參賽隊伍人員及機器人簡介

Team Member and Robot Introduction

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I、Teams personnel：

I、Teacher：詹榮茂　Teacher

Teacher 詹榮茂 worked at Minghsin University of Science and Technology Department of Electrical Engineering, level assistant professor of main research direction for the electric power system, power electronics and motor control. Semester to teach the disciplines including Circuit Theory, fuel cell and process control, motor mechanical system simulation practice and practice topics. School Address Xinfeng Township, Hsinchu County, Xinxing Road, contact telephone (03) 5593142-3076.

II、The　team：

Leader: 鄭傑文

Attending fourth grade, the Minghsin University of Science and Technology, Department of Electrical Engineering,

Be responsible for word processing and data aggregation.

Members: 胡峻瑋

Studying in the third year of the Ming University of Science and Technology Department of Electrical Engineering,

Be responsible for the design and circuit wiring.

Members: 陳昆暉

Studying in the third year of the Ming University of Science and Technology Department of Electrical Engineering,

Be responsible for programming and computer aided drafting.

Members: 傅奕嘉

Studying in the third year of the Ming University of Science and Technology Department of Electrical Engineering,Be responsible for programming and robot assembly.

II、Robot Profile

I、Vision and strategy analysis

1. Plan

Is based on a machine can complete all actions as their starting point.

2. Strategic Analysis

Factors due to the body structure, the clearance process set landslide zone rescue zone for landslides District → → ambulance stations → mudslide area → the mudslide zone rescue area → ambulance station → the rescue flooded area flooded → → ambulance station .

II、 Mechanism Design

1. The landslides District of institutions

Rule stipulates shall rockfall completely move the ground reference push up the operation of the machine and the gates, however, so the "shovel" action, use of a motor with rope to complete the move action.

2. Flooded area institutions

Reference to the action of the pommel horse and lift, and therefore the use of the motor with a row of teeth so that the body lift.

3. The mudslide zone of institutions

The use of sensors to avoid obstacles.

4. Helping agencies

Three lift arms to do the crawl doll, so that any height can do the crawl action.

5. Ambulance institutions

Make a fourth arm to undertake three lifting arm crawl doll, do color discrimination, move the arm to the color of the ambulance station.

III. Wheel drive design

Send the main circuit board to the motor to drive the wheels, Figure 1 is motor drive circuit, motor two groups TIP control forward TIP two groups inversion of control to be able to operate self-propelled car will use a total of eight the TIP, the UIC 4041 the information is transmitted to the motor circuit to control the motor reverse.

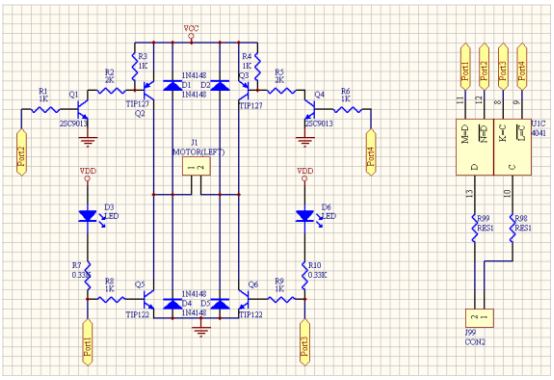

Figure 1 motor drive circuit

IV. Circuit design

We use 89C51 to when the main control circuit and main control circuit description, when the sensor signal is received,after 89C51 processed, then the signal is sent to the motor drive circuit.

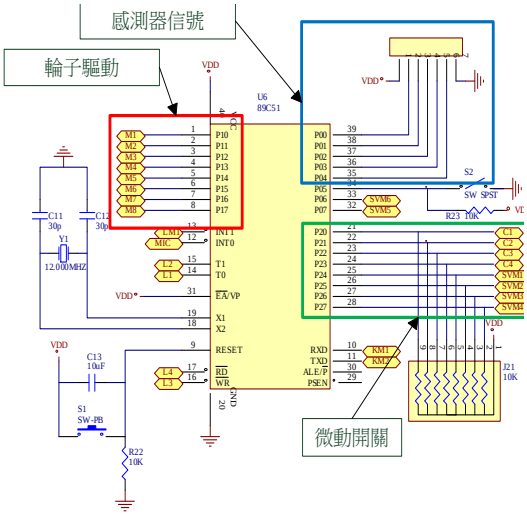

Figure 2 main control circuit

V. Sensor design

This competition in previous years,the venue has labeled black line,through the line sensor is installed below the body front, in order to move the car body,there is a direction to be found.

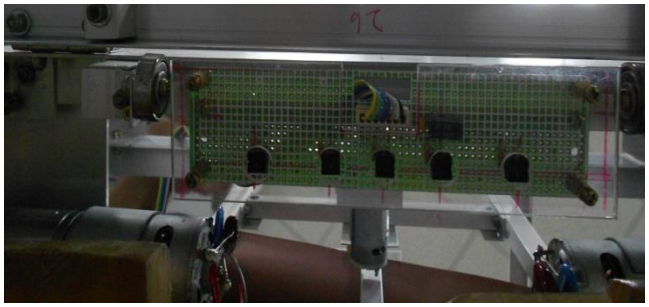

Figure 3 through the line sensor.

VI. Assembly, test, and modify

I. Assembly

I. Flooded area institutions →stepped slopes

Ladder movements are many, such as lifts, bypass or climbing, we tried two ways, lifts and bypass the first bypass design institutions, but due to the position and angle of the other checkpoints, resulting in when climbing can not be successfully completed, and therefore decided to use the lift's done in the way institutions and Figure 4 is a diagram of the the ladder lift design concept, Figure 5 complete diagram for the ladder lift design, lift part of the two sections, chosen by the rows of teeth do lifting device auxiliary wheel, auxiliary wheel rear lift power.

Figure 4
diagram of the the ladder lift design concept

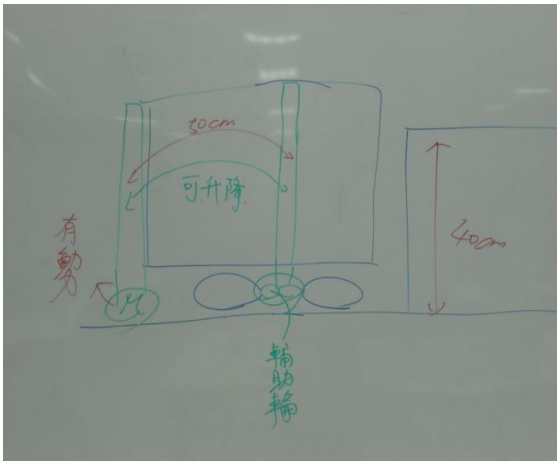

Figure 5
complete diagram for the ladder lift design

II.The landslides District of institutions→rockfall

Competition rules rockfall when you move, you must want to completely leave the venue platform reference Stacker and gates works, by a motor with a rope to pull up the rockfall, so that will not move when dragged to the ground. Figure 6 shovel institutions.。

Figure 6
shovel institutions.

III. The mudslide zone of institutions→avoid obstacles

This part is based on a software program to avoid obstacles。

IV.The rescue area's institutions →crawl dolls.

The competition has three rescue zone, neither the same as the height of its platform.40cm、0cm、-10cm，the crawling doll also need to do lift rails with rope with motor do lift.

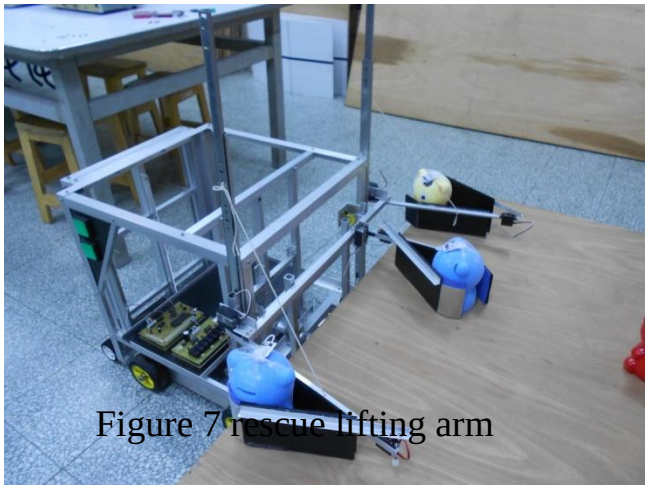

Figure 7 rescue lifting arm

V. Ambulance

station agencies→placed Doll

Ambulance station portion as intend to do an arm segment doll and place the doll, as shown in Figure 8 the part of the doll's arm undertake doll color color sensors, can be distinguished, when after completion of the color discrimination, the arm is moved to the color of the platform, the servo arm open, the doll will directly falling on the platform of the color.

Figure 8　Ambulance arm

II.　Test

Ladder after the completion of the lifting portion, a simple test of the machine functions, shown in Figure 9 with continuous action, the individual motor is energized, in order to achieve the simulation results. Move rockfall provisions is not dragged venues platform, "shovel" finished, do a simple simulation move rockfall, the test will not be dragged to the ground?As shown in Figure 10 rockfall completely off the ground.

Figure 9 The ladder lift test simulation

Figure 10 The rockfall move mimic diagram

III. Modify

Originally designed to lift the arm. Rail highest height of 90cm , but so will the card to the fourth only ambulance arm mobile shift rails is 5cm high, as shown in Figure 11 is a two-way rail rails shift high, does not affect the height of the rails decline, can still rescue the doll of flooded and mudslide area.

Figure 11
Improved rail location
map

VII. Robot creative Features Description

The mechanical structure of the robot is divided into four parts, the landslide area were "shovel" flooded the ladder lift, the ambulance arm of the three-level rescue the rescue lifting arm and the ambulance station, the following description of the agency's various checkpoints creative ingenuity:

1. The landslides District → "shovel"

Game rules, moving rockfall to completely leave the venue platform, on this point, the first thought is to heap action it move when not dragged to complete the action, but such action will directly affect the rescue lift arm structure installed in a fortuitous opportunity to see a picture of Lego bricks, the gates of the description of a medieval castle, suddenly think,if push high action with the castle the gates operation together that you can solve the current institutions? So simple to do a small simulation found that can solve the moving rockfall and not dragged to the ground, move rockfall agencies also will not affect the the rescue lift arm institution erected, it is derived from the "shovel" idea and action.

2. Flooded → ladder lift

The ladder lift of the way are many, such as lifts, bypass or climbing, initially to bypass design agencies, but due to the position and angle of the other checkpoints, lead climbing can not be successfully completed. Find appropriate materials, in mechanical hardware store to see lift, also please the boss for us to do a simple lift of the action with the principle of introduction, and recently the London Olympics, watch the Olympic broadcast, the opportunity to see the gymnastics competition pommel horse, the project also found that the part of the similarity of the pommel horse action with the action of the lift, the lift action with the pommel horse action way do combine, it is possible to reach the the ladder ramp action requirements, so in this part of a small simulation, and the results expected the same, so the idea to make the ladder lift, have now stepped lifting mechanism.

3. The three hurdles rescue → rescue lift arm

Flooded, mudslide area and landslide zone rescue zone platform height neither the same basis venues platform, -10cm, 0cm and 40cm, because of the different heights, plus is to crawl doll dolls machine, so in this condition, the first people to think that clip, but the clip doll machine lifting arm crawl the structure is not easy to make and not suitable for the installation have set up a shovel and ladder lift car body, but we still have to actually go to the site to observe the action clip doll machine, the process of observation, discovery clip doll machine inside dolls hand posture, their hands can move, it should be very suitable for grasping take unicorn dolls, so also do the simple simulation, its results are very suitable for crawling doll and will not conflict the the ladder lifting of institutions set up with the "shovel", so the folder lift doll with dolls hand action it produces the rescue lifting arm mechanism.

III. competition experience

This is the first time we participate in the the TDK automatic group match, although in the final, because the astringent between the ground and the wheels too late to do the processing, leading to the final only to get fourth place finish. Production machine failures and setbacks encountered many times, but this frustration is the largest in our production process momentum source. Mental as well as encourage teammates and support to overcome difficulties in the face of adversity, before today's results and harvesting. Lastly, I hope that after the race, for the lack of experience in this game, the next time to do better to improve mood more extra effort to get next year's championship.