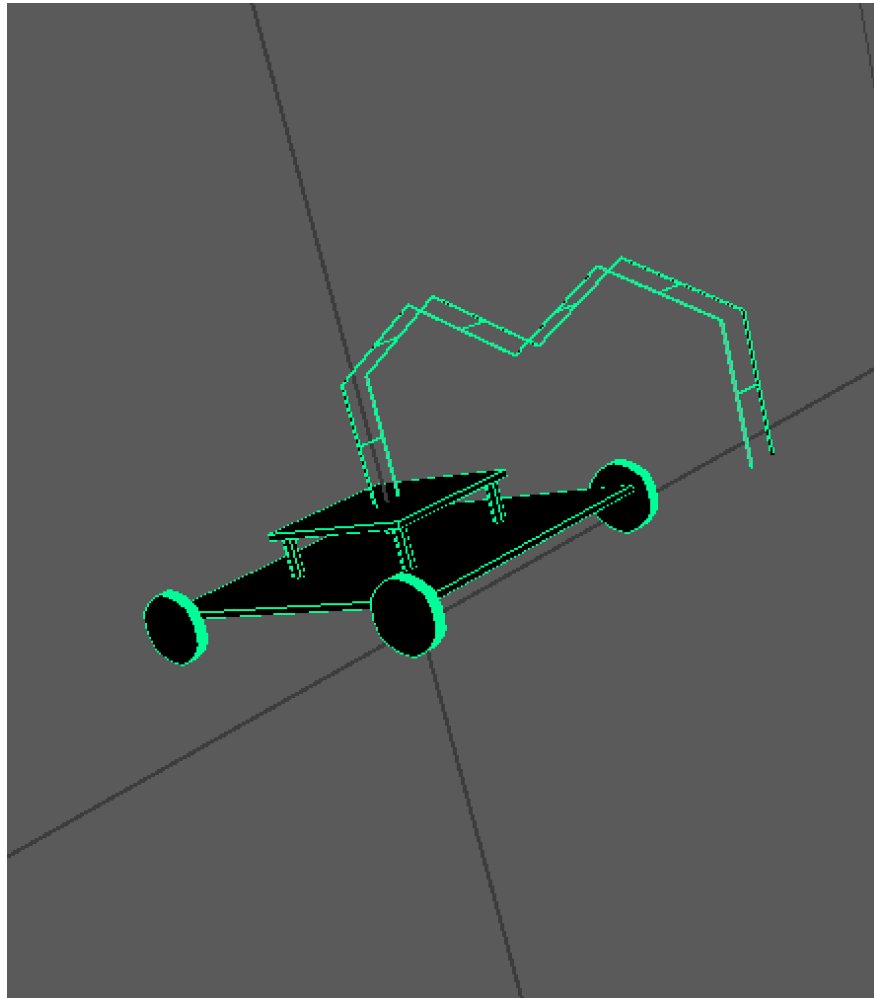


Figure 1: Car Model

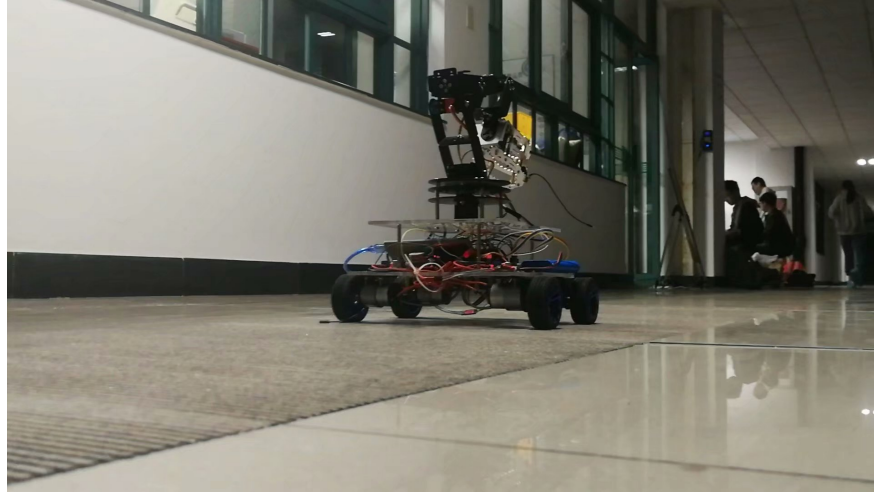


Figure 2: Physical Implementation

## 2 Modeling Techniques

- Polygonal Meshes

Generate vertex data for polygon meshes directly. It is used to model chassis, panels and pillars of the car.

We can implement nearly every effect we want by directly controlling the polygons of the model. However, it also means that it is not easy to implement when doing complex modeling.

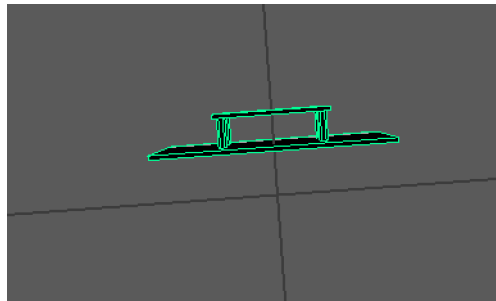


Figure 3: Polygonal Meshes

- Subdivision

By dividing a simple initial graph, a more complex graph is obtained. It is used to model the wheels of the car.

This method can automatically generate some complex models without defining each polygon by human. But its computational complexity is high.

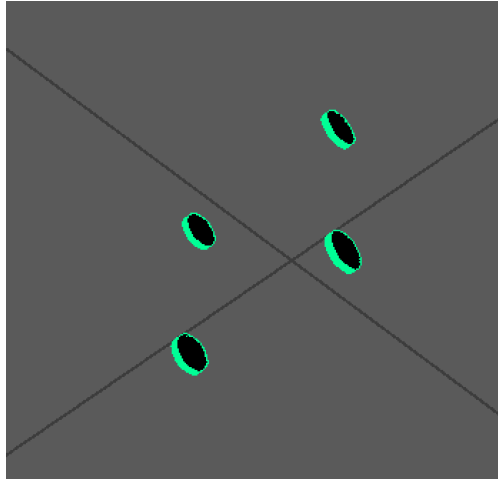


Figure 4: Subdivision

- L-system

Use a regular language string to control multiple generations of similar structures. It is used to model the robot arm.

This technique is very effective for models with a few similar structures. But its scope of application is narrow.

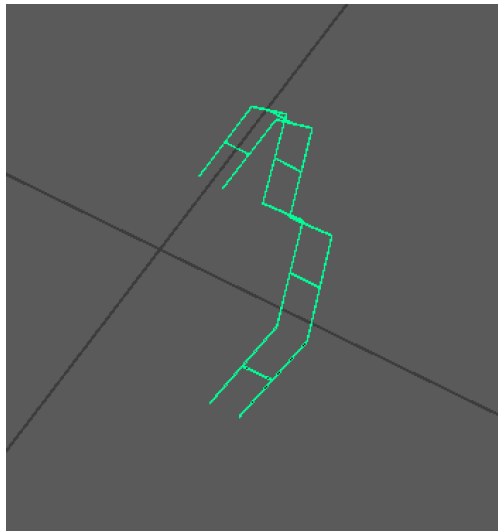


Figure 5: L-system

### 3 Conclusion

In this assignment, I have used three different model techniques. In fact, these techniques all construct meshes in low level.

The obj format is easy to read and write and of great compatibility. The obj files generated in this assignment can be further optimized to improve storage efficiency.