Good afternoon judges. We are “Hero Upon Great Fire” from Hong Kong.

Since the steam machine had been invented during the industrial revolution, scientific development of mankind has been being advancing. This relies heavily on the natural resources on our mother planet, the Earth. However, it is estimated that the mostly-consumed fossil fuels will be used up in near future. This makes many scientists try to work a solution out to the resource crisis.

Some countries has made renewable energy resources into practice while some has invested on nuclear power plants in the past few ten years. Unfortunately, Renewable energy such as wind power, hydro-power and solar power can only provide humans with a limited amount of energy. Moreover, nuclear accidents like the Chernobyl disaster as well as the Fukushima Daiichi nuclear disaster also reminded humans that the cost-effectiveness of nuclear power comes with the terrifying potential dangers. It is extremely difficult for the scientists to work a perfect way out towards the energy problem.

Regarding to the upcoming and unsolved power shortage, some scientists has turned to the outer space to search for solutions. Based on the past investigation, space resources can be found in the planets quite near us, inside the solar system. For example, Io, which is the innermost moon of the planet Jupiter, is rich in sulphur mine. The one even nearer is moon, the only natural satellite of our Earth. Scientists has discovered a great deal of 3He there. 3He is a special raw material because it can provide a large amount of energy during combustion. The more delighting fact is that nuclear plants using 3He as fuel would not produce any radiation due to its chemical structure.

These series of discoveries has inspired us to develop a system to collect resources on other planets. It is named Planet Resources Hunter for its function is to prospect the location of the resources and collect it. We hope this can be at least a conceptual one for the future space missions that aims at collecting space resources.

The system can be simply divided into four parts. The base, the prospector, the resource-hunter and the railway-replenisher. Let’s look into the base first.

The base is connected with three motors and a gyro-sensor. One of the motor is used for driving the di-clockwise motion separator. What is it? Di-clockwise stands for clockwise and anti-clockwise. The device is called di-clockwise motion separator because when the motor spins oppositely, one of the two outputs will spin oppositely. You can see it clearly here. (Give the sample device to the judges and further explain it.). In this way we can finish more tasks while the number of output ports of EV3 is limited. One output of the device is used to lift this shelf up. The other one is used to spin the shelf. The shelf can hold different things to finish different tasks. For example, if we have a camera on it, we can send images of the planet back to the Earth. So… one motor is used this way. The other two motors are installed opposingly. They serve to adjust the direction of the railway. At the beginning, we decided to have one motor only, however, we found that the power to pull is quite smaller than that to push. This means we can only adjust the railway in one direction if only one motor is used. Therefore, we changed our mind. Moreover, the position to install these motors is special. When the heaviest machines are at the front, being more distant from the machines meaning having greater power to turn the railway. (May further explain with physics knowledge). (Gyro-sensor, nothing good explain)

Then, let’s look into the prospector. We have installed the suspension on it (Pick up the prospector to explain) to increase the stability of it. Also, the prospector is equipped with an obstacle-sweeper to flatten the path. The sweeper is driven by two di-clockwise motion integrators. This one is the opposite of the former one. Whatever direction do the motor spin, the output would be in the same direction. This can be the reverse of the separator because we made it by inputting one of the outputs of the separator to another separator so that the final out put becomes mono-directional. Since we need to construct a railway to collect the energy mines, it’s vital to ensure the path from the base to the energy mines is flat. The input of the integrators are connected to the motions from the two wheels. Therefore, when the prospector moves, no matter forward or backward, the sweeper will be turned on to sweeper away any obstacles flattening the path.

Thirdly, let’s look into the resource-hunter. It is equipped with a railway tank of capacity up to five railways, a pair of railway recyclers and a pair of resource collectors. It is believed that ordinary planet explorers are easily broken down due to the rugged surface. Regarding to this problem, we decide to have our resource-hunter riding on a railway which is absolutely flat. This can increase the life span of the machine. When the resource-hunter runs forward, the railways stored in the tank will automatically dropped on the opening of the previous railway. This is to construct a long railway to collect distant energy mines. After collection, the railways can be recycled by the pair of recyclers. Therefore, the whole process is sustainable.

Finally, let’s look into the railway-replenisher. This to for collecting energy mines that are even more distant that they are unreachable if railways on the Resource-hunter are used only. Therefore, we need replenishment of railways. The principle of it is to make use of the mobile hooks. When the hook is inserted through the railways, the hook will move upwards so that the hook are pass through the railways. After passing through the railways, the hook will re-expand to hold the railways. Inversely, when we want to put the railway back, we can move the hooks upward first so that the railways will be dropped into the railway tank on the Resource-hunter. To control the movement of the hook, we connect the ending of the hook to a bar on the top. When the bar is pushed upward, the hook will be pulled upwards by the connecting strips.

Then, it’s the time for demonstration.