
LN
VEX 63936
639368

VRC 高中组

余虹杰、18063862206

姓名：林家乐
Name: LAM KA LOK (William)
负责：机器测试、零件管理
Responsibility: Machine Test and Parts Management.

姓名：赵芯露
Name: ZHAO XIN LU (Gracie)
负责：工程笔记、记分
Responsibility: Engineer notes and keep the score.

Happy ~

姓名：甘子鸿
Name: KAM CHI HONG (Perry)
负责：制作机器、操纵机器
Responsibility: Making machines and Manipulating machines

Good Lucky

姓名：黄麒峰
Name: WONG KEI FONG (Ben)
负责：编程，指挥
Responsibility: Programming and Command.

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时间 Time	主题 Project	页码 Page
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世界锦标赛
World Championship

比赛感想：我们很荣幸参加了2022~2023的「世界锦标赛」，在比赛中不仅看到了其他队伍超群的技术，还体会到了因为VEX而建立起来的友谊，互换贴纸。在比赛中紧张的每个时刻，我们都记忆深刻，让我们充满动力准备下一年比赛。

Competition Reflection: We are honored to participate in the 2022~2023 World Championships. During the competition, we not only saw the exceptional skills of other teams, but also experienced the friendship established due to VEX, exchanging stickers. At every tense moment in the competition, we have a deep memory that motivates us to prepare for the next year's competition.

日期：2023.4.27
Date：

记录员：Gracie
witnessed by:

比赛总结：在世锦赛的时候，因为我们是进攻型的机器，所以我们会被"针对"，更会被其他队伍推走，从而影响准度。所以我们认为新赛季的机器必须要在底盘上做一些改变：新赛季的底盘需要能抗住其他机器的攻击，还需要不太轻易地被推走，所以会在重量上需要改进。

（只是在比完赛之后的想法）

Competition Summary: During the World Championships, because we are attacking machines, we will be targeted and pushed away by other teams, which will affect accuracy. So we believe that the new season's machines must make some changes to the chassis: the new season's chassis needs to be able to withstand attacks from other machines and not be easily pushed away, so it will need to be improved in terms of weight. (Just thinking after the competition).

1. 反省：在比赛期间，我们过分关注资格赛队友，了解他们与我们的适配度。而不是整个分区的队伍，导致在我们进入分区赛16强之后，并没有选择到适配度极高的队伍，组成互补的联队。

1. Reflection: During the competition, we overly focused on our qualifying teammates and understood their compatibility with us. Instead of the entire team in the division, we did not choose a highly adaptable team after entering the quarter finals, forming a complementary team.

2. 反省：在U组比赛时，我们发现有队伍最后时刻将气缸中的气喷出，达到不接触高筐又令对手失分。我们认为我们没有吃透规则。

2. Reflection: During the U-group competition, we found that a team sprayed the air from the cylinder at the last moment, achieving a goal of not touching the high basket and causing the opponent to lose points. We don't think we have fully understood the rules.

2. 日期：2023.4.24 记录员：G1

Date: Witnessed by:

目标

GOAL

~~进世锦赛~~

~~世锦分区冠军~~

世界冠军!!!

赢得 Skill 自動的世冠 13

幫助 隊伍 林拿冠軍

赵：超过上年的我们，努力配合拿「世界冠军」，多点幸运，认真玩好最后一年.

今年我们的目标是努力做好每个方面，超过上一年的我们，达到梦想。

Our goal this year is to strive to do well in every aspect, surpassing our previous year and achieving dreams.

世界冠军

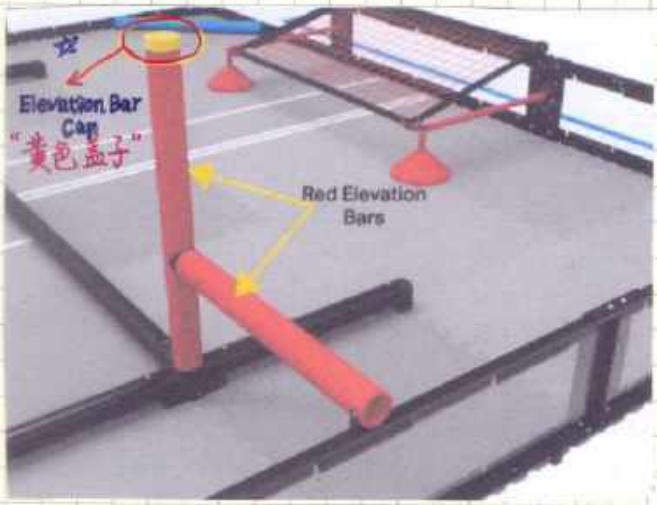
規則 RULE 分析 Analysis

4.

4月27日(27 Apr.)

在比赛闭幕式时观看了新赛季的宣传片，我们认为它类似一个"足球运动"。但是队长甘在看了宣传片之后提出了吐槽："在2016~2017赛季中，机器爬升杆子，是没有阻挡的黄色盖子，有很多队伍都是勾在中空的杆子口上，来取得分数，可是这个赛季在杆上有黄色的盖子。"

After watching the promo for the new season at the closing ceremoney of the game, we thought it was similar to a "football sport". But captain Kam complained after watching the promotional video: "In the 2016~2017 season, the machine climbing poles did not have yellow covers. Many teams hooked on the hollow pole mouth to score points. But there is a yellow cover on the pole this season.



4月28日(28 Apr.)

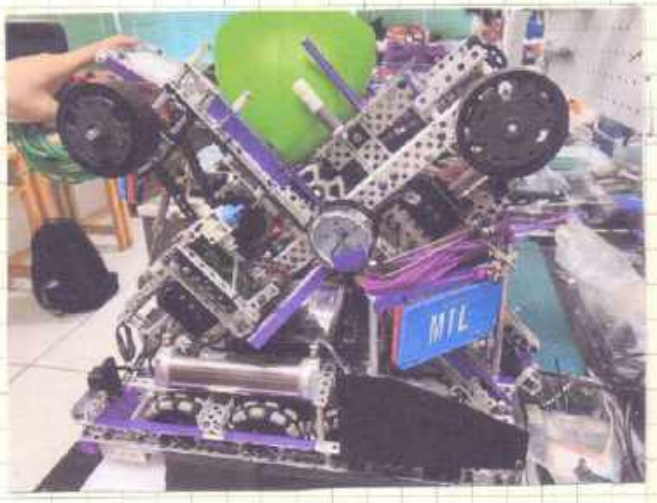
闭幕式第二天，我们偶然间发现U组MIL的结构刚好可以放下一个"Triballs"，所以在一开始就有制作"撞针"机器的想法。(图片在后页)

On the second day of the closing ceremony, we accidentally discovered that the frame of Group U MIL could just fit a "Triballs", So we had the idea of making a "firing pin" machine from the beginning. (Image on the back page).

日期 Date: 2023.4.28

记录员 witnessed by: G

- 图中机器来自U组 MIL 2022~2023赛季。
- The machine in picture is from Group U MIL 2022~2023 season.



4月29日(29 Apr.)

- 因为只看了宣传片，不清楚具体规则，所以我们在讨论时产生了些许想法。
  - 设计机器在展开后能遮挡Goals的长度，这样做可以在手动操作时缩小对方可进攻的范围，让对手不易得分。
  - 今年主要弄一台攻击型机器，攻击对手拿取得分物的部位。
  - 认为Triballs在Goals上是需要机器弄下来，还需要构思怎么弄下来。
- Because we only watched the promotional video and didn't know the specific rules, we had some ideas during the discussion.
  - The design machine can block the length of goals after unfolding, which can narrow the range of the opponent's attack during manual operation, so that the opponent is not easy to score.
  - This year, you can get an attack machine to attack the part where the opponent gets the parts.
  - It is recognized that Triballs needs to be removed by a machine on Goals, and you also need to figure out how to get it down.

日期: 2023.4.29
Date:

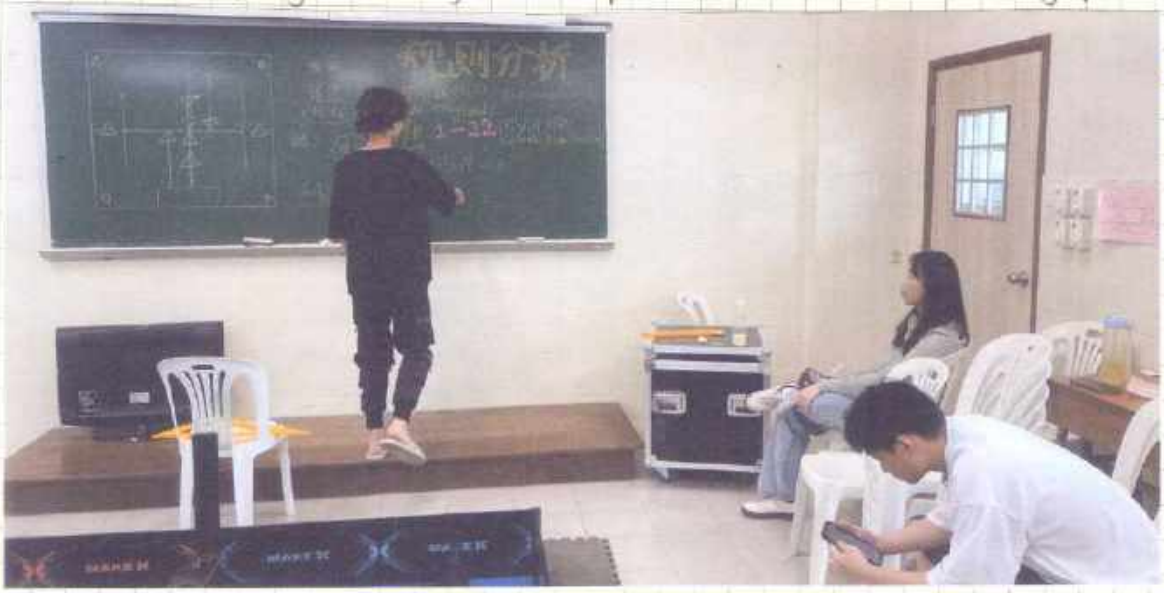
记录员: G
witnessed by:

4月30日(30 Apr.)

- 官方发布了竞赛规则，我们先略看了规则，发现之前的想法都因为竞赛规则而不能实现。
  1. 规则限制机器在36英寸；(SG,2a.)
  2. 竞赛手册中提到了"不可有意攻击敌方机器"；(G13)
  3. 竞赛规则说明需要在裁判同意下，自行把Triballs拿下来。(SG3.)
- The official issued the competition rules. We skimmed through the rules first and found that the previous ideas could not be realized because of the competiton rules.
  1. The rule limits the machine to 36-inch; (SG,2-a.).
  2. It is mentioned in the competition manual that "you can't intentionally attack enemy machines" (G13).
  3. The rules of the competition indicate that the Triballs need to be taken down by themselves with the consent of the referee. (SG3)

5月10日(10 May.) 规则分析(Rule analysis)

- 我们进行了第一次正式会议，主题是"规则分析"，主要分析「竞赛手册」1~22页的内容。(到记分)
- We held the first formal meeting. The theme was "Rule Analysis", which mainly analyzed the content of Page 1~22 of the "competition manual" (to the scoring part).



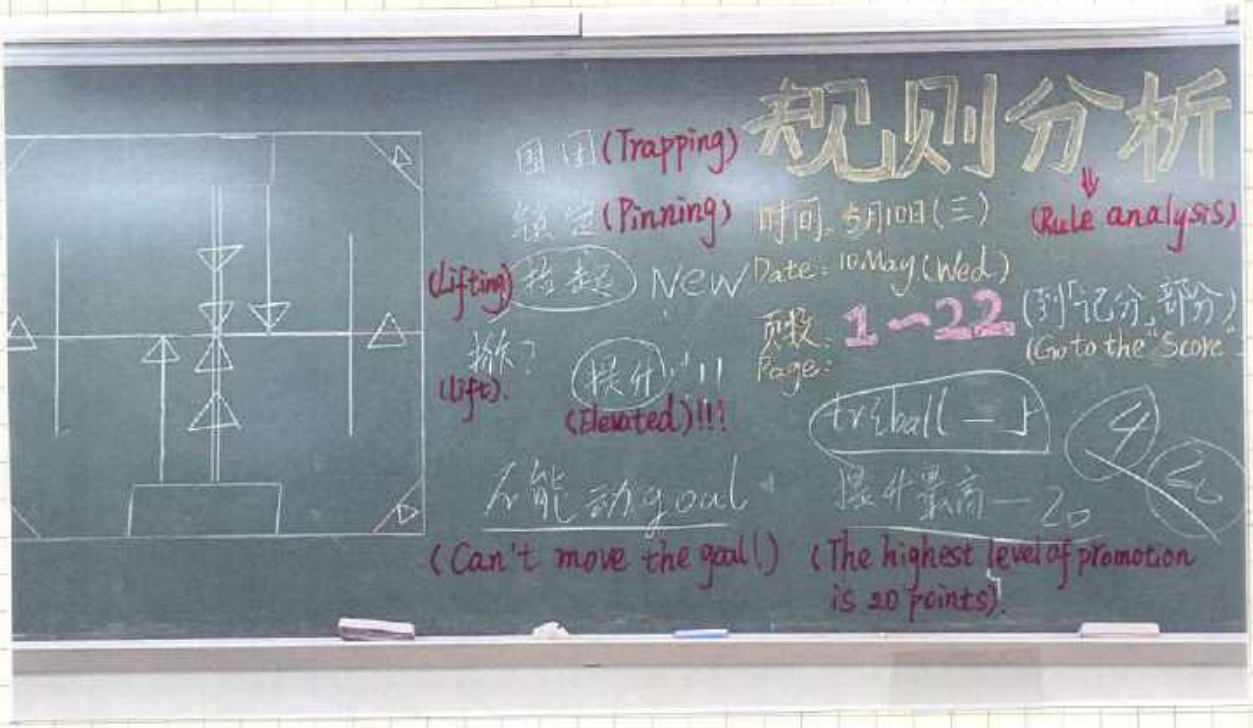
- 会议情况
- Meeting Situation

日期：2023.4.30
Date:

记录：G7
Witnessed by:

会议内容

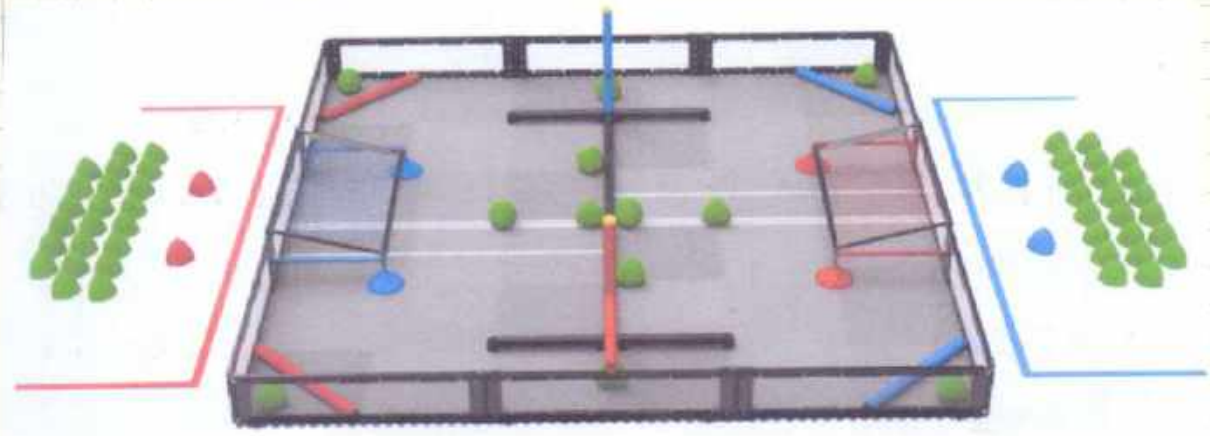
Content of the meeting



1. 新赛季分析(Analysis of the new Season)

赛局目标：通过使用Triballs在Goal内得分，在赛局结束时提升机器人，以获得比对方联队更高的得分。自动赛时段结束时，任意联队完成3个指定任务，将获得自动获胜分。

Game goal: By using Triballs to score in Goal, upgrade the robot at the end of the game to get a higher score than the opposing team. At the end of the automatic competition period, any team that completes 3 designated tasks will get automatic winning points.



场地概图 Site overview

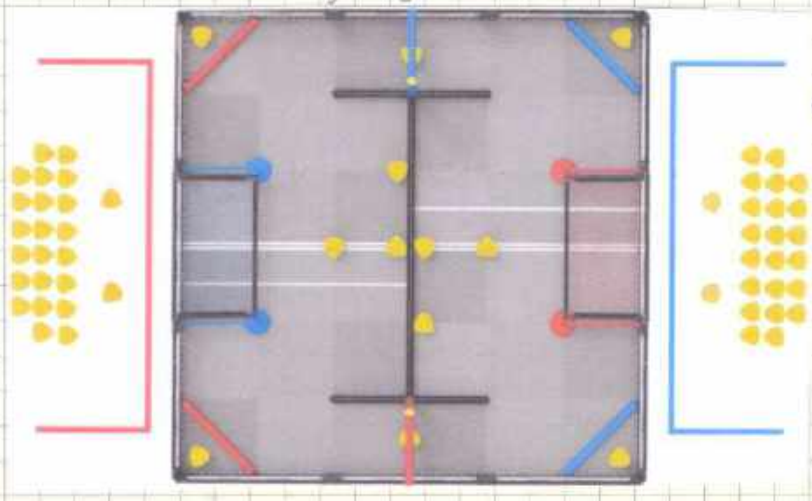
日期：Date: 2023.5.10

记录员：witnessed by: G

场地分析 Site analysis

1. Triballs：双方联队各2个(共4个)，双方联队各22个(共44个)赛局导入物，12个Triballs在场地上的初始位置。
2. 2组 Elevation Bars，双方联队各1个。
3. 红蓝共2个Goals，双方联队各1个。
4. 共4个赛局导入杆，双方联队各2个。

1. Triballs: 2(a total of 4) of the two teams, 22(44 of a) of the two teams, and 12 Triballs in the initial position on the field.
2. 2 groups of Elevation Bars, 1 each of the two teams.
3. There are 2 Goals in red and blue, one for each team.
4. There are a total of 4 game introduction poles, and there are 2 teams from each team.



场地图
Field map

2. 赛局定义 (General Defintions)

1. 罚停：被罚停赛队在赛局剩余时间不得操作机器人，上场队员必须将遥控器放在地上。
2. 纠缠：如果一台机器人抓住，钩住或附着于场地要素或对方的机器人，就会被认为纠缠。
3. 牵制：如果一台机器人符合「围困、锁定、抬起」标准，则视为牵制。
   - 围困：将对方机器人的动作限制在场上小于一块泡沫地板的尺寸，没有逃脱路径。
     - 若某个机器人未试图逃脱，则其不视为被围困。
   - 锁定：阻止对方机器人接触围栏，场地或竞赛道具或其他机器人。

● 新要点：抬起是通过抬高或倾斜对方机器人离开泡沫垫来控制对方的动作。
(初步猜想为抬起对方机器)

1. Disablement: The team that has been suspended is not allowed to operate its robot for the rest of the game, and the players must put the remote control on the ground.

2. Entanglement: If a robot grabs, hooks or adheres to the field element or the other party's robot, it will be considered entangled.

3. Holding: If a robot meets the "encirclement, locking, lifting" standard, it is regarded as a containment.

● Trapping: Limit the action of the opponent's robot to less than the size of a foam floor on the field, and there is no escape path. If a robot doesn't try to escape, it is not considered besieged.

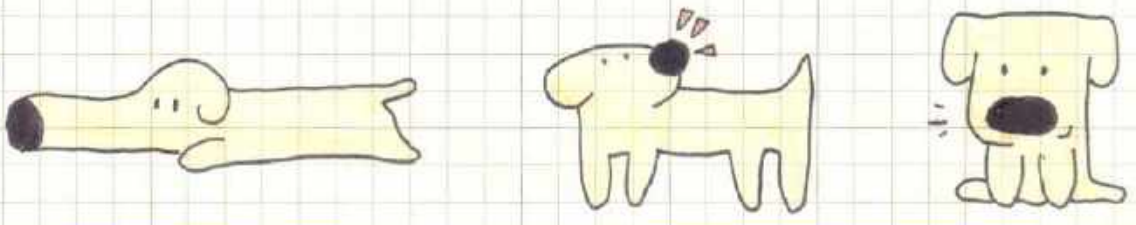
● Pinning: Prevent the other robot from touching the fence, venue or competition props, or other robots.

● New point: Lifting controls the other party's movements by raising or tilting the other party's robot away from the foam pad.
(The preliminary guess is to set off the opponent's machine).

3. 特定赛局定义 (Game-Specific Definitions)

● 联队Triballs：分为双方联队各2个，与各自联队的颜色一致(不是绿色)。联队Triballs可作为预装或赛局导入物。

● Alliance Triballs: two per Alliance, that are Alliance-colored instead of green. Alliance Triballs may be used as Preloads or Match Loads.



日期 Date: 2023.5.10.

记录 Witnessed by:

● 障碍杆：由标称2"的40PVC管(外径2.375")及相关连接件，位于场地中间。某些规则中，障碍杆被分为1根长杆和2根短杆，但它通常统称为"障碍杆"。

● Barrier: Made up of 2" Schedule 40 PVC pipe (with a 2.375" outer diameter) and associated connectors/hardware, that sits in the middle of the field. For some rules, the Barrier is divided into one Long Barrier and two Short Barriers, but it's usually referred to collectively as just "the Barrier".

● 长短障碍杆示意图

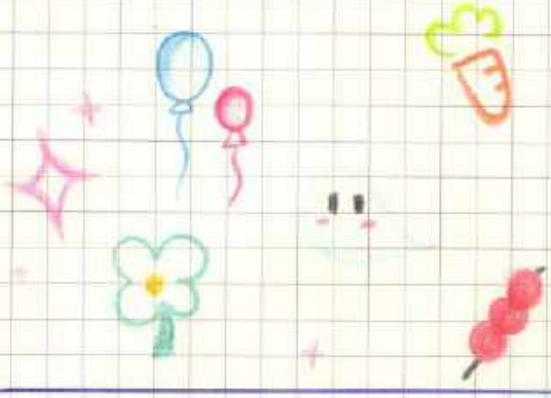
● Sketch map of long and short Barrier.

? ● 翻倍：如果联盟的2台机器人在同一个进攻区内，则该联盟符合"翻倍"的定义。机器人符合以下标准，才视为此定义中的"在区域内"。

1. 接触区域内的灰色泡沫垫；
2. 不接触长障碍杆；
3. 不接触任何 Elevation Bars.

● Double Zone: An Alliance status. An Alliance meets the definition of being "Double-Zoned" if both Robots from the Alliance are in the same Offensive Zone. To be considered "in the Zone" for the purposes of this definition, Robots must meet the following criteria:

1. Contacting the gray tiles within the Zone;
2. Not contacting the Long Barrier;
3. Not contacting any Elevation Bars.



日期：Date: 2023.5.10.　　记录员：witnessed by:　　00.

● 提升：如果机器人在赛局结束时符合以下标准，则视为提升：

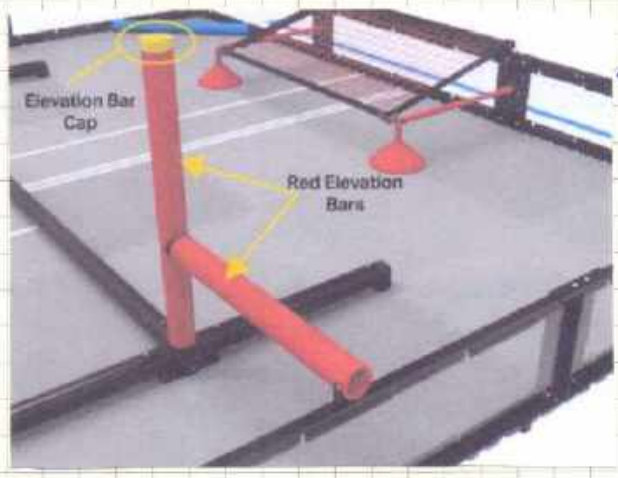
1. 机器人至少要一处或多处接触本方联队的Elevation Bars和障碍杆；
2. 机器人不接触任何第1点所列以外场地要素。这包括灰色泡沫垫，围栏，Goals，对方联队的Elevation Bars等（接触或持有Triballs与确定机器人的提升状态无关）。
3. 机器人不接触黄色的Elevation Bar Cap.

● Elevated: A Robot is considered Elevated at the end of the Match if it meets the following criteria:

1. One or more of their Alliance's Elevation Bars and the Barrier.
2. The robot doesn't touch any field elements other than those listed in point1. This includes gray foam pads, fences, Goals, Elevation Bars of opposing team, etc. (touching or holding Triballs has nothing to do with determining the lifting status of the robot)
3. The robot is not contacting the yellow Elevation Bar Cap.

● Elevation Bar Cap：每组Elevation Bar顶部的黄色塑料片。Elevation Bar Cap是独立的场地要素，不视为Elevation Bar的一部分。

● Elevation Bar Cap: The yellow plastic piece at the top of each set of Elevation Bars. The Elevation Bar Cap is a separate field element and isn't considered part of the Elevation Bar.



● Elevation Bar和Elevation Bar Cap.
● An Elevation Bar and Elevation Bar Cap.

日期：2023.5.10
Date:
记录员：G
witnessed by:

- 提升等级：赛局结束，一种代表达成提升的机器人离地高度的状态。等级是通过将高度标尺垂直放置在提升的机器人旁，来判断机器人的最低点处在高度标尺上字母标记的哪个区间。见下图。
- 注1：没有超出高度标尺范围之上的提升等级。赛局结束时位于高度标尺范围之上的机器人，将视为最高提升等级J.
- 注2：未达成提升的机器人无提升等级。

- Elevation Tier: A status that represents an Elevated Robot's height off of the field at the end of the Match. A Robot's Elevation Tier is measured by placing the Hight Guide vertically next to an Elevated Robot and determining which letter-labeled segment of the Height Guide the lowest point of the Robot falls within. See the picture below.
- Note 1: There are no additional Elevation Tiers above the Height Guide. Robots which end the Match above the Height Guide will be considered to be at the maximum, Elevation Tier J.
- Note 2: Robots that are not Elevated do not receive an Elevation Tier.

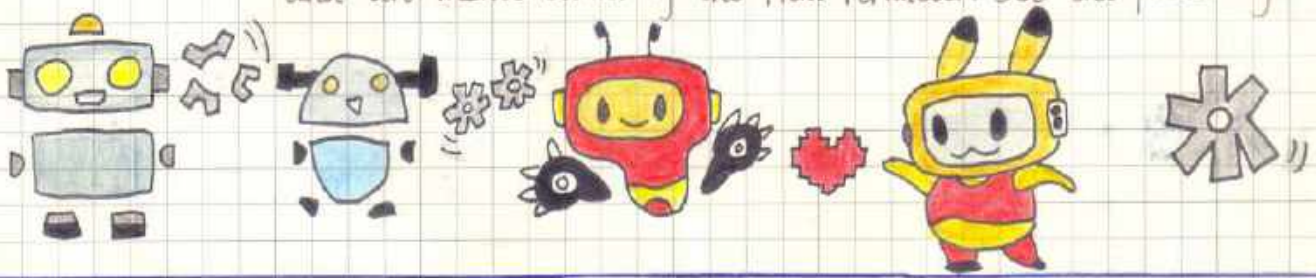
- 提升等级示意图
- Upgrade the level diagram.

- Goal：场地两边用联队颜色区分的网状结构，红方和蓝方各一个，可通过将Triballs放入其中得分。以得分为目的，"Goal"是以其PVC管的最外沿的垂直投影面内的场地泡沫垫上方和网的表面下方为边界构成的三维立体空间。
- Goal: The Alliance-colored, netted structure on either side of the field, one red and one blue, into which Triballs can be scored for points. For the purposes of scoring, the "Goal" refers specifically to the three-dimensional volume bounded by a vertical projection of the outermost PVC Pipes onto the field and below the surface of the net.

- 得分外边界用绿色标示的Goal
- The three-dimensional outer Scoring boundaries are highlighted in green.

- 赛局导入杆：用联队颜色区分的结构，由标称2"的40PVC管（外径2.375"）及相关连接件斜跨连接在场地角落。
- Match Load Bar: The Alliance-colored structure, made up of 2" Schedule 40 PVC pipe (with a 2.375" outer diameter) and associated connectors / hareware, that connects diagonally across a corner of the Field.

- 赛局导入区：赛局导入杆和场地角落内侧围栏构成的边界内的泡沫垫部分。见右图。
- Match Load Zone: The portion of the floor tile bordered by a Match Load Bar and an inside corner of the Field Perimeter. See the picture right.



日期：2023.5.10.
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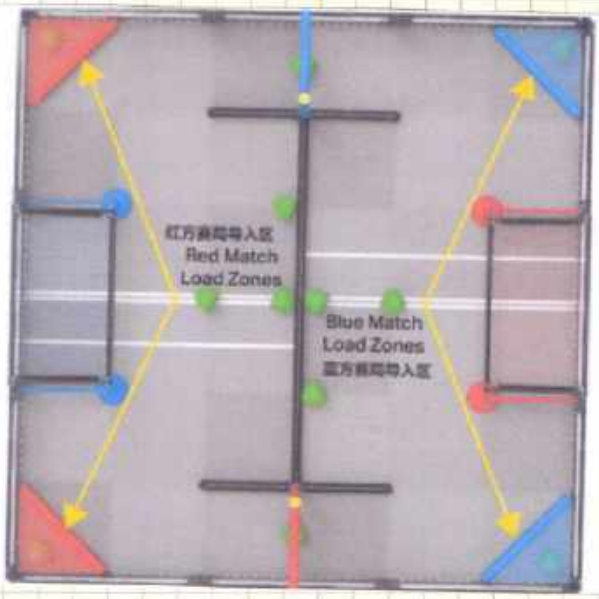
记录员：G
Witnessed by:



- VRC挑战赛 over under 场地上的4处赛局导入区.
- The four(4) Match Load Zones found on a VRC Over Under Field.

- 中立区：由白色胶带线，障碍杆和围栏为边界构成的2个区域之一。中立区是灰色泡沫垫本身；不是三维空间。
- Neutral Zone: One of two areas of the field bordered by white tape lines, the Barrier, and the field perimeter. The Neutral Zone is defined as the gray foam tiles themselves; it's not a 3-dimensional volume.

!!! 若自动时间段超过此区，所造成的撑零件、结构出现问题的风险自己承担；若裁判必须对防御性机器人和进攻性机器人做出判罚时，会更偏向进攻性机器人。

!!! If the automatic time period exceeds this area, the risk of problems with parts and structures will be borne by yourself; if the referee must punish defensive robots and offensive robots, it will be more offensive robots.

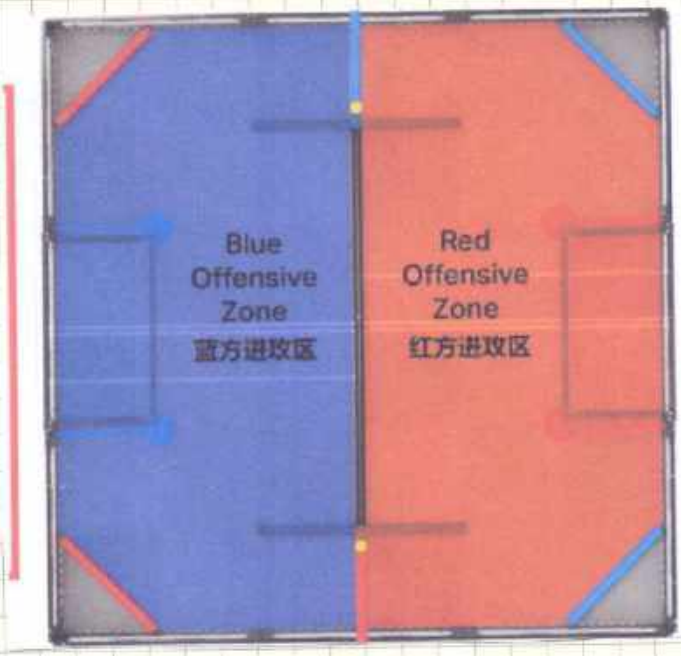
- 中立区(蓝色)和自动时段分界线(黄色)及各自边界的示意图.
- A depiction of the Neutral Zone(blue) and Autonomous Line(yellow) and their boundaries.

● 进攻区：场地的两个半场之一，由障碍杆分隔开。见下图。

1. 双方联队各有1个进攻区。联队的进攻区位于离本方联队站位最远和离本方颜色一致的Goal最近的一侧。
2. 每个进攻区由障碍杆一侧的灰色泡沫垫构成。它不是三维空间。
3. 长障碍杆不属于任何一方的进攻区。
4. 赛局导入区不属于任何一方的进攻区。

● Offensive Zone - One of two halves of the field, divided by the Barrier. See the picture below.

1. Each Alliance has an Offensive Zone. An Alliance's Offensive Zone is on the side furthest from their Alliance Station and closest to that Alliance's colored Goal.
2. Each offensive Zone consists of the gray foam tiles on one side of the Barrier. It's not a 3-dimensional volume.
3. The Long Barrier is not considered to be in either Offensive Zone.
4. The Match Load Zones are not considered to be part of either Offensive Zone.



● 双方进攻区及各自边界示意图.

● A depiction of the two Offensive Zones and their boundaries.

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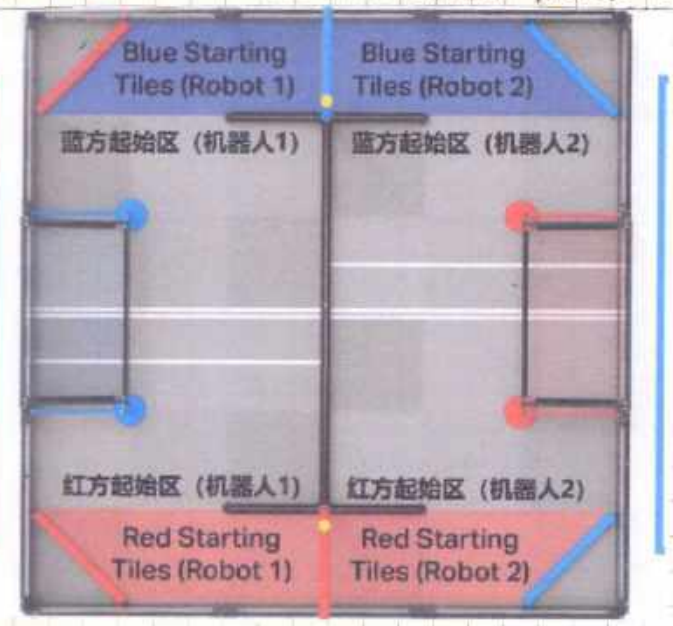
witnessed by:

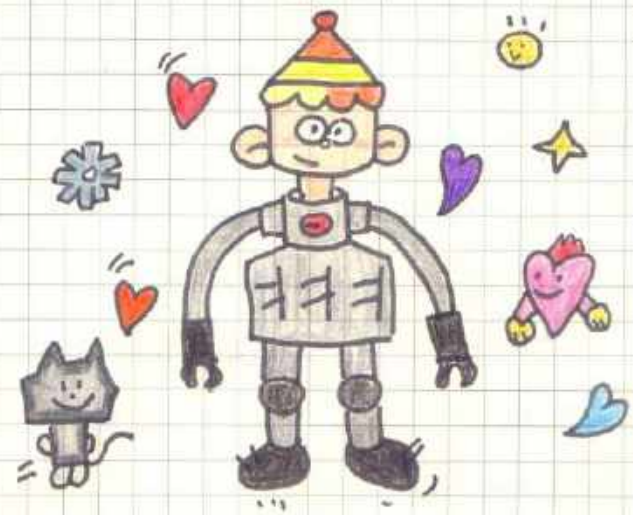
- 持有：某台机器人携带、把持、或控制某个Triball的移动，在机器人改变方向时，Triball也随机器人一起移动的情况，视为这台机器人持有该Triball。推、拨Triball不视为持有，但是如果使用机器人上凹陷的部分来控制Triball的移动，则会被视为持有。
- Possession: A Robot is considered to be in Possession of a Triball if the Robot is carrying, holding, or controlling the movement of a Triball such that if the Robot changes direction, the Triball will move with the Robot. Therefore, pushing/plowing Triballs is not considered Possession; however, using concave portions of a Robot to control the movement of Triballs is considered Possession.

? 机器人的"双翼"在国内比赛时，战队是不可以用的，算违规行为；可是官方都可以用"双翼"。
? When the robot's "double wings" are playing in domestic games, the team can't be used, which is considered a violation, but the official can use the "double wings".

- 起始垫：灰色泡沫垫之一，这些泡沫垫沿着围栏边缘且位于各自联队站位右侧。见下图。
- Preload: An Alliance Triball, when loaded into a Robot prior to a Match. See the picture below.



- 机器人起始垫及各自边界示意图。
- A depiction of the Robot Starting Tiles and their boundaries.



● Triball：一种绿色、红色或蓝色的塑料得分物，像略带圆弧的金字塔，这种形状被称为"勒洛三角形"。每个Triball的高度约6.18"，重量约103~138g.

● Triball: A green, red or blue plastic scoring object with a slightly rounded triangular pyramidal shape known as a Reuleaux triangle. Each Triball is approximately 6.18" tall with a weight of 103-138g.

● 用于VRC挑战赛over under的三种颜色的Triballs.

● The 3 colors of Triballs used in a VRC Over Under Match

!!4.记分(Scoring).

自动时段奖励分	8分
每个在Goal内得分的Triball	5分
每个在进攻区内得分的Triball	2分
提升—最高级	20分
提升—第二级	15分
提升—第三级	10分
提升—第四级	5分

● 讨论：

我们认为"进攻区"应该会被清场，想尽量多入"Triballs"因为进4个Triballs等于提升的最高级，而"提升-最高级"的难度相当于附加题，所以我们打算先做容易的题，也尽量在提升上拿到第四级的5分.

● Discuss:

We believe that the "offensive area" will be cleared, and we want to enter as many Triballs as possible, because entering 4 Triballs is equivalent to Elevation-Top Tier, we try to get 5 points in the Elevation-4th Tier.

Autonomous Bonus	8 Points
Each Triball Scored in a Goal	5 Points
Each Triball Scored in an Offensive Zone	2 Points
Elevation - Top Tier	20 Points
Elevation - 2nd Tier	15 Points
Elevation - 3rd Tier	10 Points
Elevation - 4th Tier	5 Points

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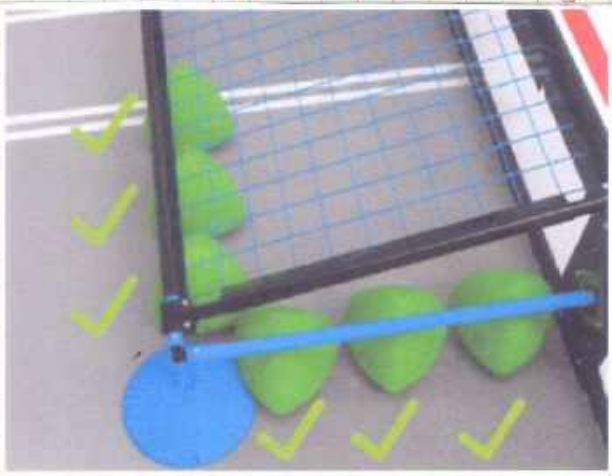
得分标准 Scoring Criteria

- 如 Triball 符合以下标准，则视为在 Goal 内得分：

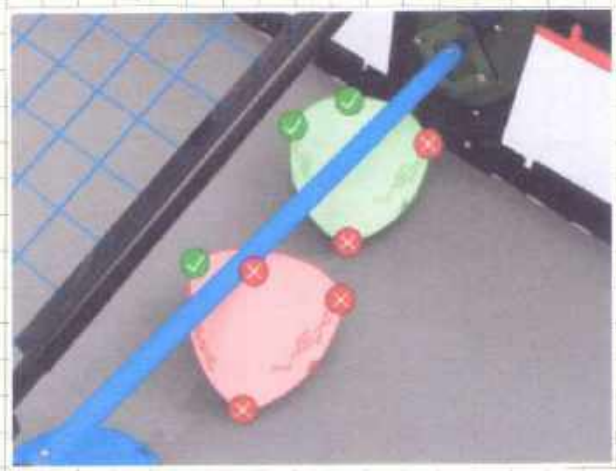
1. 不接触与 Goal 同色的机器人。
2. 至少两个角在 Goal 内（即穿过构成 Goal 区域的 PVC 管子外沿的立面）。

- Triball is considered Scored in a Goal if it meets the following criteria:

1. The Triball is not contacting a Robot of the same color Alliance as the Goal.
2. At least 2 corners of the Triball are within the Goal (i.e., are under the Net and have "broken the plane" of the outer edge of the PVC pipes that define the Goal volume).



- 图中所有的 Triball 都得分，因为它们有2个或以上的角在 Goal 边界内。
- All the Triballs in the figure Score because they have 2 or more corners within the goal boundary.



- 图中绿色的 Triball 得分，因为它有两个或以上的角在 Goal 边界内。红色 Triball 不得分。
- The green Triball in the picture Scores because it has 2 or more corners within the goal boundary. Red Triball is not Scored.

- 如Triball符合以下标准则视为在进攻区内得分：
  1. 不接触与进攻区同色的机器人；
  2. 接触进攻区内的灰色泡沫垫。
- 注：进攻区得分是基于接触到每个进攻区内的灰色泡沫垫。在判断任何边界情况时，裁判可以用"纸张测试"（即，在Triball下缓慢滑动一张纸），以确定其在哪方进攻区得分。如果Triball同时接触双方进攻区，则其在任何一方进攻区内都不得分。见下图。
- A Triball is considered Scored in an Offensive Zone if it meets the following criteria:
  1. The Triball is not contacting a Robot of the same color Alliance as the Offensive Zone.
  2. The Triball is contacting the gary foam tiles within the Offensive Zone.
- Note: Offensive Zone scoring is based on contact with the gary foam tiles in each Offensive Zone. In the case of any close calls, referees may use a "paper test" (e.g. gently slide a piece of paper under the Triball) to determine which Offensive Zone it should be scored. If the Triball is contacting both Offensive Zones, then it is not considered Scored in either Zone. See the picture below.

- 因为此Triball接触了双方进攻区，它在任何一方进攻区内都不得分。
- This Triball would not be considered as Scored in either Offensive Zone, because it is touching both Zones.

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- 联队Triball可以在任何Goal或进攻区内得分，且总是为与其同色的联队得分。例如，一个红方的Triball符合在蓝方Goal内得分的定义，则其为红方得5分。
  1. 联队Triball不接触同色机器人方可得分；
  2. 规则<SC3a>不适用与联队Triball.
- Alliance Triballs may be Scored in any Goal or Offensive Zone, and always count toward the same color Alliance as the Triball. For example, a red Alliance Triball that meets the definition of Scored in the blue Goal will count as 5 points for the red Alliance.
  1. To be eligible for points, Alliance Triballs must not be contacting any Robots of the same color Alliance as the Triball.
  2. Rule <SC3a> does not apply to Alliance Triballs.

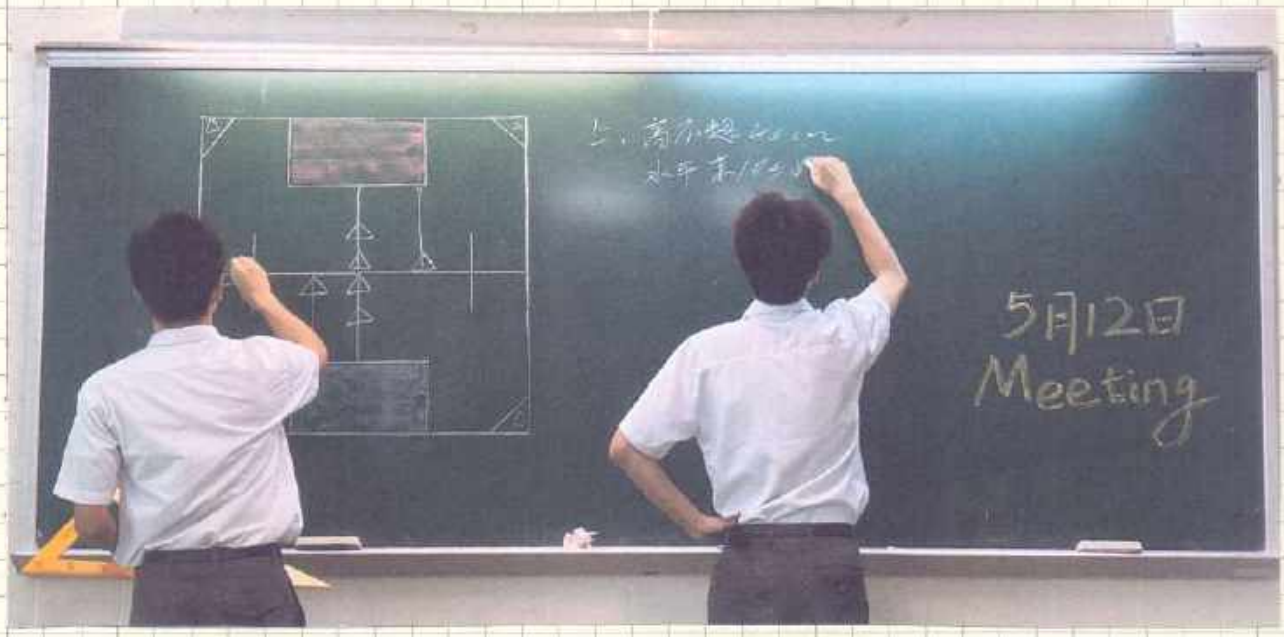
- 自动时段结束后，完成以下任务的联队获得自动获胜分。
  1. 将Triball从联队的赛局导入区移除，该区域与其起始泡沫垫重合。例如，红方联队须移除初始位置在左下角赛局导入区内的Triball，该区域与红方机器人1的起始垫相邻。
  2. 在本方联队的Goal内至少有一个联队Triball得分。
  3. 自动时段结束后，至少一台机器人接触其本方的Elevation Bar.
- An Autonomous Win Point is awarded to any Alliance that has completed the following tasks at the end of the Autonomous Period.
  1. Removed the Triball from the Alliance's Match Load Zone that coincides with their Starting Tiles. For example, the red Alliance must remove the Triball that begins in the bottom-left Match Load Zone, adjacent to Robot 1's Starting Tiles.
  2. Scored at least one Alliance Triball in the Alliance's own Goal.
  3. Ended the Autonomous Period with at least one Robot contacting their own Elevation Bar.

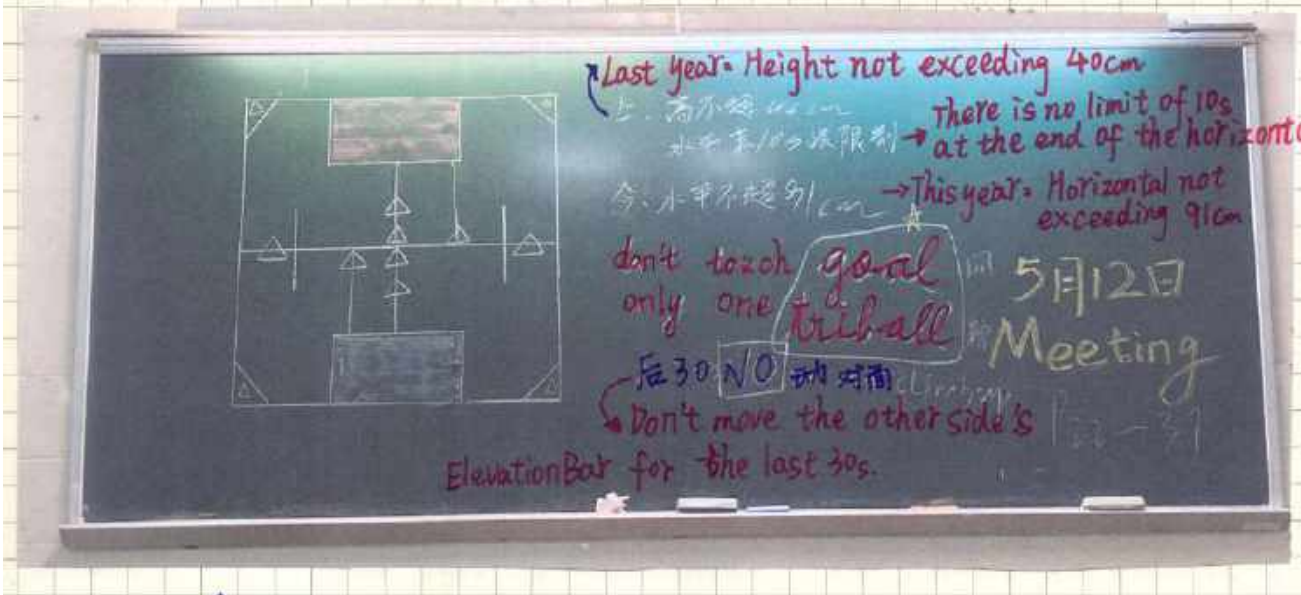
5月12日(12 May)

规则分析2(Rule Analysis2)

- 我们进行了第二次正式会议，主题是"规则分析"，主要分析「竞赛手册」23页~37页的内容(第三章前).
- We held the second official meeting, with the theme of "Rule Analysis", mainly analyzing the content of pages 23 to 37 of the "competition manual." (before Chapter 3).

会议情况 Meeting Situation





会议内容 Conten of the meeting.

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5.通用赛局规则(General Game Rules)

- 判罚受益方：当裁判不得不对防御性机器人和进攻性机器人之间的破坏性互动，或有疑问的违规做出判罚时，他会偏向于进攻性机器人。

- Offensive Robots get the "benefit of the doubt":

In a case where Head Referees are forced to make a judgment call regarding a destructive interaction between a defensive and offensive Robot, or an interaction which results in a questionable Violation, referees will err on the side of the offensive Robot.

- 牵制计数：在手动控制时段，不得牵制对方机器人超过5次计数。1次"计数"被定义为约1秒时长。由主裁判口头"倒计时"。在至少满足以下条件之一时，牵制计数结束：

1. 2台机器人分开距离约一个泡沫垫距离；
2. 任一机器人离开距离围困或锁定开始计数的位置约一个泡沫垫的距离；
3. 发起牵制的机器人被另一台机器人围困或锁定。(!在此情况下，原计数停止，并对新发起牵制的机器人开始计数)
4. 在围困的情况下，由于赛局环境变化，有了逃逸路径。

!! 牵制计时结束后，该机器人在5个计数内不得牵制对方同一台机器人。如果此情况发生，计数将从之前结束时累计。

- No holding for more than a 5-count:

A Robot may not Hold an opposing Robot for more than a 5-count during the Driver Controlled Period. For the purposes of this rule, a "count" is defined as an interval of time that is approximately one second is duration, and "counted-out" by Head Referees verbally. A Holding count is over when at least one of the following conditions is met.

1. The two Robots are separated by at least approximately one foam tile;

2. Either Robot has moved at least approximately 1 tile from the location where the Trapping or Pinning count began.
3. The Holding Robot becomes Trapped or Pinned by a different Robot. (In this case, the original count would end, and a new count would begin for the newly Held Robot.)
4. In the case of Trapping, if an avenue of escape becomes available due to changing circumstances in the Match.

After a Holding count ends, a Robot may not resume Holding the same Robot again for another 5-count. If a Team resumes Holding the same Robot within that 5-count, the original count will resume from where it ended.

6. 特定赛局规则 (Specific Game Rules).

- 赛局开始前，机器人须按如下要求放置：
  1. 接触至少1块本方联队的起始垫。见下图。
  2. 不接触与其联队伙伴相同的进攻区内的任何起始垫。一台机器人须在红方进攻区，另一台机器人须在蓝方进攻区。
  3. 不接触任何其他变色场地泡沫垫，包括赛局导入区。
  4. 除最多1个预装以外，不接触任何其他Triball。
  5. 不接触其他机器人。
  6. 不接触任何障碍杆或Elevation Bar。(可以接触围栏或赛局导入杆，但不是必须的)
  7. 完全静止(即：无电机或其他机构处于动作中)。
- 速规注释：赛局在所有场上的机器人符合本规则条件后开始。如果某台机器人不能及时满足这些条件，该机器人将被从场上移出。
- Prior to the start of each Match, the Robot must be placed such that it is:
  1. Contacting at least 1 of their Alliance's Starting Tiles. See the picture below.
  2. Not contacting any Starting Tiles in the same Offensive Zone as their

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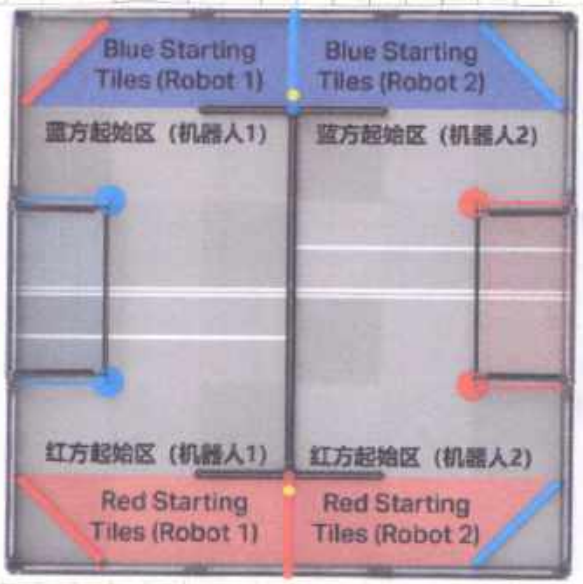
Alliance partner. One Robot must be in the red Offensive Zone, and one must be in the blue Offensive Zone.

3. Not contacting any other gray foam field tiles, including the Match Load Zones.
4. Not Contacting any Triballs other than a maximum of 1 Preload.
5. Not contacting any other Robots.
6. Not contacting any Barriers or Elevation Bars. (Contact with the field perimeter/Match Load Bars is permitted, but not required.)
7. Completely stationary. (if no motors or other mechanisms are in motion.)

● Violation Notes: The match will not begin until the conditions in this rule are met. If a Robot cannot meet these conditions in a timely manner, the Robot will be removed from the filed.



● 机器人起始的泡沫垫.

● The tiles in which Robots can start a Match.

● 水平展开限制：赛局开始，机器人可展开，但赛局任意时刻水平尺寸都不得超过36"(914.4mm).

1. 该限制是指以竞赛场地为参照的"水平"展开(即，该限制不"与机器人一起旋转"。例如，在赛局中翻倒或在提升时改变方向的机器人仍受36"的水平限制。
2. 机器人垂直展开没有限制。

! 主裁判在赛局中做出判罚时，可用场地上的一块泡沫垫的对角线(约34")、从障碍杆到中立区的单条白色胶带线的距离(约34.5")和Goal底部的宽度(约39.4")三要素作为视觉参考。

违规注释：

- 此规则的主要目的是限制防御性水平展开。因此，在对方的Goal或赛局导入杆的附近水平展开的机器人，可能会受到规则的约束，且在任何主裁判的判罚中都不会成为"判罚受益方"
- 由于提升本质上是一种进攻性行为，因此在提升过程中，瞬时/意外的轻微违规，此规则的多数以"判罚受益方"处理。

!!! 国内关于"双翼"争议，我们决定先装好，如果国内比赛不允许用，我们就不给气。

- Horizontal expansion is limited:

Once the Match begins, Robots may expand, but no horizontal dimesion may exceed 36" (914.4mm) at any point during the Match.

1. This limit refers to "horizontal" expansion relative to the playing field. For example, Robots which tip over during a Match or change orientation while Elevating are still subject to a 36" horizontal limit.
2. There is no height limit on Robot expansion.

! There following visual references on the field may be used by Head Referees when making in-Match judgment calls: Diagonal of a single field tile (~34"), Distance from the Barrier to the Neutral Zone's single white tape line (~34.5") and Width between Goal bases (~394").

! Violation Notes:

1. The primary intent of this rule is to limit defensive horizontal expansion. As such, Robots who choose to expand horizontally in the vicinty of opponent Goals or Match Load Bars may be subject to rule and will not receive the "benefit of the doubt" in the case of any Head Referee judgment calls.
2. Because Elevation is an inherently offensive action, a greater "benefit of the doubt" will be applied to momentary/accidental Minor Violations of this rule during Elevation.

!!! For the domestic controversy about "double wings", we decided to install it first. If it is not allowed to be used in domestic competitions, we will stop using it.

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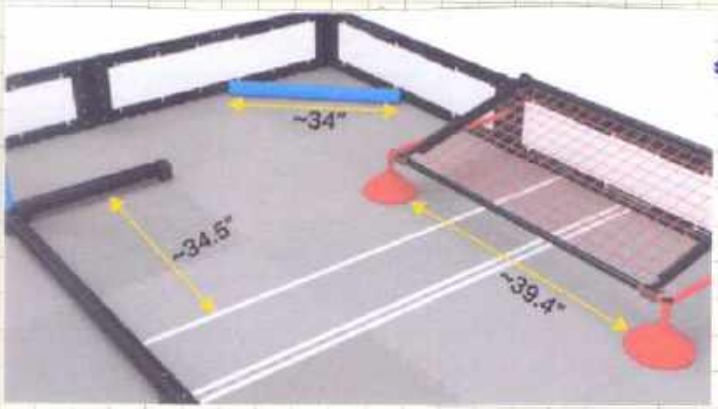

- 主裁判的视觉参考，用于判断机器人是否超出最大展开限制。
- Visual references for a Head Referee to determine if a Robot has exceeded the maximum expansion limit.

- 保持Triball在场地内：赛队不得蓄意将Triball移出场地。尽管Triball可能偶然离开场地，但蓄意或反复地这样做会视为违反此规则。裁判会在其空闲并且认为安全的时候，将Triball放回场地。
- 注1：停在Goal顶部的Triball可以由上场队员从该Goal附近的联队站位区取回。该Triball则被视为取回它的联队的赛局导入物。
- Keep the Triballs in the field:

Teams may not intentionally remove Triballs from the field. Although Triballs may accidentally leave the field, doing so intentionally or repeatedly would be a Violation of this rule. Referees will return the Triball to the field when it is deemed safe to do so, at the leisure of the referee.

- Note 1: Triballs which come to rest on top of a Goal may be retrieved by a Drive Team Member from the Alliance Station adjacent to the Goal in question. The Triball is then considered a Match Load for the Alliance who retrieved the Triball.

- 远离Goal上的网：与任何Goal上的网发生纠缠，将被罚停。导致对方联队与网纠缠的行为，至少罚停双方相关的两支赛队。
- 被迫违规(例如被推入网中)的机器人不会受到惩罚。然而，可预见Goal的周围会有大量的机器人之间的互动，并且纠缠极有可能造成场地损坏，因此无论是哪方的过错，任何发生纠缠的机器人都必须被罚停。赛队应对其机器人的行为和结构设计负责。

- 注1：直接操纵网，如将其从场地上抬起，以试图添加或移除Triball，可由主裁判判定为违反。
- 违规注释：可预见的瞬间或偶然的接触，不会被判定为违规或罚停。只有当机器人与网纠缠并且主裁判希望避免潜在的场地损坏时，才会调用该规则。

- Stay away from nets on the Goals:

  Becoming Entangled with the net on either Goal will result in a Disablement. Causing an opponent to become Entangled with the net is considered a Violation at a minimum, will result in a Disablement for both Teams.

- A Robot which is forced into breaking a rule (such as being pushed into the net) is not penalized. However, because heavy Robot-to-Robot interaction is expected around the Goals, and Entanglement carries a high risk of playing field damage, any Robot that becomes Entangled must be Disabled regardless of fault. Robots are responsible for their own actions and mechanism designs.
- Note 1: Directly manipulating the net structure, such as lifting it from the field in an attempt to add or remove Triballs. It can be judged as a violation by the presiding judge.
- Violation Notes:

  Momentary or incidental contact is expected and is not considered a Violation or Disablement. The rule only becomes invoked once a Robot has become Entangled with a net and the Head Referee wishes to avoid potential field damage.

- 最多持有1个Triball：机器人一次持有的Triball不得超过1个。违反此规则的机器人须立即停止所有动作，除了试图移除多余的Triball。适用于故意和意外的持有。
- 此规则目的不是为了惩罚机器人推动阻拦其行进路线的Triball，也就是说，机器人可以在持有一个Triball的情况下，自由穿越场地上Triball。

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记录： witnessed by: G

- Possession is limited to 1 Triball.

  Robot may not have greater-than-momentary Possession of more than one Triball at once. Robots in Violation of this rule must immediately stop all Robot actions except for attempting to remove the excess Triball(s). This rule applies to both intentional and accidental Possession.

- The intent of this rules is not to punish Robots for pushing Triballs that are in their way; that is, Robots are free to incidentally drive through Triballs on the field while Possessing an Triball.

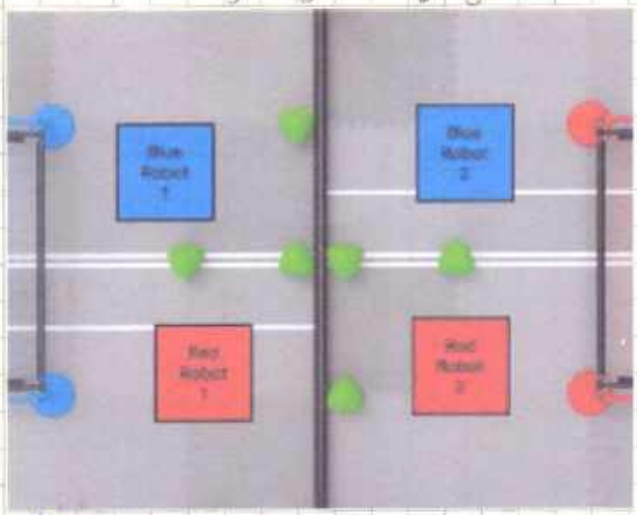
- 翻倍之前，远离对方的Goal：当某方联队符合翻倍定义的期间，对方机器人可以穿过翻倍。联队Goal的边界面，如移除Triball。
  1. 一旦该联队不再翻倍(即当一台或两台该联队的机器人回到场地另一侧或接触长障碍杆)，此规限结束。
  2. 禁止在其他任何时间进入对方的Goal，这包括在对方结束翻倍状态后继续留在其Goal内。
- 违规注释：试图从对方的Goal中移除Triball是一种有意的和防御性的动作。在对双方机器人之间互动的临界情况进行判罚时，进攻方联队始终是"判罚受益方"。
- Stay out of your opponent's Goal unless they are Double-Zoned.

  During the time when an Alliance meets the definition of Double-Zoning, opposing Robots are permitted to "break the plane" of the Double-Zoning Alliance's Goal, such as to remove Triballs.

  1. This allowance ends once the Alliance is no longer Double-Zoning (i.e., when one or both of the Robots has returned to the other side of the field or contacted the Long Barrier).
  2. Entering an opponent's Goal at any other time is prohibited. This includes staying inside of an opponent's Goal after they end their Double-Zone status.

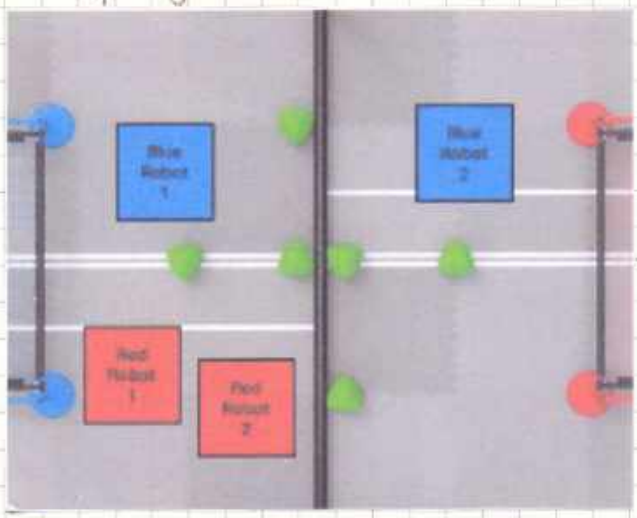
● Violation Notes:

Attempting to remove Triballs from an opponent's Goal is an intentional and inherently defensive action. The offensive Alliance will always receive the "benefit of the doubt" in the case of any close judgement calls between opposing Robots.



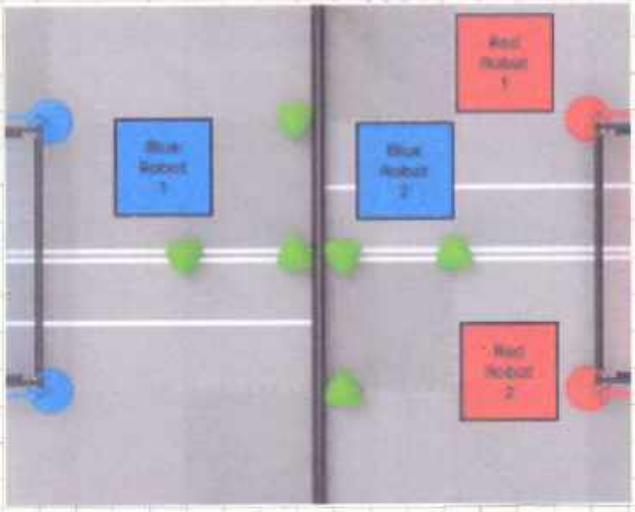
● 图中双方联队各有1台机器人在己方进攻区内，双方Goal内的Triball都是安全的。

● One Robot from each Alliance in their respective Offensive Zones; Triballs in Goal are safe.



● 图中2台红方机器人在蓝方进攻区内，红方的Goal可被蓝方机器人消分。

● Both Red Robots are in the Blue Offensive Zone; Red Goal is open for descoring by a Blue Robot.

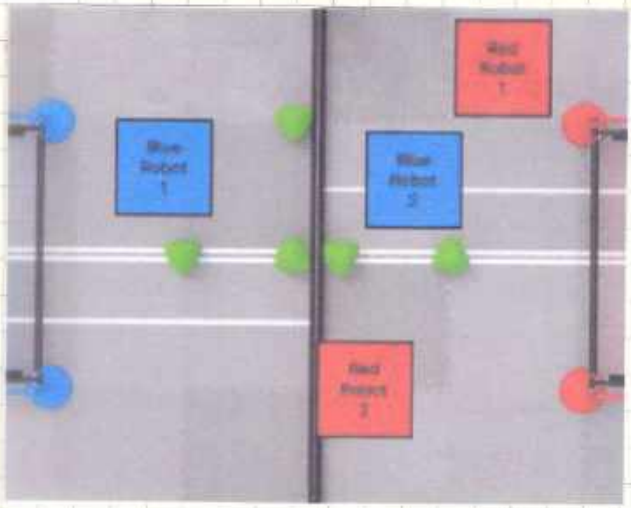


● 图中2台红方机器人在红方进攻区内，红方的Goal可被蓝方机器人消分。

● Both Red Robots are in the Red Offensive Zone; Red Goal is open for descoring by a Blue Robot.

日期: Date: 2023.5.12.

记录员: Witnessed by:



● 图中1台红方机器人接触长障碍杆，红方联队不是翻倍状态，因此Goal内的Triball是安全的。

● A Red Robot is contacting the Long Barrier; the Red Alliance is NOT Double-Zoning, therefore Triballs in Goals are safe.

● 自动赛：自动赛时段，机器人不得接触中立区对方联队侧的泡沫垫、Triball或场地要素，也不能接触自己开始比赛时场地另一侧的进攻区。

● Autonomous: During the Autonomous Period, Robots may not contact foam tiles, Triballs, or Field Elements on the opposing Alliance's side of the Neutral Zone, or in the opposite Offensive Zone from which they began the Match.

!(上一年没有的规则)。● 自动赛期间进入中立区：风险自负。任何在自动赛时段争夺中立区的机器人都应该意识到，对方机器人也可以这样做。赛队在任何时候都要对其机器人的行为负责。

!(Rule not available in the previous year). ● Enter the Neutral Zone during Autonomous at your own risk: Any Robot who engages with the Neutral Zone during the Autonomous Period should be aware that opponent Robots may also choose to do the same. Teams are responsible for the actions of their Robots at all times.

● 提升的机器人受到保护：在赛局最后30秒内，机器人不得接触：

1. 对方联队的Elevation Bar；
2. 接触己方Elevation Bar的对方机器人；
3. 满足提升定义的对方机器人。

1. The opposing Alliance's Elevation Bars.
2. Opponent Robots who are contacting their Elevation Bar;
3. Opponent Robots who meet the definition of Elevated.

● Elevated Robots are protected:

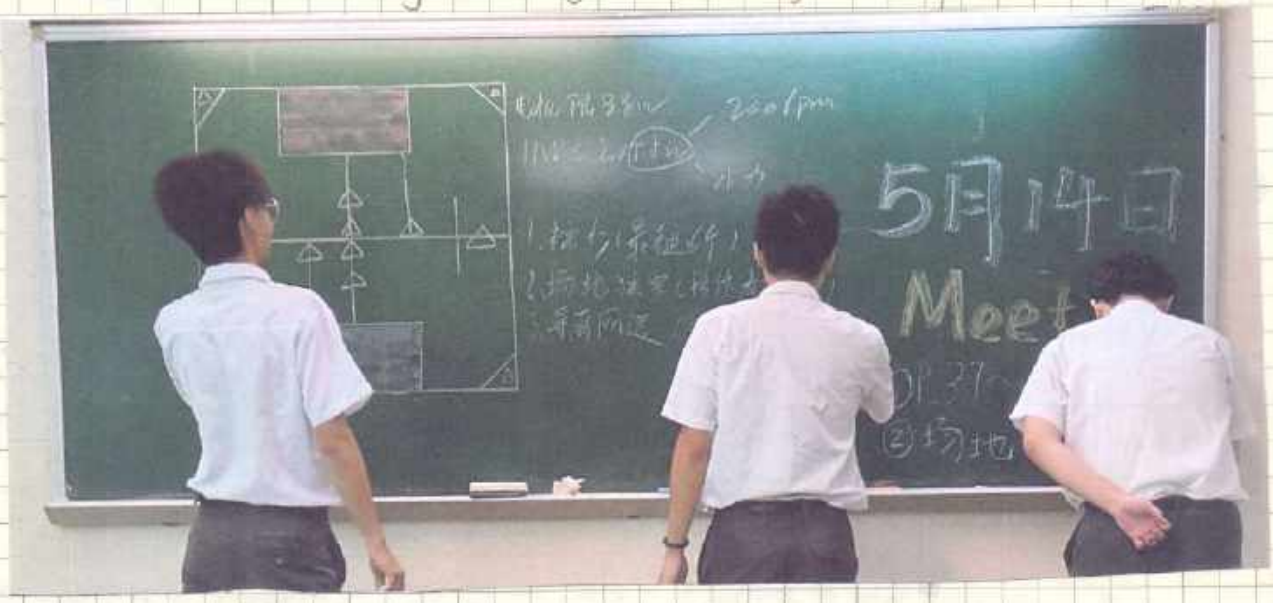
During the last 30s of the Match, Robot may not contact the following:

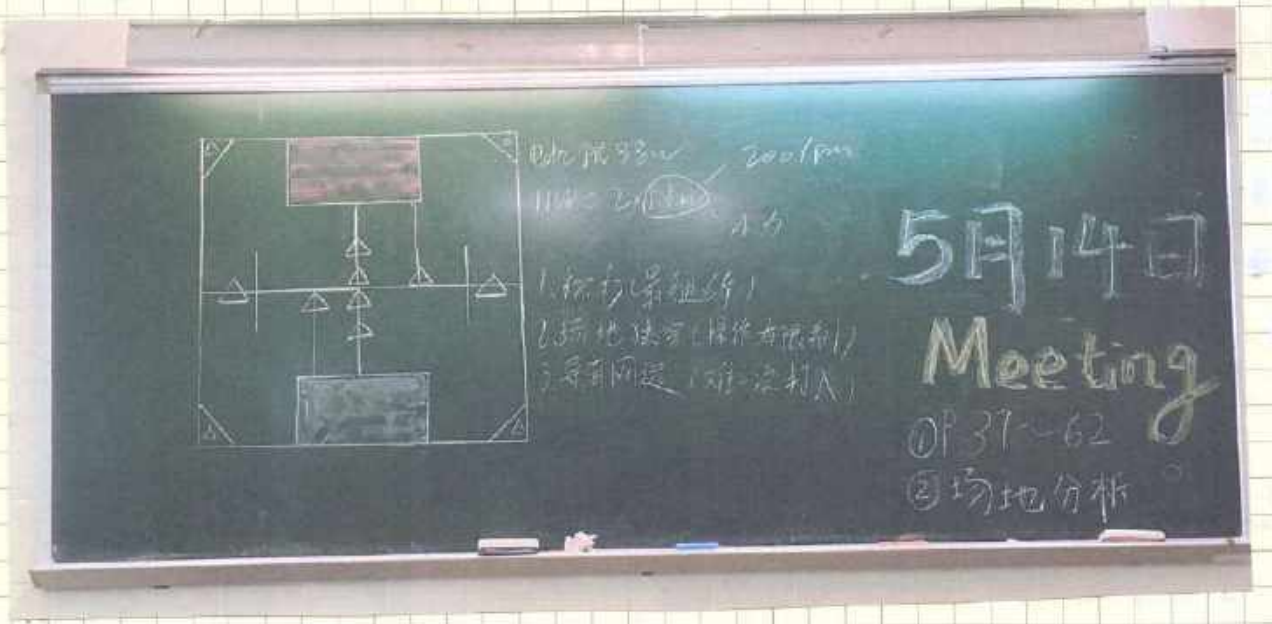
5月14日(14 May)

规则分析3(Rule Analysis 3)

- 我们进行了第三次正式会议，主题是"规则分析"，主要分析「竞赛手册」38~63页的内容(结束)及场地。
- We held the third formal meeting with the theme of "rule analysis", mainly analyzing the content (end) and venue analysis on pages 38 to 63 of the "competition manual."

- 会议情况
- Meeting Situation





- 会议内容
- Conference content.

日期: 2023.5.14
Date:

记录员:
Witnessed by:

- 电机和气动装置总的功率限制：
  1. 官方给的是200rpm为初始转速；
  2. 换不了变速箱；
  3. 力气小（我们自己测试后得出）。

- Motors are limited.
  1. The official is 200 rpm as the initial speed.
  2. Can't change the gearbox.
  3. Little strength (we got it after our own set).

- 气动限制：机器人的气动系统应满足如下要求：
  1. 赛队在一台机器人上可使用最多2个V5合规的VEX储气罐；
  2. 气动装置的充气压力最高可达100psi.
  3. 气动子系统中的压缩空气仅可用于驱动合规的气动装置（如气缸）。

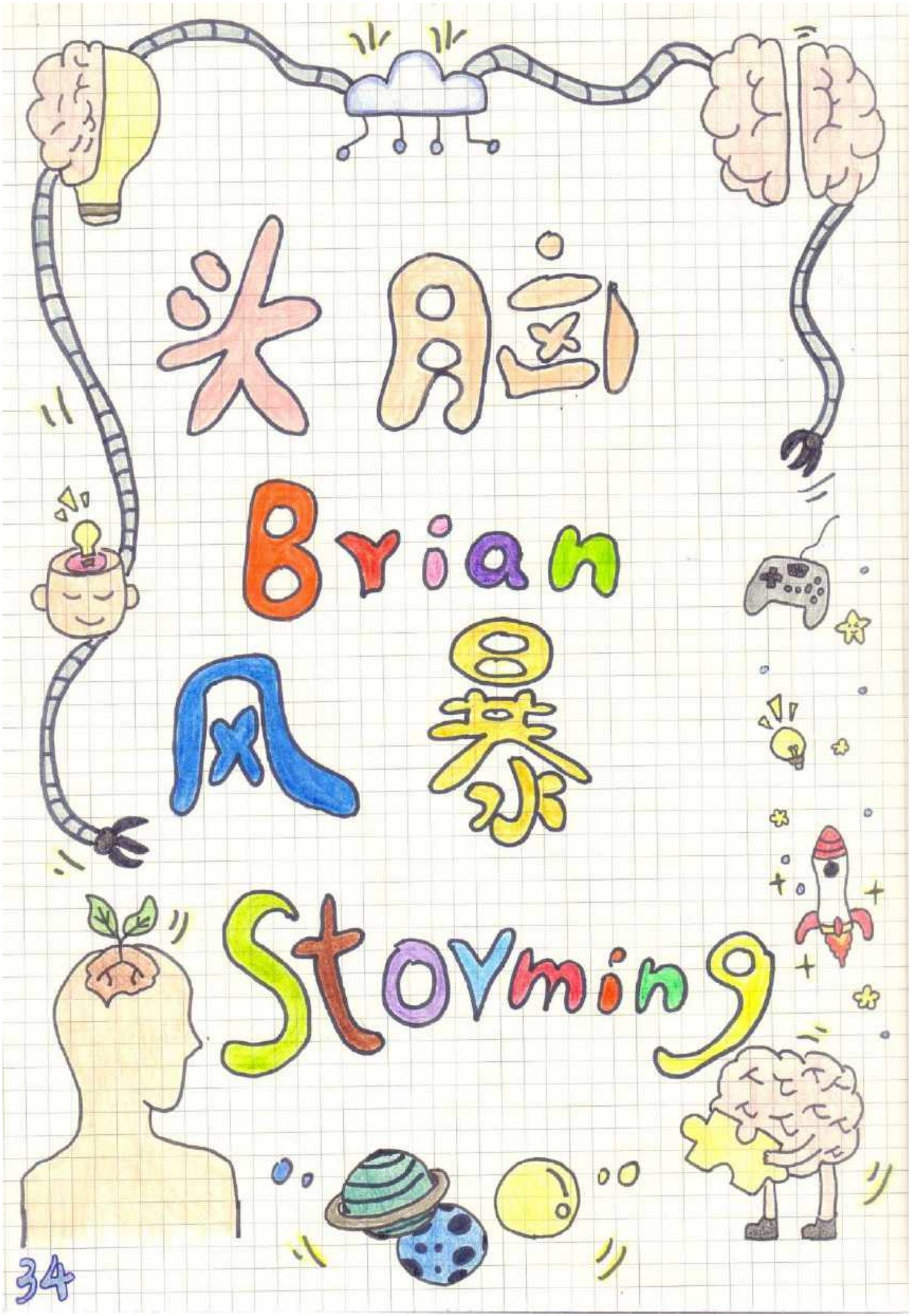
- Pneumatics are limited: A Robot's pneumatic subsystem must satisfy the following criteria:
  1. Teams may use a maximum of 2 legal VEX pneumatic air reservoirs on a Robot.
  2. Pneumatic devices may be charged to a maximum of 100psi.
  3. The compressed air contained inside a pneumatic subsystem can only be used to actuate legal pneumatic devices (eg. cylinders).

会议讨论—场地分析

1. Triball很难进，最多进6个；
2. 场地比较狭窄，不可以过进攻区，所以会导致操作有限制；
3. 导入区离Goal比较远，很难一次打进。

Conference Discussion—Venue Analysis

1. Triball is difficult to enter, up to 6;
2. The field is relatively narrow and you can't cross the offensive zone, so it will lead to restrictions on operation;
3. The introduction area is relatively far away from the goal, and it is difficult to enter at one time.

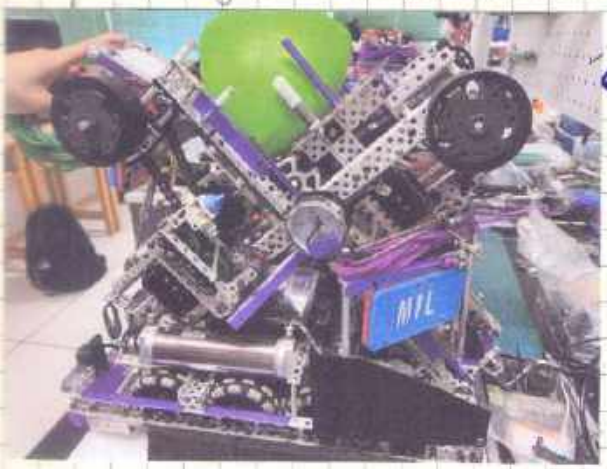

头脑
Brian
风暴
Storming

5月17日(17 May)

会议4(机器类型)Meeting4 (machine type)

我们进行了第四次正式会议，主题是"机器的大概类型"。甘在世锦赛的时候已经想好了用"撞针"，因为在18年的比赛中(ring)，有些得分数的队伍不会选择爬上去，而是选择"跨步"上去。

We held the fourth formal meeting on the theme of "Aweal Types of Machines". Kam had already thought about using a "trash needle" when he was in the World Championships, because in the 18th Competition (ring), some teams with scores did not choose to climb up, but chose to "step up".



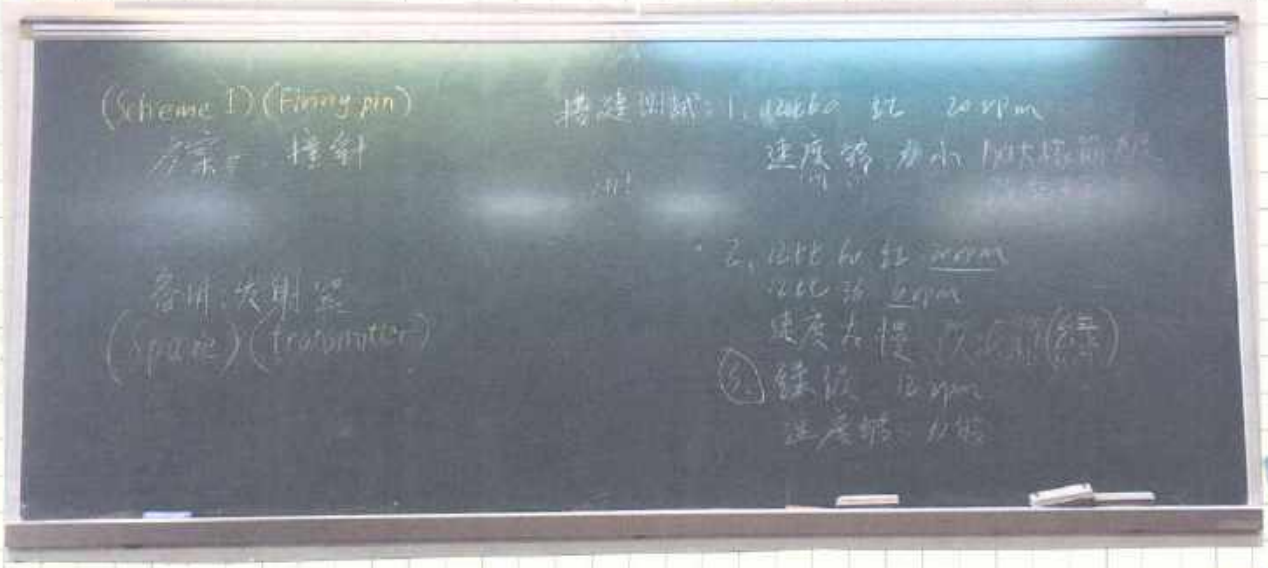
图中机器来自U组MIL 2022~2023赛季。

The machine in picture is from Group U MIL 2022~2023 Season.

会议情况

Meeting Situation

会议内容 Conference content



● 方案一：撞针搭建测试：

1. 齿轮比是12:60，用的是红色波箱，计算出来是20rpm的转速，它的速度是足够的，可是依旧是力气小（担心无法投出Triball）。❗我们打算加大橡皮筋力度以及再尝试更改一下齿轮比）

2. 将原来的12:60的齿轮比改成了12:60+12:36的齿轮比，用的依旧是红色波箱，计算出来是6rpm的转速，它的速度太慢了，可是力度是足够的。❗经过两次测试后，我们更改过齿轮比不能解决问题，所以我们打算试一下更换波箱，将红色波箱更换成绿色波箱。

3. 依旧是12:60+12:36的齿轮比，但是更换成了绿色波箱，计算出来是12rpm的转速，这一次速度够，力度也足够。

● Scheme 1: Hit the needle Constuction test:

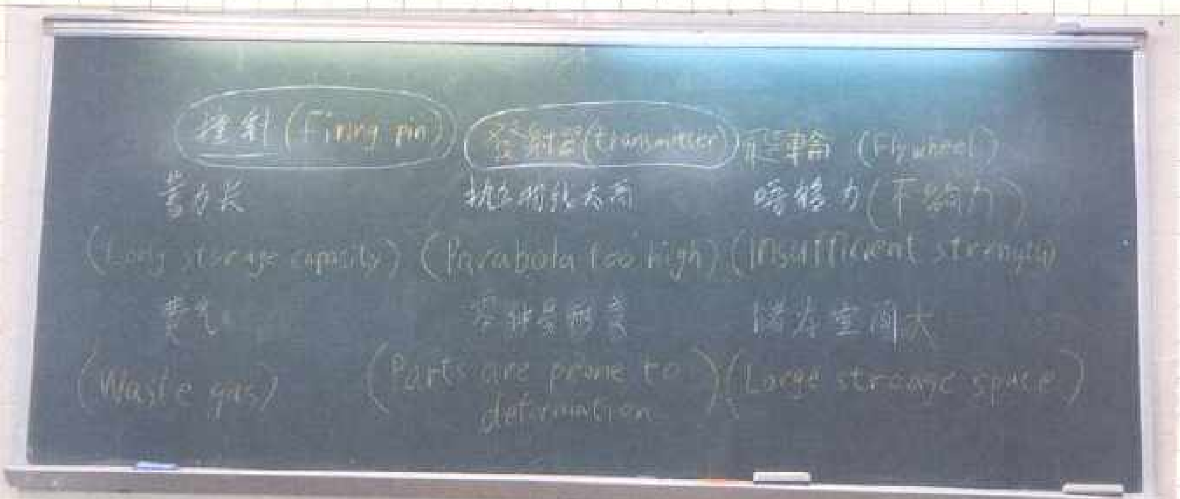
1. The gear ratio is 12:60. With a red gearbox, it is calculated to be a speed of 20rpm. Its speed is enough, but it is still weak (We were worried about not being able to throw Triball). ❗we plan to increase the strength of the rubber band and try to change the gear ratio again.

日期：2023.5.18
Date:

记录员：
Witnessed by:

2. Change the original 12:60 gear ratio to 12:60 + 12:36 gear ratio. The red gearbox is still used, and it is calculated to be a speed of 6rpm. Its speed is too slow, but the strength is enough. ! After two tests, we have changed the gear ratio and still can't solve the problem. So we plan to try to replace the gearbox and replace the red gearbox with a green gearbox.

3. It is still a gear ratio of 12:60 + 12:36, but it has been replaced with a green gearbox, and it is calculated to be a rotation speed of 12rpm. This time, the speed is enough and the force is enough.



● 我们讨论了3种类型的机器，分别是，撞针、发射器、飞轮，分别列出了它们的优缺点。(我们暂时能想到的).

1. 撞针：蓄力比较长，可是气的容量不足，很费气；
2. 发射器：抛物线太高，不容易进Triball 而且零件很容易形变；
3. 飞轮：不够力拐出Triball (因为我们上一赛季是飞轮机器，所以比较了解)，可是它储存空间大，占用的位置也多。

! 我们选择了"撞针"而备用方法选择了"发射器"。

● We discussed three types of machines: Firing pins, Transmitters and Flywheels, and listed their advantages and disadvantages respectively (We can think of it for the time being).

1. Firing Pins: The storage force is relatively long, but the capacity of gas is insufficient, which is very exhausting.

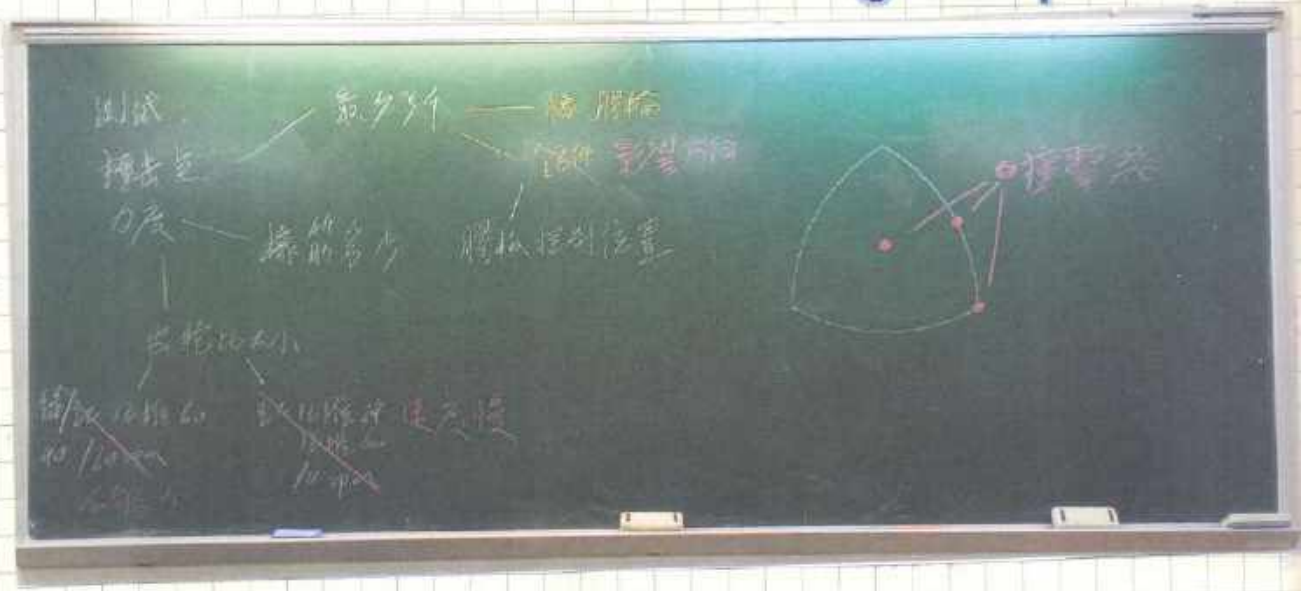
2. Transmitter: The parabola is too high, it is not easy to enter Triball, and the parts are easy to deform.

3. Flywheel: Not enough to throw the Triball (because we were a flywheel machine last season, so we know it better), but it has a lot of storage space and takes up a lot of space.

! We chose "Firing pins" and chose "Transmitter" for the backup plan.

5月19日(19 May) 会议5(撞击测试) Meeting 5(Impact test)

● 会议内容
● Conference content.



● 撞击测试：撞击点有三个，我们有两个选择方案：

1. 用铝件撞击需要用塑料板来保持同一个撞击点，但是塑料板会影响Triball的运动轨迹。
2. 用橡胶轮，而不用塑料板，可以减少运动轨迹的偏移。

! 因为撞针所需要的力度可以通过橡皮筋调节，所以我们用了两种齿轮比，经过反复实验发现，撞针需要的力很大，12:60的齿轮比通过切换红绿波箱，发现还是拉不动橡皮筋，但是在12:60的基础上加上一个12:24，力度足矣拉动，但是在速度上却很慢。

日期: Date: 2023.5.19.

记录: Witnessed by: B

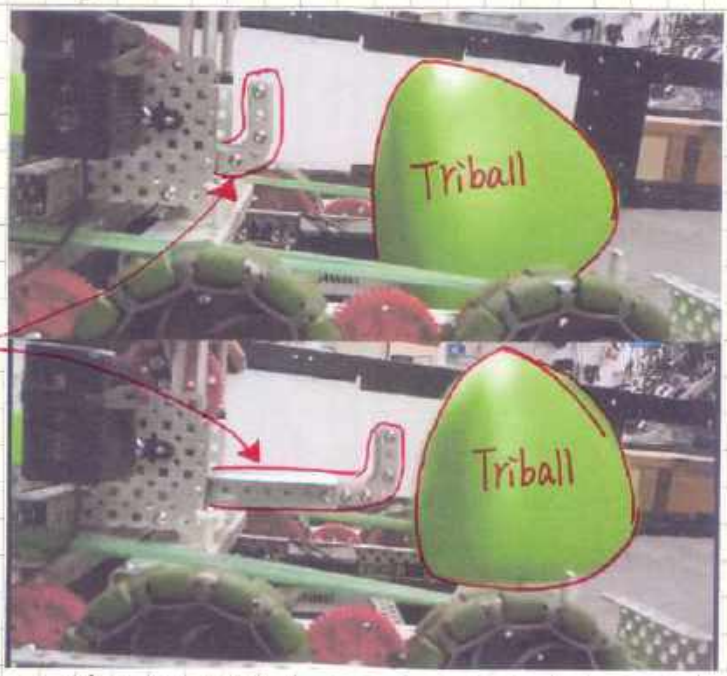
Impact test: There are three impact points, and we have two options:

1. When impacting with aluminum parts, a plastic plate is required to maintain the same impact point, but the plastic plate will affect the movement trajectory of the rice dumpling.
2. Using rubber wheels instead of plastic plates can reduce the offset of the motion trajectory.

! Because the force required by the striker can be adjusted by the rubber band, we used two gear ratios. After repeated experiments, we found that the force required by the striker is very large. The gear ratio of 12:60 is achieved by switching the red and green gear boxes. I found that I still couldn't pull the rubber band, but I added 12:24 to 12:60. The strength was enough, but the speed was very slow.

撞针的"针"

The "needle" of the Firing Pin.

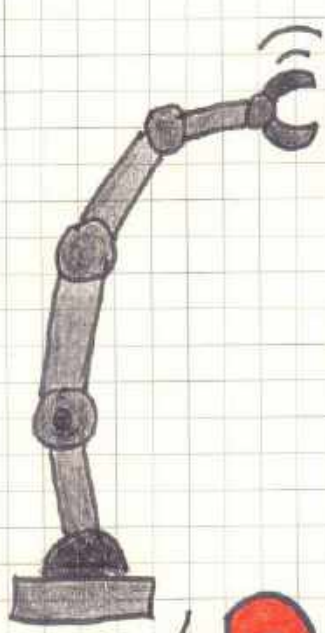


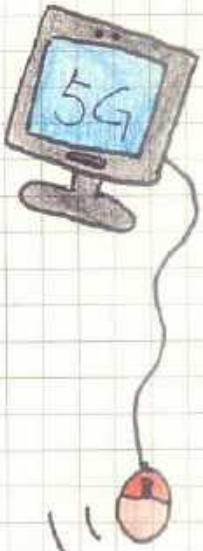
撞针测试 Impact Test

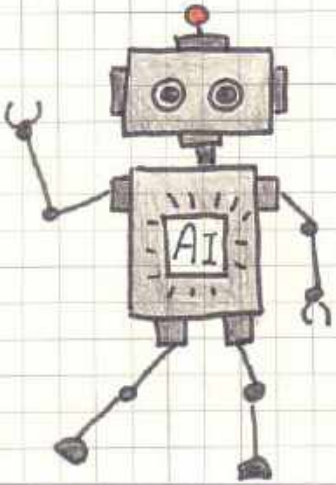
日期: 2023.5.19.
Date:

记录员:
witnessed by:

搭建 Build 編程 Programming

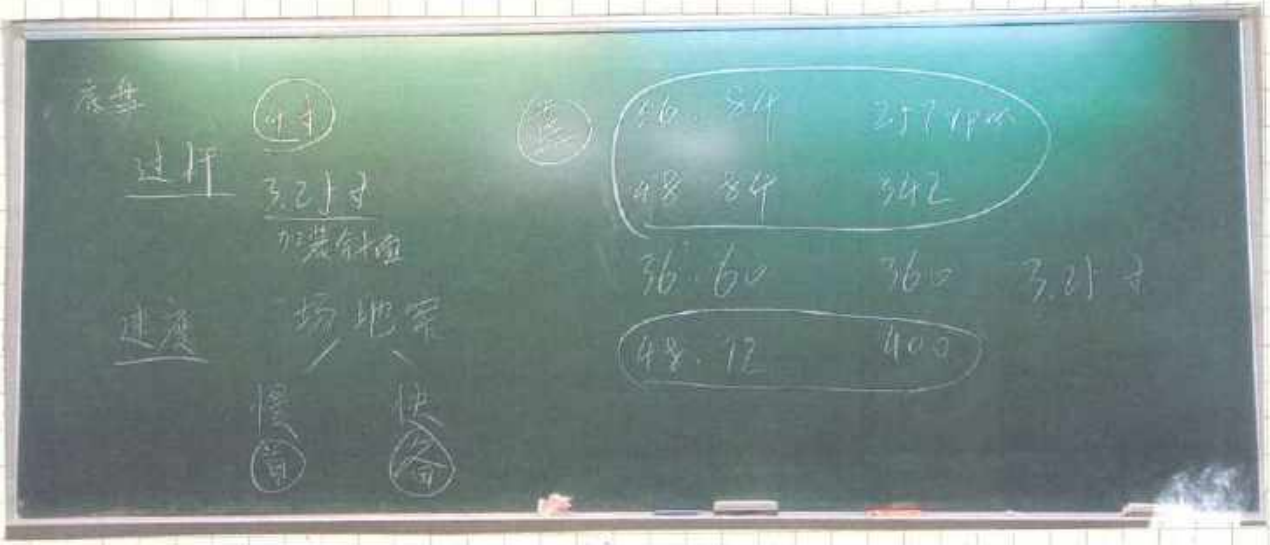






8月1日(1st Aug) 会议6(底盘会议) Meeting 6 (Chassis Meeting)

会议内容
Conference content



底盘会议：

1. 经过我们组内对场地的分析，今年想要在两个进攻区内来回移动，有两个选择：(1)跨过栏杆；(2)搭建较低的机器从两边穿过。由于我们还不清楚机器能否搭建的比较低，同时我们猜测3.25寸万向轮需要加装一个倾斜的平面才能跨过栏杆，所以我们选择在第一代机器上尝试使用4寸万向轮；
2. 今年的场地相对于以往的赛季狭窄了许多，所以我们一致认为今年的速度可以慢一些，将慢速为首选，快速为备选。并列举了251rpm，342rpm，360rpm(只能用3.25寸万向轮)和400rpm，我们决定先尝试251rpm和342rpm，再考虑400rpm.
3. 今年比赛所用的Triball的尺寸与上一年的"飞盘"大小相同，在底盘尺寸上还是采用上一年的宽29格.

! 今年机器讨论中心是抛射部分，其余部分比较简易.

Chassis Session:

1. After analyzing the field within our team, if we want to move back and forth between the two offensive zones this year, we have two options: (1) Cross the railing; (2) Build lower machines to pass through both sides. Since we still don't know whether the machine can be built relatively low, and we guess that the 3.25-inch universal wheels need to be equipped with an inclined plane to cross the railing, we chose to try to use the 4-inch universal wheels

on the first-generation machine. Towards the wheel.

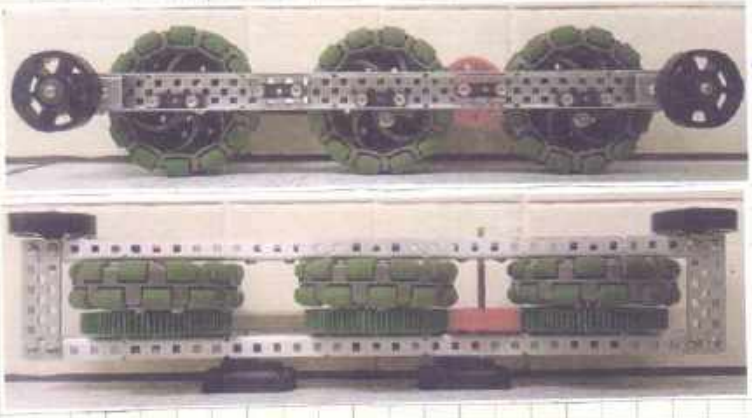
2. The venue this year is much narrower than in previous seasons, so we all agree that the speed this year can be slower, with slow speed as the first choice and fast speed as the alternative. And listed 257rpm, 342rpm, 360rpm (only 3.25-inch universal wheels can be used) and 400rpm. We decided to try 257rpm and 342rpm first, and then consider 400rpm.

3. The size of the Triball used in this year's competition is the same as the "Frisbee" of the previous year, and the chassis size is still 29 squares wide from the previous year.

! The center of this year's machine discussion is the projectile part, and the rest is relatively simple.

8月2日 ~ 8月4日 (2nd Aug. ~ 4th Aug.)

底盘搭建 + 修改 (Chassis construction + Modification)



● 底盘的第一种方案.

● The first scheme of the chassis

● 上图是刚开始尝试 36:84 和 48:84 的齿轮比，但是我们在尝试后发现 84 齿轮有问题，所以我们改成了下图 48:72 的齿轮比，转速为 400rpm.

● 下图中的齿轮没有加黑橡胶轮（后来加回来了）！只改了齿轮比。

● 黑橡胶轮的作用是为了辅助机器很好地过栏杆.

● 现在底盘的缺点：

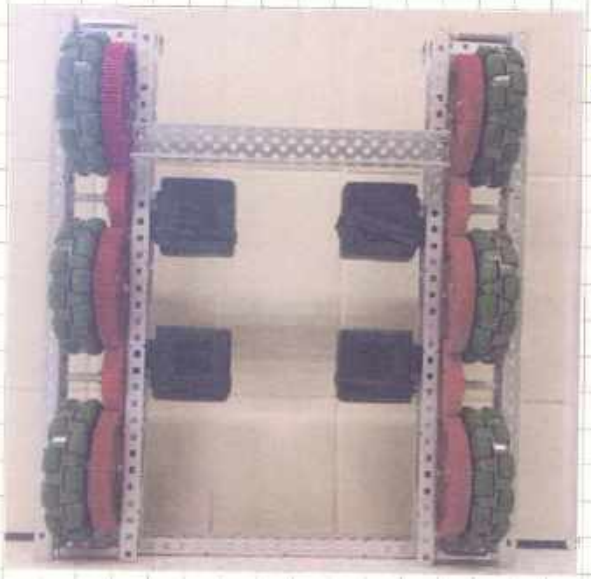
1. 底盘太长；
2. 48齿的齿轮大小稍微偏大，在机器跨过栏杆时会不断被磨损，而且很容易掉.
3. 因为上一年的底盘齿轮用了左右两边各用了3个电机（共6个），而今年只有四个。加了配重之后不够力气冲上栏杆并且跨过去。！（二代机可改进的地方）.

日期: 2023.8.2
Date:

记录员:
witnessed by:

- The picture above shows the gear ratio of 36:84 and 48:84 at the beginning, but we found that there was a problem with the 84 gear after trying, so we changed it to 48:72 in the picture below, with a speed of 400rpm.
- The gears in the picture below are not added with black rubber wheels (later added back). ! Only the gear ratio has been changed.
- The fuction of the black rubber wheel is to assist the machine to cross the railing well.
- Disadvantages of the current chassis.

1. The chassis is too long;
2. The gear size of 248 teeth is slightly larger, which will be constantly worn when the machine crosses the railing, and it is easy to fall off.
3. Because the chassis gear used three motors (a total of six) on each side of the chassis gear last year, compared with only four this year. After adding the weight. I didn't have enough strength to rush to the railing and cross over. ! (Where the 2nd machine can be improved)



- 改进后的底盘.
- The improved chassis.

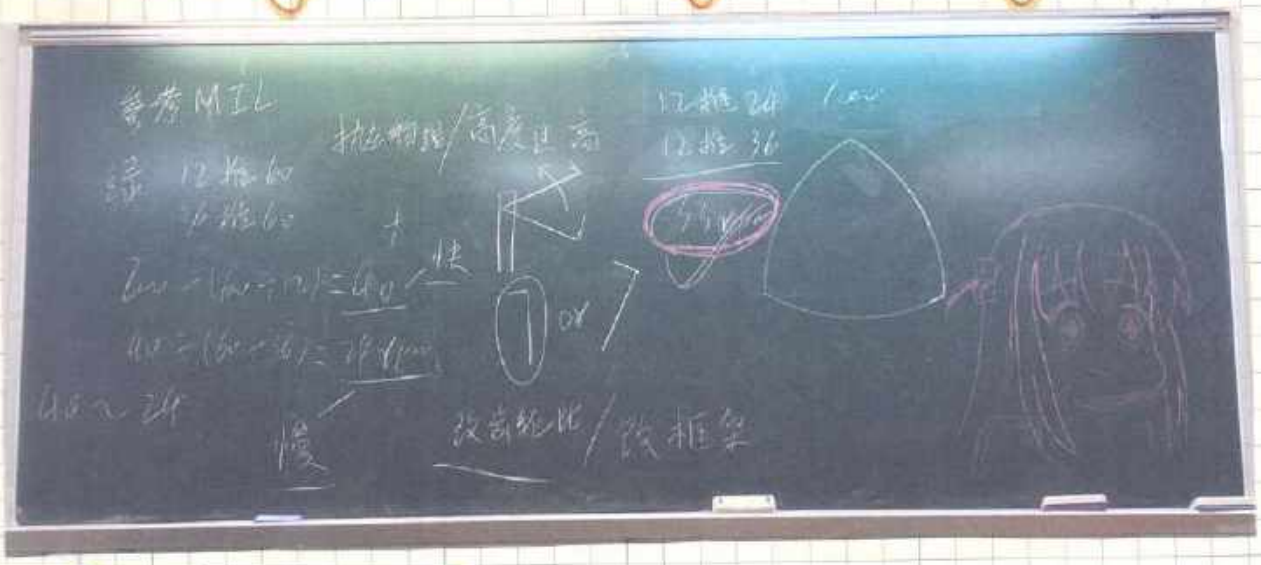
日期: Date: 8 2023.8.3~4.

记录: Witnessed by: G

8月5日(5 Aug)

会议7(抛射会议)

Meeting 7 (Throwing Meeting).



●会议内容 ●Conference content

●抛射会议。

1. 我们的抛台参考VEX U MIL 2022~2023赛季的，但是2022~2023赛季的设计的抛物线会很高，所以我们在想如果抛台竖直之后的抛物线会不会有可能向下，所以决定尝试一下。
2. 2022~2023赛季MIL的齿轮比是12:60+36:60，速度是24rpm，速度有些慢，只用12:60的话又不够力，那么速度只能在24~40rpm之间，加上齿轮比导致抛台高度较高，我们想了一个12:24+12:36的齿轮比，速度在33rpm，高度也降低了许多。

●Throwing meeting.

1. Our throw platform refers to the VEX U MIL 2022~2023 season, but the parabola designed in the 2022~2023 season will be very high. So we were thinking about whether it would be possible for the parabola to go down if the stage was erected, so we decided to try it.

日期: 2023.8.5
Date:

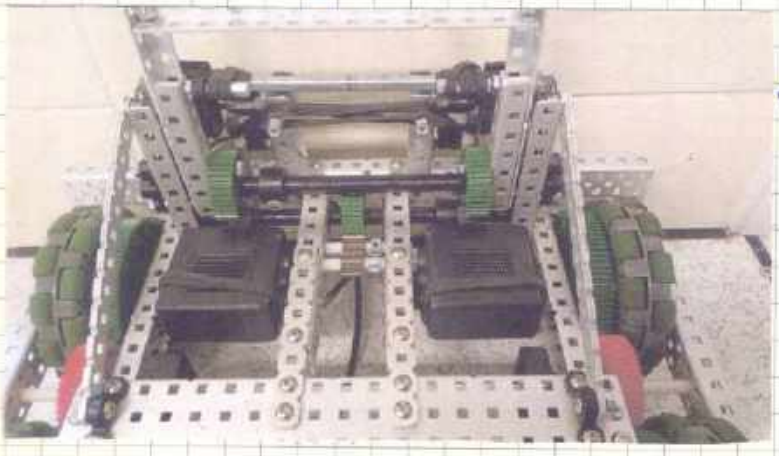
记录:
Witnessed by:

2. The gear ratio of MIL in the 2022~2023 season is 12:60 + 36:60, and the speed is 24 rpm. The speed is a little slow. If you only use 12:60, it is not strong enough, so the speed can only be between 24~40rpm. In addition, the gear ratio leads to a higher throwing table height. We thought about one. The gear ratio of 12:24 + 12:36, the speed is 33rpm, and the height is also greatly reduced.

8月6日~8月26日(6Aug~26Aug)

抛射搭建+修改2次

Throwing construction + Modified 3 times.



● (第一版) 初搭建

● (First Edition) Initial construction.

● 搭建出现的问题:

1. 会议讨论的抛台是竖直的,但是担心铝件会因为太长导致弯曲,将抛台的结构改为L字型。
2. 一个12齿齿与36齿齿轮相连接,会导致抛台上面的36齿与电机摩擦,所以电机需要通过两个12齿齿轮传递力。

! 12齿齿轮与36齿齿轮之间的12齿齿轮出现位移,在旋转的时候向下磨铝件。

● Problems arising from construction:

1. The throwing platform discussed at the meeting was vertical, but I was worried that the aluminum parts would bend because it was too long, so I changed the structure of the throwing platform to an L-shaped shape.

2. A 12-tooth gear is connected to a 36-tooth gear, which will cause the 36 teeth on the throwing table to rub against the motor, so the motor needs to transmit force through two 12-tooth gears.

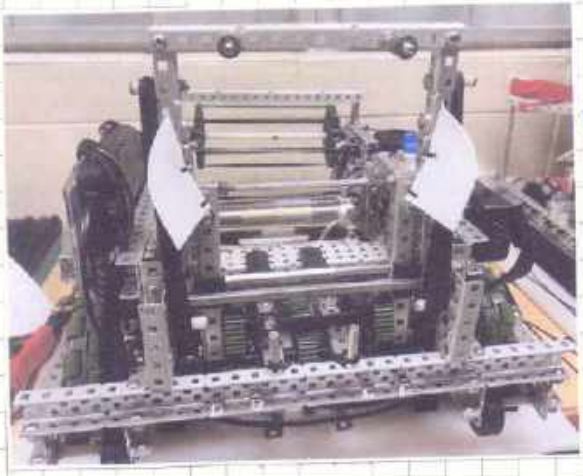
! The 12-tooth gear between the 12-tooth and the 36-tooth is disaplaced, and the aluminum parts are ground down when rotating.

(第二版) 第一次修改

(Second Edition) First revision:

第一版(初搭建)的抛射部分的齿轮比是 12:36 + 24:36; 第二版(第一次修改)的齿轮比则是 12:24 + 12:36。12:24 +12:36 的齿轮比没有出现 12齿的齿轮移位的现象。但是出现了一个新的问题:12齿与24齿不能完全咬合。

The gear ratio of the first version (initial construction) is 12:36 +24:36; the gear ratio of the second edition (first modification) is 12:24 +12:36. 12:24 +12:36 gear ratio has no 12-tooth gear shift. But there is a new problem: 12 teeth and 24 teeth cannot be completely bitten.

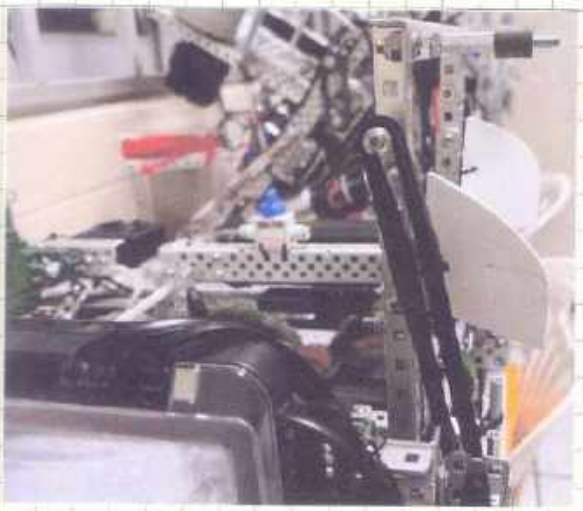


(第三版) 第二次修改

(Third Edition) Second Amendment:

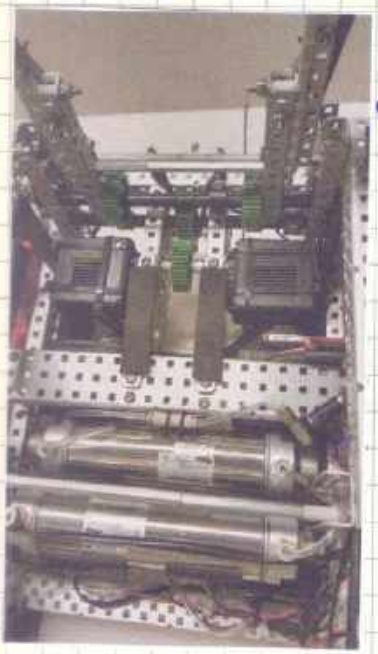
日期: 2023.8.19
Date:

记录员:
witnessed by:



● (第三版) 第二次修改 ● (Third Edition) Second Amendment

● 原先12:24+12:36的齿轮比是先将200rpm转速减到100rpm转速。因为红色的变速箱是100rpm转速，所以我们直接换成红色变速箱，再把12:24+12:36的齿轮比换成36:36+12:36，抛台下降速度还是33rpm保持不变。



● (第三版) 第二次修改

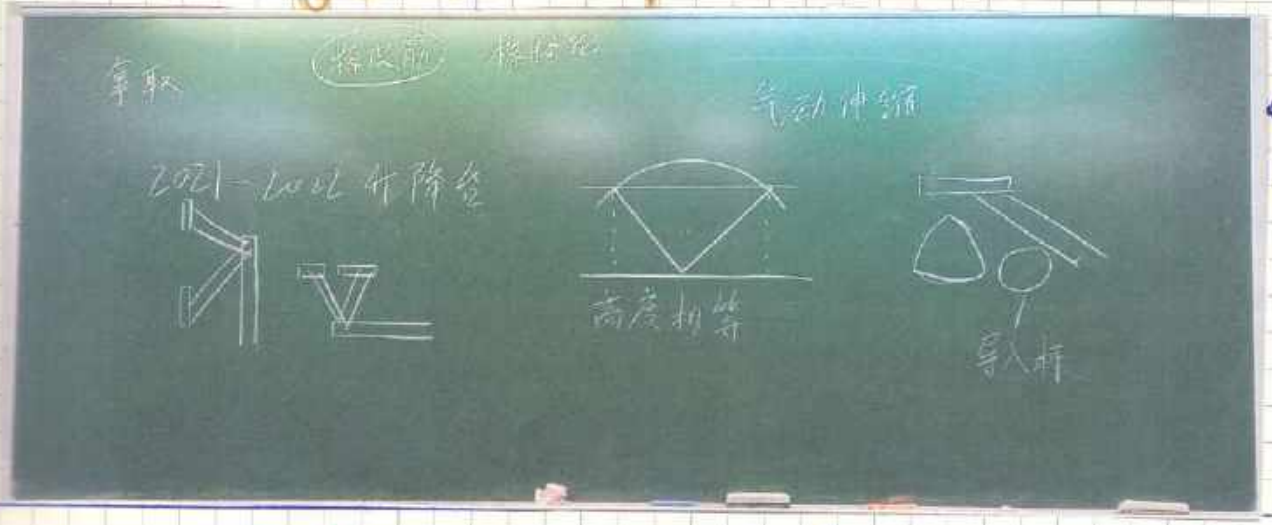
● (Third Edition)
Second Amendment

● The original gear ratio of 12:24+12:36 was to reduce the speed of 200rpm to 100rpm first. Because the red gearbox is 100rpm, we directly replaced it with a red gearbox, and then changed the gear ratio of 12:24+12:36 to 36:36+12:36, and the drop speed of the throwing platform is still 33rpm.

8月27日 (27 Aug.)

会议8 (拿取的方案)

Meeting 8 (The plan to take)



● 会议内容

● Conference content

日期: 2023.8.27.
Date:

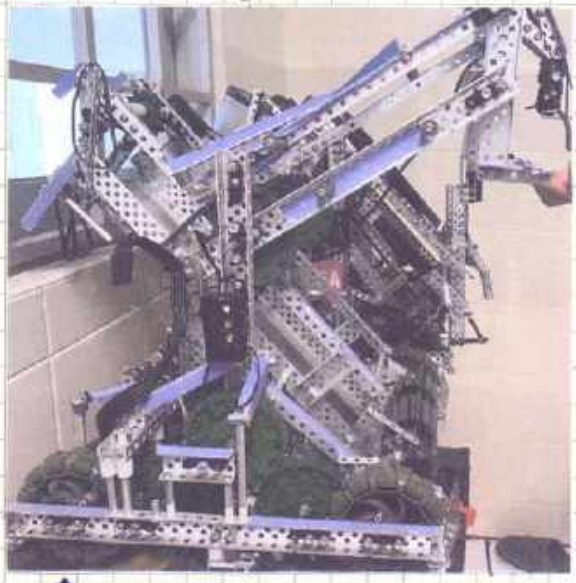
记录员:
Witnessed by:

本来是想要用机器直接在导入区拿出Triball，但是后来我们看到了下图机器的结构。下图中的升降台是上下移动的，可我们想要把升降台放平，让它变成水平前后移动来拿取Triball.

Originally, we wanted to use the machine to take out the Triball directly in the import area, but later we saw the structure of the machine in the picture below. The lifting platform in the picture below is moved up and down, but we want to flatten the lifting platform and make it move horizontally back and forth to get the Triball.

机器收缩图

Machine shrinkage diagram



机器伸展图

Machine extension diagram.

在会议讨论时发现此结构的移动轨迹是扇形，有两个垂直点的移动高度是一样的，可以达到在此结构后移时(收缩)可以拿取进攻区内的Triball，此结构前移时(伸展)可以拿取进攻区内的Triball，此结构前移时(伸展)可以拿取导入区的Triball.

During the discussion at the meeting, it was found that the movement trajectory of this stucture is fan-shaped, and the movement height of two vertical points is the same. It can reach the Triball in the attack area when moving backwards (shrinking) of this structure, and the Triball in the introduction area can be taken when moving forwards (stretching) of this structure.

日期: 2023.8.29
Date:

记录员:
witnessed by:

8月28日～9月11日(28 Aug.～11 Sep.)

拿取搭建+修改1次

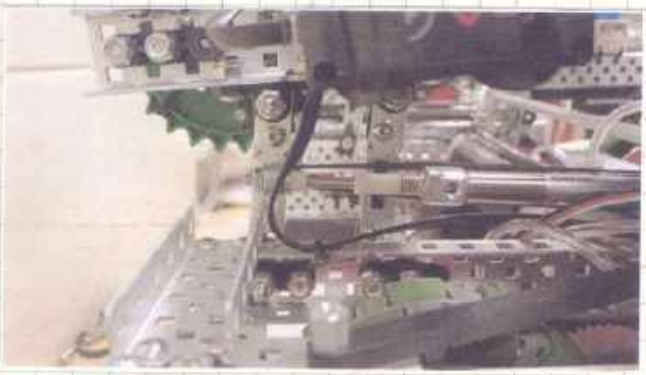
Take the build + Modify it once

(第一版)初搭建

(First Edition) Initial construction

因为拿取的结构高度弄得较高，靠后面的气动杆伸展才可以拿到Triball，再加上还要一个气动杆将结构向前推，所以气动杆的数量就需要四个.

Because the height of the structure is high, the back pneumatic rod can be extended to get the Triball. In addition, a pneumatic rod is needed to push the structure forward, so the number of pneumatic rods requires four.



(第二版)第一次修改.

(Second Edition) First revision.

因为规则上写明导入区的Triball不可以通过人手改变位置，所以我们决定放弃伸展拿导入区的Triball，改为伸展来拿取进攻区的Triball. 当时没注意到8月1日规则已更新.

Because the rules stipulate that the Triball in the introduction area cannot be changed by hand, we decided to give up the Triball in the introduction area and extend it instead to take the Triball in the attacking area. At that time, We didn't notice the update of the rules on 1st August.

日期: 2023.8.30～9.12. 记录员:

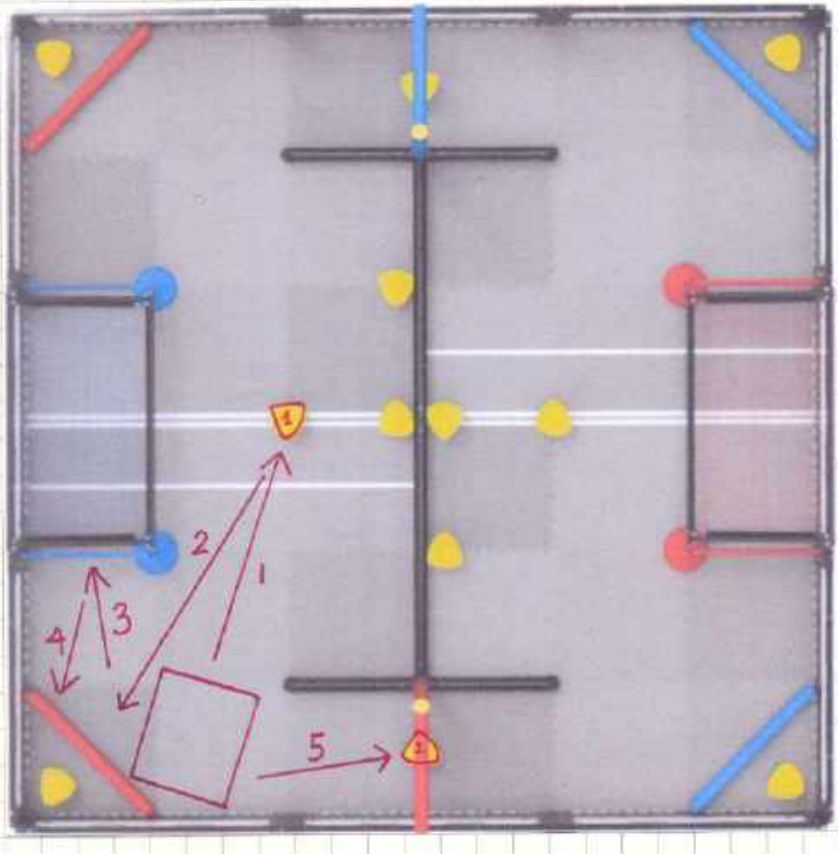
Date: Witnessed by:

9月13日～9月30日(13 Sep.～30 Sep.)

自动路线规划、编程

Automatic Route Planning and Programming.

- 左边自动(机器与赛局导入杆有夹角)
- Automatic on the left(the machine has an angle between the machine and the game inlet rod).



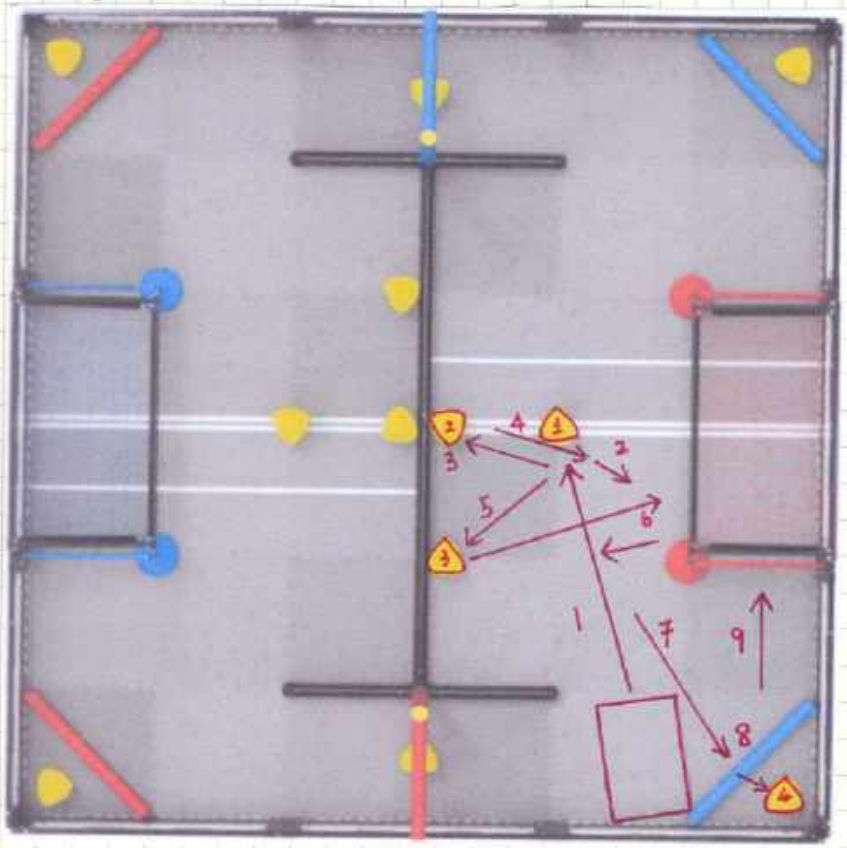
- 移动轨迹:
  1. 拿Triball 1;
  2. 退到导入区前;
  3. 把Triball 1塞进Goal内;
  4. 后退至导入区;
  5. 拿取中立区的Triball 2.
- Moving trajectory:
  1. Take Triball 1
  2. Before retreating to the introduction area.
  3. Put Triball 1 into Goal.
  4. Back to the inductory area
  5. Take the Neutral Zone of Triball 2.

日期: 2023.9.13
Date:

记录员:
witnessed by:

● 右边自动(机器与赛局导入杆有夹角).

● Automatic on the right (the machine has an angle between the machine and the introduction rod of the game).



● 移动轨迹:

1. 拿Triball 1
2. 把Triball 1塞进Goal内.
3. 拿取栏杆前的Triball 2.
4. 把Triball 2塞进Goal内
5. 拿取栏杆前的Triball 3.
6. 把Triball 3塞进Goal内.
7. 退至导入区前;
8. 拿取导入区的Triball 4
9. 把Triball 4塞进Goal内.

● Moving trajectory.

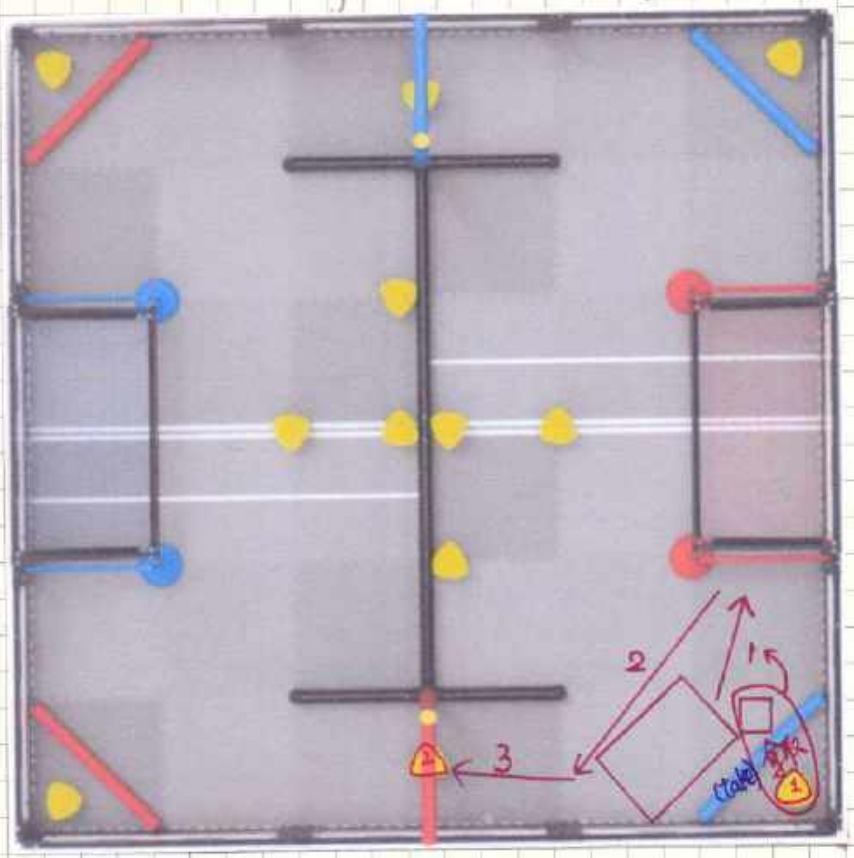
1. Take Triball 1
2. Put Triball 1 into Goal
3. Triball 2 before taking the railing.
4. Put Triball 2 into Goal
5. Triball 3 in front of the railing.
6. Put Triball 3 into Goal
7. Retreat to the front of the introduction area.
8. Take the Triball 4 in the introduction area.
9. Put Triball 4 into Goal.

日期: 2023.9.16.
Date:

记录: G
witnessed by:

● 右边自动(机器与赛局导入杆平行).

● Automatic on the right (the machine is parallel to the introduction rod of the game).



● 移动轨迹:

1. 拿取导入区的Triball及塞进Goal内;
2. 行至中立区;
3. 拿取Triball 3.

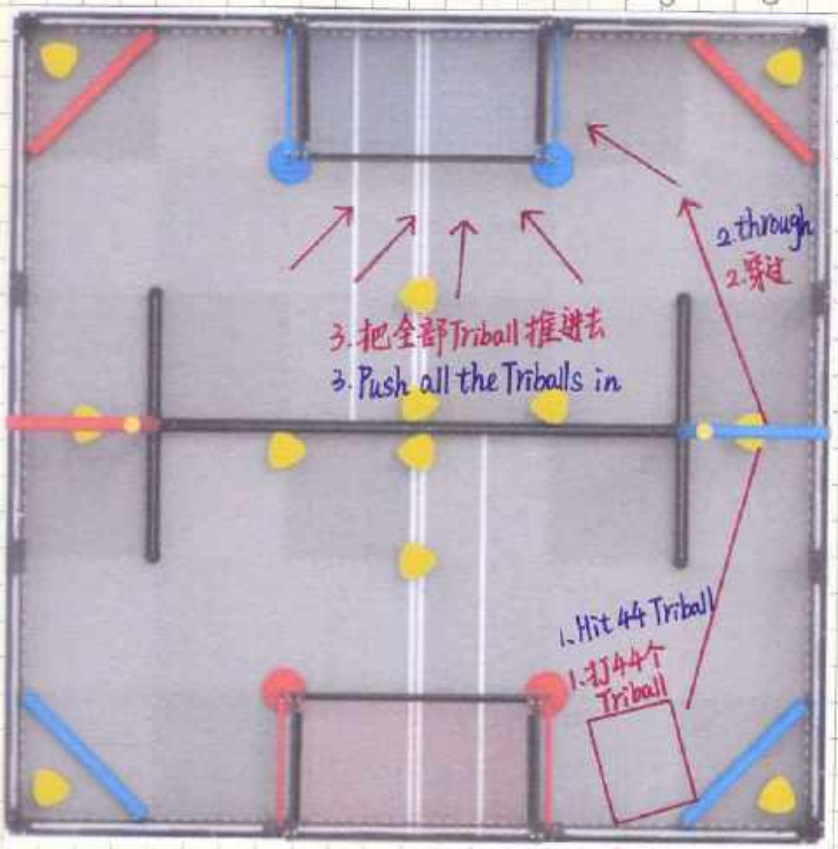
● Moving trajectory:

1. Take the Triball 1 in the introduction area and stuff it into Goal.
2. Go to the Neutral Zone
3. Take Triball 3.

日期: 2023.9.18
Date:

记录员:
witnessed by:

Skill 自动编程　Skill automatic programming.



移动轨迹：

1. 在导入区旁边打44个 Triball
2. 通过 Elevation bar.
3. 再将未打入的 Triball 推进 Goal 内.

Moving trajectory.

1. Play 44 Triballs next to the introductory area.
2. Through the Elevation bar.
3. Push the unined Triball into the Goal.

手动编程 Manual Programming

```
task rc_auto_loop_task_Controller1(rc_auto_loop_function_Controller1);
```

```
if(Controller1.ButtonL2.pressing()){
  RingG.spin(fwd, 100, pct);
}
else if(Controller1.ButtonL1.pressing()){
  RingG.spin(reverse, 100, pct);
}
else{
  RingG.stop();
}
```

```
if(Controller1.ButtonR2.pressing()){
  ProjG.spin(fwd, 100, pct);
  waitUntil(Shoot.pressing());
  ProjG.stop();
}
if(Controller1.ButtonR1.pressing()){
  ProjG.spin(fwd, 100, pct);
  wait(0.13, sec);
  ProjG.stop();
  wait(0.5, sec);
  ProjG.spin(fwd, 100, pct);
  waitUntil(Shoot.pressing());
  ProjG.stop();
}
```


```
if(Controller1.ButtonX.pressing()){
  Angle.set(true);
}
else if(Controller1.ButtonA.pressing()){
  Angle.set(false);
}
```

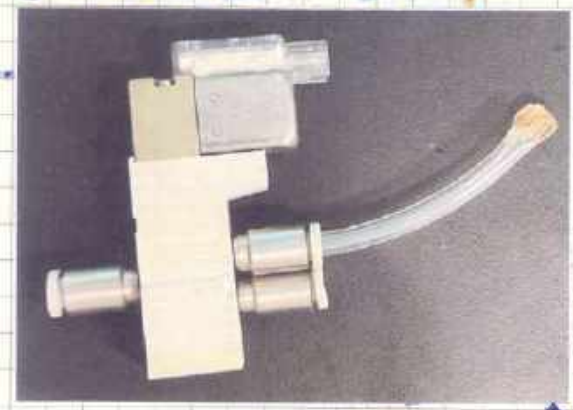
```
if(Controller1.ButtonUp.pressing()){
  End1.set(true);
}
else if(Controller1.ButtonLeft.pressing()){
  End1.set(false);
}
```


日期 Date: 2023. 9. 25.

记录员 Witnessed by:

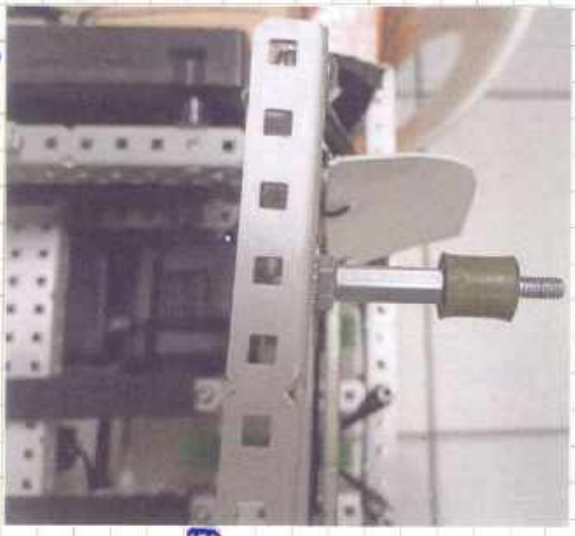
特别结构 Special structure

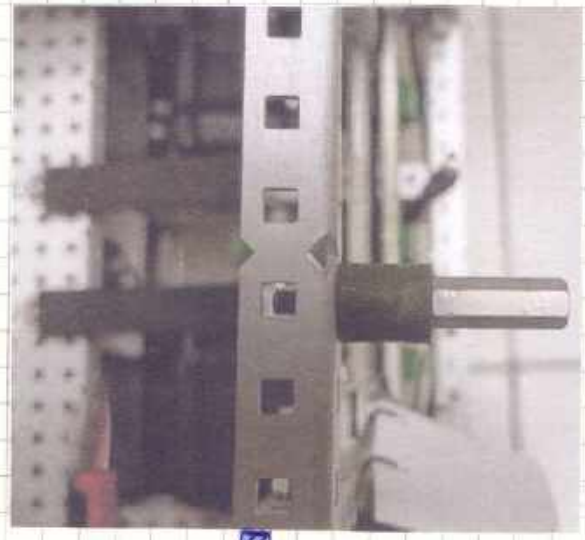
1.



- 有一边的气管封死之后达到省气的效果。
- After the trachea on one side is sealed, the effect of gas saving is achieved.

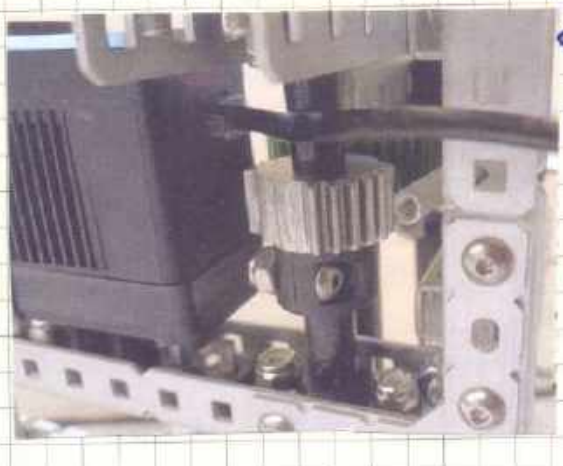
2.





- 橡胶放在前端可以令Triball的运动轨迹向下，橡胶放在后端会令Triball的运动轨迹向上(效果是实验得出，不清楚真正原因)参考VEX VRC 21417 (2022~2023赛季)。
- The rubber on the front end can make the Triball's trajectory downward, and the rubber on the back end will make the Triball's trajectory upward. (The effect is experimental, and the real reason is not clear). Refer to VEX VRC 21417 (2022~2023 season).

3.



- 第一次，六角柱卡的齿轮磨过，所以有一部分不会卡住。
- The first time:
  the gear of the hexgonal card has been worn, so some parts will not get stuck.

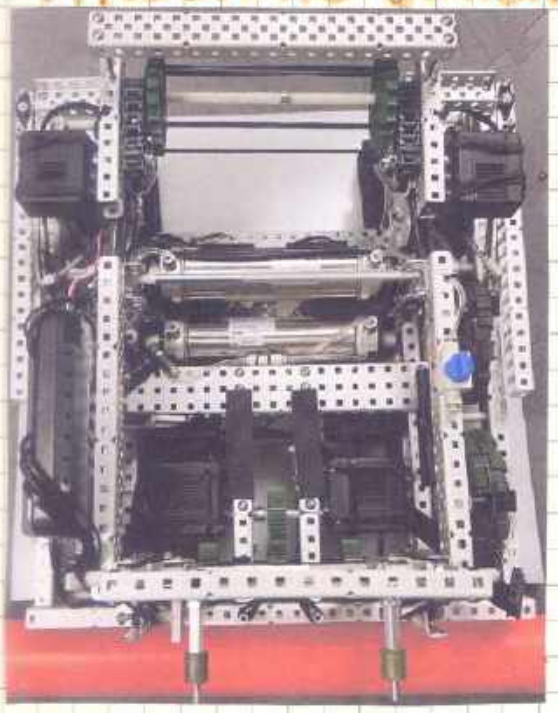
- 没磨过的齿轮可以卡住，像一个"荆棘"齿，只可以按照一个方向转，顶着齿轮，减轻电机负担，不让电机易过热.
- The gear can be stuck without grinding, like a "thorn" tooth, which can only be turned in one direction, against the gear, reducing the burden on the motor and preventing the motor from overheating.

日期: 2023.9.30.
Date:

记录:
Witnessed by:

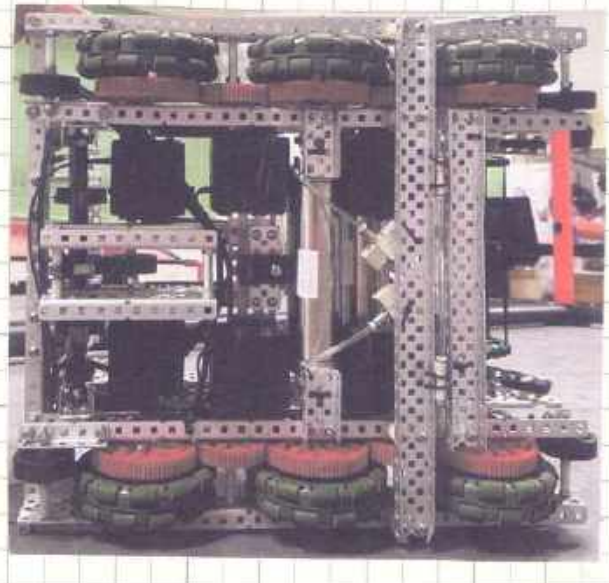
机器成品图1

Machine finished product drawing 1.



机器俯视图

Top view of the machin



机器仰视图

Machine Elevation View

机器正面图

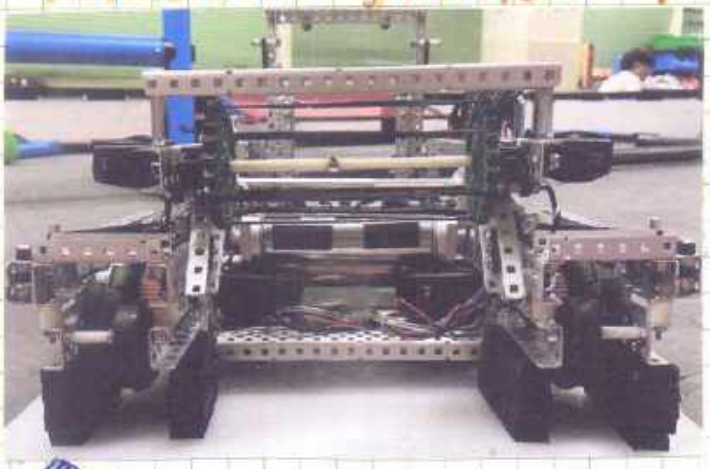
Front view of the machine

日期: 2023.10.1
Date:

记录员:
witnessed by:

机器成品图2

Machine finished product drawing 2.



机器背面图

Machine back view

机器左面图

Left side view of the machine

机器右面图

Right side view of the machine

日期: 2023.10.1
Date:

记录员:
witnessed by.

一代机花絮图

1st machine behind the scenes picture

日期：2023.10.2
Date：

记录员：G
Witnessed by：


else
Ring
}
if(Contr
RingG.
}
Program
VEX

手动编程 Manual Programming.

```
task rc_auto_loop_task_Controller1(rc_auto_loop_function_Controller1);
```

```
lse if(Controller1.ButtonL1.pressing()){
 RingG.spin(reverse, 100, pct);
```

```
  else{
    RingG.stop();
  }
```

```
ontroller1.ButtonL2.pressing()){
ngG.spin(fwd, 100, pct);
```

```
if(Controller1.ButtonR2.pressing()){
  ProjG.spin(fwd, 100, pct);
  waitUntil(Shoot.pressing());
  ProjG.stop();
if(Controller1.ButtonR1.pressing()){
  ProjG.spin(fwd, 100, pct);
  wait(0.13, sec);
  ProjG.stop();
  wait(0.5, sec);
  ProjG.spin(fwd, 100, pct);
  waitUntil(Shoot.pressing());
  ProjG.stop();
}
```


```
if(Controller1.ButtonX.pressing()){
  Angle.set(true);
}
else if(Controller1.ButtonA.pressing()){
  Angle.set(false);
}
```

```
if(Controller1.ButtonUp.pressing()){
  End1.set(true);
}
else if(Controller1.ButtonLeft.pressing()){
  End1.set(false);
}
```

自动编程：左边自动

Automatic Programming: Left automatic

- 机器与赛局导入杆有夹角
- The machine has an angle between the machine and the game inlet rod.

```
void Left1(){//左1
task a=(gdddd);
Angle.set(true);
RingG.spin(reverse, 100, pct);
chassis.drive_distance(-60);
chassis.drive_distance(-12, Iner.rotation());
wait(0.2, sec);
chassis.drive_distance(15);
Angle.set(false);
wait(0.4, sec);
chassis.turn_to_angle(-120);
wait(0.2, sec);
chassis.drive_distance(15);
wait(0.5, sec);
task b=(gddd);
wait(0.2, sec);
chassis.drive_distance(-3);
Angle.set(true);
chassis.turn_to_angle(-158);
chassis.drive_distance(-48);
wait(0.2, sec);
RingG.stop();
chassis.turn_to_angle(-50);
wait(0.1, sec);
chassis.drive_distance(-16);
RingG.spin(fwd, 100, pct);
wait(0.3, sec);
chassis.drive_distance(3);
wait(0.2, sec);
```


日期：2023.10.2
Date:

记录员：G
Witnessed by:

左边自动 Left automatic

```
chassis.turn_to_angle(130);
RingG.stop();
wait(0.1, sec);
chassis.drive_distance(13.5);
wait(0.2, sec);
chassis.drive_distance(-10);
chassis.drive_distance(13.5);
wait(0.2, sec);
chassis.drive_distance(-10);
chassis.turn_to_angle(139);
End1.set(true);
wait(0.1, sec);
chassis.drive_distance(-9);
chassis.left_swing_to_angle(90);
End1.set(false);
wait(0.4, sec);
chassis.drive_distance(-5);
chassis.turn_to_angle(-92);
wait(0.2, sec);
chassis.drive_distance(10);
chassis.right_swing_to_angle(-97);
chassis.drive_distance(20);
```

右边 自动1 Right automatic 1

- 机器与赛局导入杆有夹角.
- The machine has an angle between the machine and the inlet rod.

```
void Right1(){//右1
End1.set(true);
chassis.drive_distance(-7);
chassis.left_swing_to_angle(-40);
End1.set(false);
chassis.right_swing_to_angle(25.5);
chassis.left_swing_to_angle(-40);
RingG.spin(fwd, 100, pct);
wait(0.4, sec);
RingG.stop();
chassis.drive_distance(5);
wait(0.2, sec);
chassis.turn_to_angle(140);
wait(0.3, sec);
chassis.drive_distance(10);
chassis.drive_distance(-8);
chassis.turn_to_angle(140);
chassis.drive_distance(10);
chassis.drive_distance(-9);
chassis.turn_to_angle(140);
wait(0.2, sec);
chassis.turn_to_angle(-175);
wait(0.2, sec);
chassis.drive_distance(-26);
wait(0.2, sec);
chassis.turn_to_angle(-136);
Angle.set(true);
RingG.spin(reverse, 70, pct);
chassis.drive_distance(-29);
wait(0.3, sec);
chassis.drive_distance(28);
RingG.stop();
chassis.turn_to_angle(38);
wait(0.2, sec);
chassis.drive_distance(30);
```


日期: 2023.10.2
Date:

记录员:
Witnessed by:

右边自动2 Right automatic 2

- 机器与赛局导入杆平行
- The machine is parallel to the introduction rod of the game).

```
void Right2(){//右2
Angle.set(true);
chassis.drive_distance(-38);
wait(0.1, sec);
chassis.turn_to_angle(90);
RingG.spin(fwd, 100, pct);
wait(0.5, sec);
chassis.drive_distance(11);
RingG.stop();
chassis.turn_to_angle(-120);
wait(0.1, sec);
RingG.spin(reverse, 100, pct);
chassis.drive_distance(-8);
wait(0.2, sec);
chassis.turn_to_angle(85);
RingG.stop();
End1.set(true);
RingG.spin(fwd, 100, pct);
chassis.drive_distance(-12);
chassis.right_swing_to_angle(88);
chassis.drive_distance(-12);
Angle.set(false);
chassis.drive_distance(10);
chassis.drive_distance(-12);
chassis.drive_distance(10);
chassis.drive_distance(-12);
RingG.stop();
End1.set(false);
chassis.drive_distance(4);
```

右边自动2 Right automatic 2

- 机器与赛局导入杆平行
- The machine is parallel to the introduction rod of the game.

```
wait(0.1,sec);
gdu();
wait(0.1, sec);
chassis.left_swing_to_angle(0);
wait(0.1, sec);
chassis.drive_distance(23);
chassis.turn_to_angle(-48);
task a=(gddddd);
chassis.drive_distance(60);
chassis.drive_distance(24);
wait(0.2, sec);
chassis.turn_to_angle(26);
End1.set(true);
wait(0.2, sec);
chassis.drive_distance(-45);
wait(0.1, sec);
chassis.right_swing_to_angle(40);
wait(0.1, sec);
chassis.right_swing_to_angle(140);
wait(0.1, sec);
chassis.drive_distance(-30);
chassis.drive_distance(10);
chassis.drive_distance(-15);
chassis.drive_distance(30);
wait(0.2, sec);
chassis.turn_to_angle(10);
wait(0.2, sec);
chassis.right_swing_to_angle(160);
wait(0.1, sec);
chassis.drive_distance(-30);
chassis.drive_distance(10);
chassis.drive_distance(-15);
chassis.drive_distance(30);
```


日期: 2023.10.2
Date:

记录员:
Witnessed by:

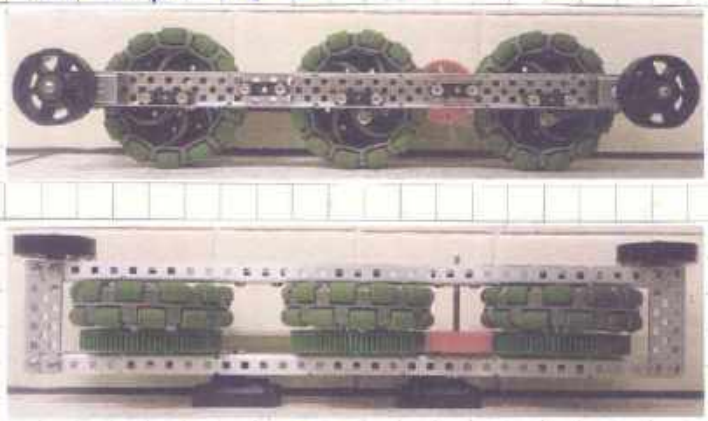
技能赛 Skill

```
void Skill(){
End1.set(true);
chassis.drive_distance(-7);
chassis.right_swing_to_angle(40);
End1.set(false);
chassis.left_swing_to_angle(-25.5);
chassis.right_swing_to_angle(40);
RingG.spin(fwd, 100, pct);
wait(0.4, sec);
RingG.stop();
chassis.drive_distance(5);
wait(0.2, sec);
chassis.turn_to_angle(-140);
wait(0.3, sec);
chassis.drive_distance(10);
chassis.drive_distance(-8);
chassis.turn_to_angle(-140);
chassis.drive_distance(10);
chassis.drive_distance(-9);
wait(0.2, sec);
chassis.turn_to_angle(-60);
wait(0.1, sec);
chassis.drive_distance(-7);
ProjG.spin(fwd, 100, pct);
        waitUntil(Shoot.pressing());
        ProjG.stop();
```

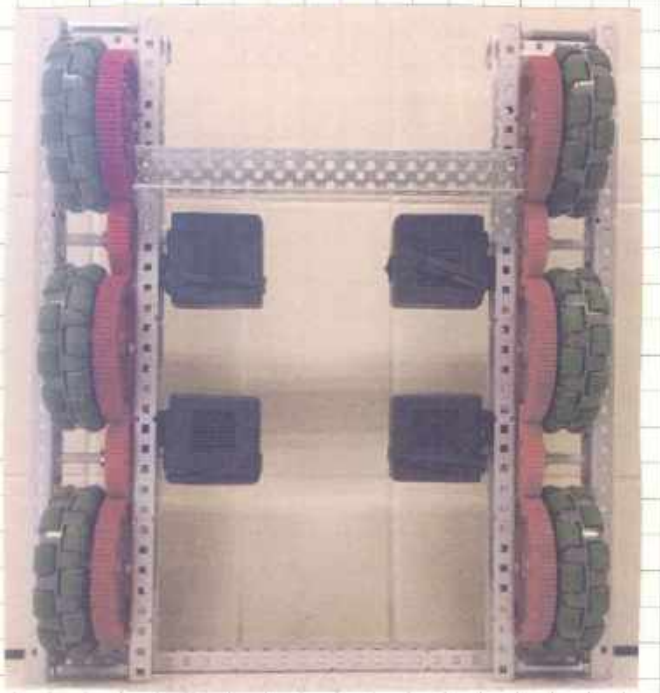
迭代 Iterative 过程 Process

底盘 Chassis

● 底盘第一代 ● 1st chassis



● 底盘第二代 ● 2nd Chassis



变化 Change

● 36:84和48:84的齿轮比改为48:72的齿轮比(转速400rpm).

● 36:84 and 48:84 gear ratio changed to 48:72 gear ratio (speed 400 rpm).

原因 Reason

● 36齿连84齿错位严重,导致传动轴会处于弯曲状态,增大了地盘阻力。

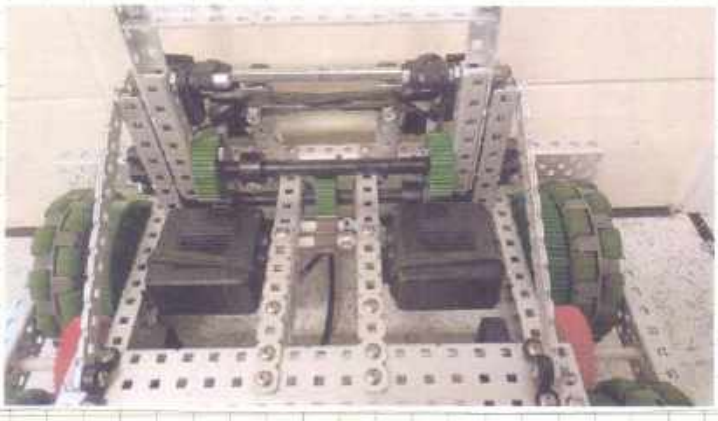
● 36 teeth and 84 teeth are seriously misplaced, causing the transmission shaft to be in a curved state, increasing the resistance of the site.

日期: 2023.10.3
Date:

记录员: G
Witnessed by:

抛射 Ejection

抛射第一代 1st ejection



抛射第二代 2nd ejection

变化 Change

12:36 +24:36的齿轮比改为12:24+12:36的齿轮比，速度由44rpm降为33rpm(绿色变速箱)

12:36 +24:36 gear ratio changed to 12:24 +12:36 gear ratio, and the speed was reduced from 44rpm to 33rpm.

原因 Reason

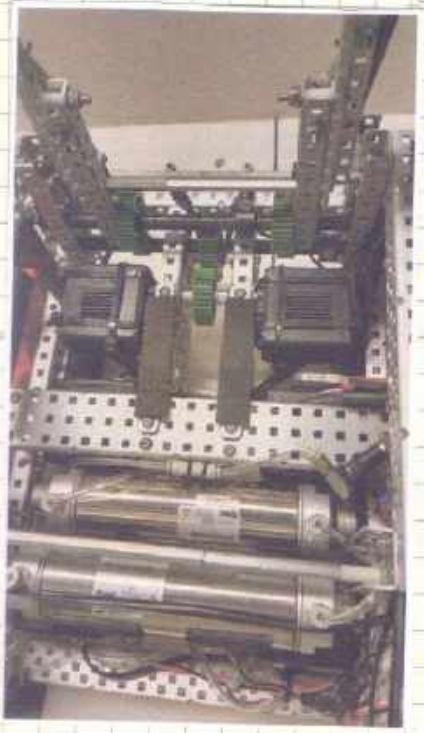
44rpm不够劲将抛射台拉下来.

44rpm is not strong enough to pull down the ejection table.

日期: 2023.10.3
Date:

记录员:
witnessed by:

抛射第三代 3rd ejection

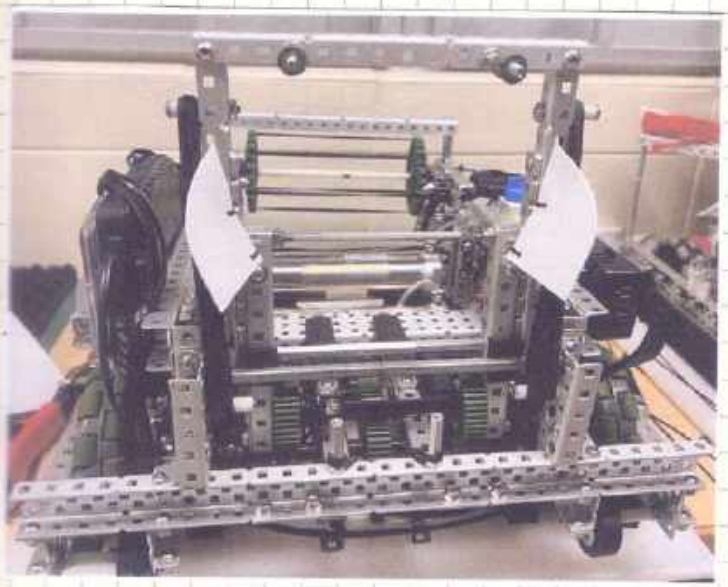


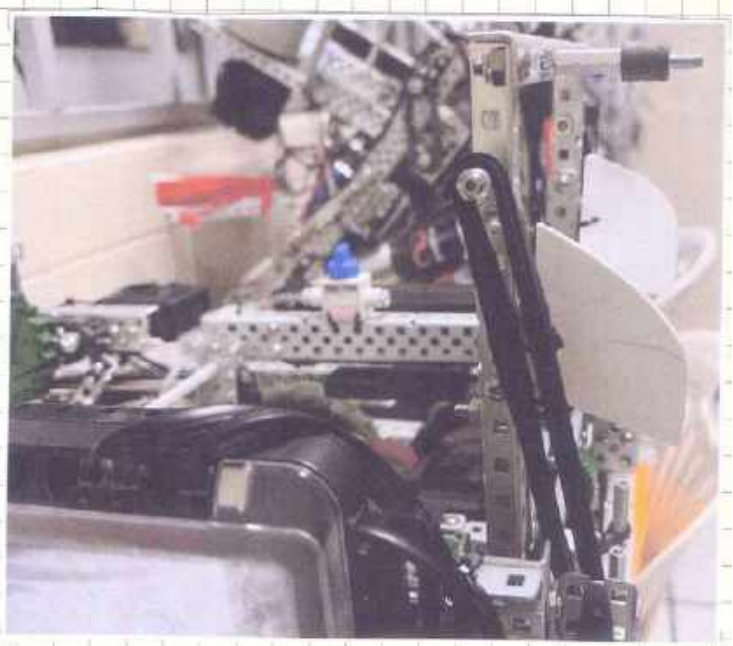
变化 Change

- 12:24 + 12:36的齿轮比改为36:36+12:36变速箱由绿色改为红色(速度仍是33rpm)
- 抛台加装两块塑料板.
- 12:24 +12:36 gear ratio changed to 36:36 + 12:36, gearbox changed from green to red (the speed is still 33rpm)
- Two plastic plates are added to the throwing table.

原因 Reason

- 原绿色变速箱为200rpm，经过12:24齿轮比降速至100rpm，与红色变速箱速度相同.
- 加装塑料板方便导入时"粽"能自动对准位置.
- The original green gearbox is 200rpm, and the speed is reduced to 100rpm after 12:24 gear ratio, which is the same as the red gearbo
- When installing plastic plates to facilitate the introduction, the "Tribal" can automatically align the position.





日期: 2023.10.3
Date:

记录员:
Witnessed by:

拿取 Take it

- 拿取第一代 1st Take

变化 Change

- 修改了高度
- Modified height.

原因 Reason

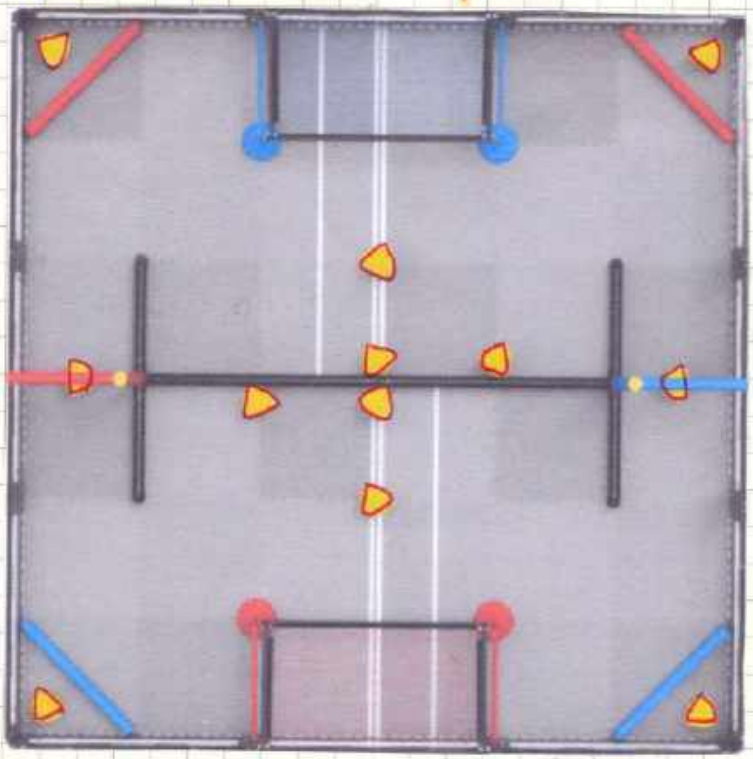
- 1×1 铝件太长，强度不高
- 1×1 aluminum is too long and not strong enough.

- 拿取第二代 2nd Take

日期：2023.10.9
Date:

记录员.
Witnessed by.

比赛策略 Competition Strategy



- 在比赛前与队友沟通，说明打比赛的方式(攻守)，在比赛中多听指挥，尽量将较多的 Triballs 撞进 Goal 里.
- Communicate with your teammates before the game, explain the way of playing the game (attack and defense), listen to the command more during the game, and try to hit more Triballs into the Goal.

日期：2023.10.4
Date：

记录员：G
Witnessed by：

10月3日～10月5日（3rd Oct.～5th Oct.）

- 第十四届VEX亚洲机器人锦标赛·中国选拔赛-华南区赛
- The 14th VEX Asian Robot Championship · China Selection · South China

赛况 Match Result

号码 Number	颜色 Colour	结果 Result	原因 Reason
Q2	红	L	编程设置错按键 The programming set wrong button
Q27	蓝	L	战术被破 The tactics were broken
Q45	蓝	W	队友违规导入，被DQ. Teammates illegally imported DQ
Q63	红	W	在末5s碰到对手高挂杆 In the last 5s, it met the opponent's high hanging rod.
Q71	红	W	
Q98	红	W	

日期 Date: 2023.10.5

记录员 Witnessed by: G

10月3日(3rd Oct.) 赛后讨论 Post-match discussion

机器缺点及改善 Machine shortcomings and improvements

缺点：
底盘尺寸不对
机器结构不稳定
吸不到"Triball"及无法得分
抛台太低。

总结：操作不习惯，机器整体不理想。

Disadvantages:
The chassis size is wrong
The structure of the machine is unstable.
Can't suck Triball and can't score
The platform is too low.

Summary: The operation is not used, and the whole machine is not ideal.

改善：
底盘改小，换齿轮比
改结构，增加铝件，形成三角形(稳定性)
更改吸Triball的结构，更易得分
增高抛台

总结：机器整体不行，所以直接开始二代机

Improvement:
The chassis is smaller, and the gear ratio is changed.
Change the structure, add aluminum parts, and form a triangle (stability).
Change the structure of Triball to make it easier to Score
Increase the height and throw the platform

Summary: The whole machine is not good, so start the 2nd machine directly.

日期：2023.10.5
Date:

记录员：G
Witnessed by:

二代机想法 The idea of the 2nd aircraft

1. 双翼

我们仍想延用"双翼"，但需要更改高度，因为在比赛过程中，我们发现在自动环节，机器难以拿出导入区的"Triball"

2. 前吸前射

因为2022~2023赛季我们一直运用前吸前射，操作队员习惯前吸前射，尝试搭建。

3. 攀高杆

我们本来是打算不攀高杆，可是在比赛中，大多数队伍都有选择攀杆且得分更高，所以我们有在二代机加上攀高杆的想法。

1. Two Wings

We still want to extend the "Wings", but we need to change the height. Because during the game, we found that in the automatic link, it was difficult for the machine to take out the "Triball" in the import area.

2. Suck in front and shoot befofe

Because in the 2022~2023 season, we have been using the front shot, and the operators are used to the front shot and try to build it.

3. Climbing the pole

We originally planned not to climb the pole, but in the game, most teams choose to climb the pole and score higher, so we have the idea of adding the pole to the 2nd machine.

日期：2023.10.5
Date:

记录员：
Witnessed by:

面试 Interview

● 错误：

在面试时没有合理分配每个队员讲解的时间，导致讲解不够全面。

● 改善：

1. 合理分配每个队员的讲解时间；
2. 队员的讲解应该按照笔记中的主题顺序进行。

● Error:

The time for each team member's explanation was not reasonably allocated during the interview, resulting in insufficient explanation.

● Improvement:

1. Reasonably allocate the explanation time of each team member.
2. The team member's explanation should be carried out in the order of the theme in the note.

日期：2023.10.5
Date:

记录员：
witnessed by:

10月5日 (5th Oct.) 获得「最佳创新奖」

Won the Best Innovation Award

比赛总结:

- 我们在比赛前和队友的交流不够全面,在比赛中搭档得不够默契,导入不够熟练,需要进一步练习。

Competition Summary:

- Our communication with our teammates before the game is not comprehensive enough, the partners in the game are not tacit enough, and the introduction is not proficient enough, and we need to partice further.

日期: 2023.10.6 Date:

记录员: G witnessed by:

10月11日(11th Oct.)

会议9(一代机问题)

Meeting 9. (1st machine problem)

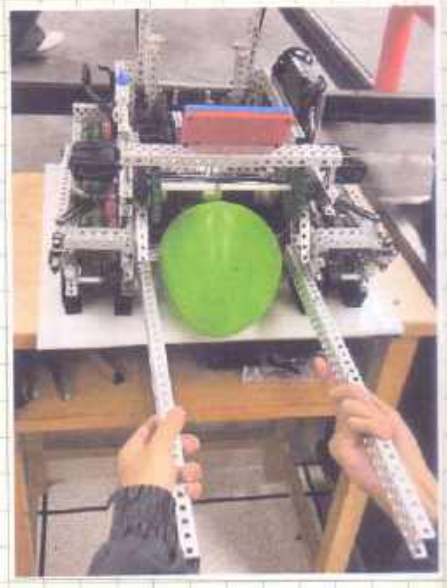
- 我们在华南赛时讨论了一代机的问题，主要是：
  1. 尺寸(33×29格).
  2. 速度(440rpm).
  3. 过杆(容易卡在中间).
  4. 攀升(无攀升).

- We discussed the problem of the 1st machine in the South China competition, mainly
  1. Size (33 × 29 grids).
  2. Speed (400rpm).
  3. Over the pole (easy to get stuck in the middle).
  4. Climbing (no climbing).

日期：2023.10.12
Date:

记录员：G
Witnessed by:

改善 Improvement:



1. 原来是33×29格，但底盘过大，我们准备二代机适当缩小，改为28×27格。
2. 原本是400rpm，齿轮比是48:72，蓝色马达，但是因为太快了(场地狭窄)，会不够力冲过中间的杆。

两个选择：

- 如果是300rpm，齿轮比是36:72，蓝色马达，比较稳妥；
- 如果是250rpm，齿轮比是36:84，蓝色马达。担心自动赛抢中间的"Triballs"，抢不过对手。

3. 我们先决定底盘所用的齿轮，再决定底盘铝件的尺寸。避免铝件前部与轮子太远，会导致铝件撑住地面，无法过杆。(2021~2022赛季经验)
4. 从4个电机增至6个电机，因为高挂杆需要利用底盘电机，4个电机可能会不够力，6个电机相对保险。

1. It turned out to be 33×29 grids, but the chassis was too large. We prepared to reduce the 2nd machine appropriately and change it to 28×27 grids.
2. Originally, it was 400 rpm, the gear ratio was 48:72, and the blue motor, but it was too fast (the field was narrow), it would not be strong enough to rush through the middle lever.

Two Choices:

- If it's 300 rpm, the gear ratio is 36:72; and the blue motor is more stable.
- If it's 250 rpm, the gear ratio is 36:84, blue motor. Worried about grabbing the "Triballs" in the middle of the automatic competition, I can't beat the opponent.

日期：2023.10.12
Date:

记录员，
Witnessed by. G

3. We will first decide the gear used for the chassis, and then decide the size of the aluminum parts of the chassis. Avoid the aluminum front and the wheels too far away, which will cause the aluminum to hold the ground and fail to cross the pole (2021~2022 season experience).

4. From 4 motors to 6 motors, because the high hanging rod needs to use the chassis motor, 4 motors may not be strong enough, and 6 motors are relatively safe.

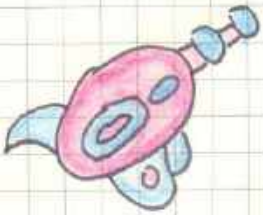
- 我们想用气动去推齿轮，让高挂时能用6个电机的力。
- We want to use pneumatic to push the gear, so that the force of 6 motors can be used when hanging high.

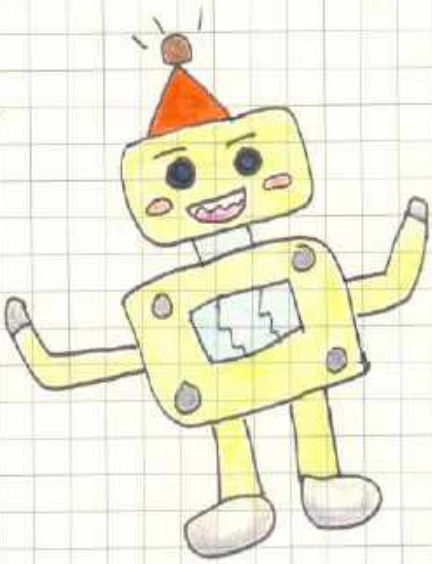
From:

- 原理：开赛时，用气动拉回其中一个齿轮，断开上下的连接，需要高挂时再用气动推齿轮，将底盘和高挂连成一组，然后能让高挂部分享有6个电机的力。

- Principle: At the beginning of the race, use pneumatic pull back one of the gears to disconnect the upper and lower connections. When high-hanging is needed, use pneumatic push gears to connect the chassis and high-hanging into a group, and then let the high-hanging part enjoy the force of six motors.

二代机器猫





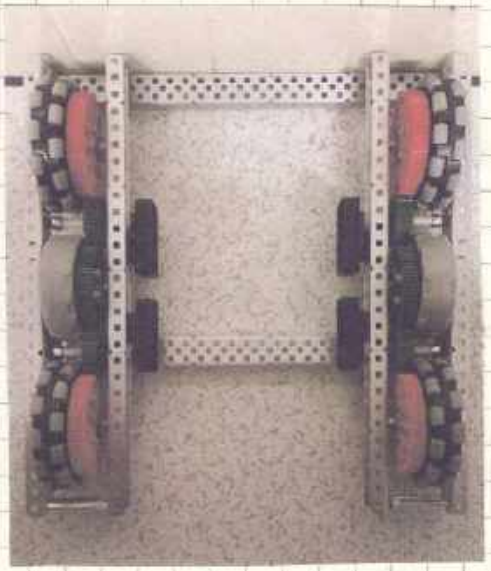
10月12日～10月15日（12th Oct.～15th Oct.）

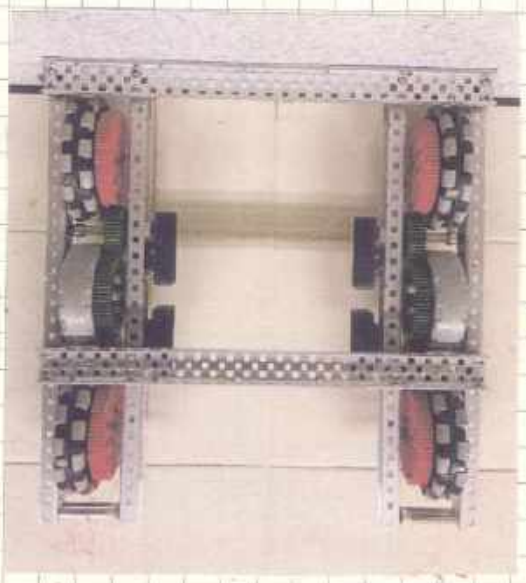
底盘搭建

Construction of Chassis

图中是二代机的齿轮比为36:72，转速为300rpm.

In the picture, the gear ratio of the 2nd machine is 36:72, and the rotation speed is 300rpm.





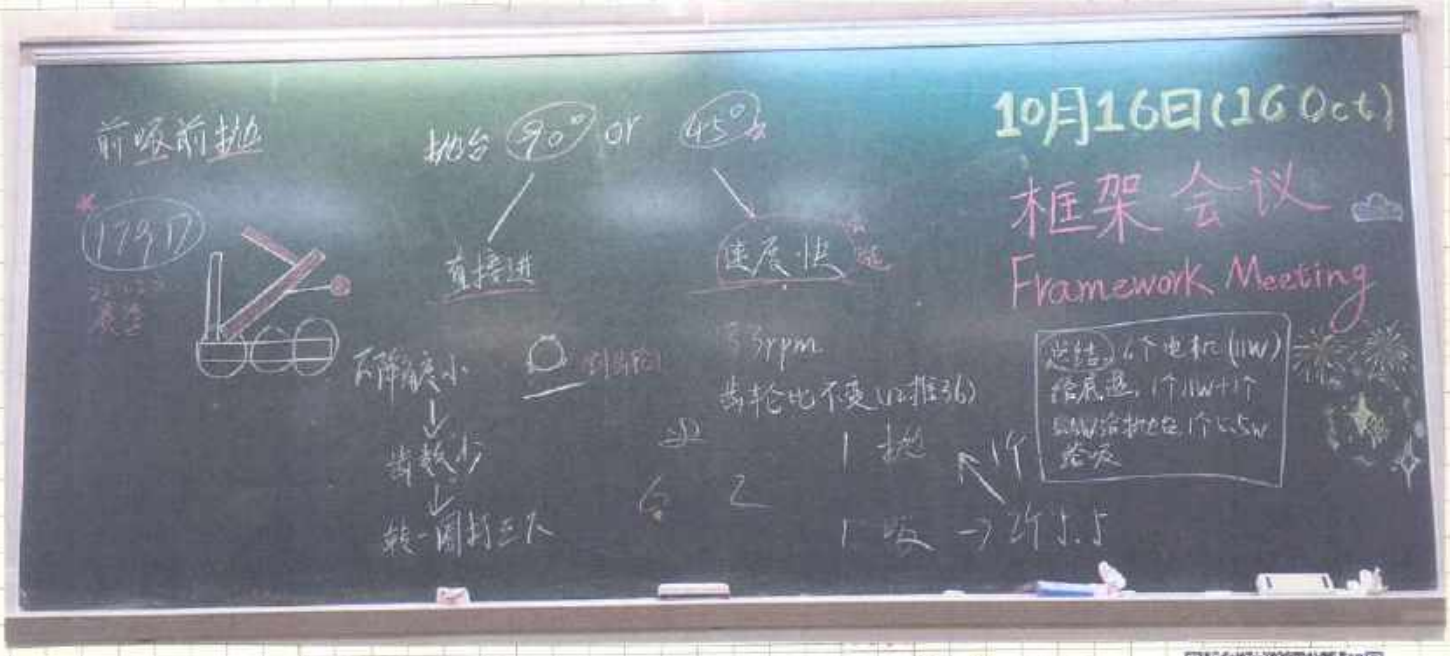
搭建后的底盘

Built chassis

10月16日(16th Oct.)

框架抛台会议10

Meeting10: Frame Throwing Meeting



主题：尝试改成前吸前抛。(From：2022~2023赛季1791队)

Theme: Try to change it to front suction and front throw.
(From：1791 team in the 2022~2023 season)

因为抛的速度都是333rpm(齿轮比12:36)，所以抛台下降有两种选择的讨论：

1. 抛台下降90°

优点：能够直接打进Goal内，但是下降时的速度相对较慢。齿轮转一圈最多打两下。

2. 抛台下降45°

优点：下降时的速度较下降90度快，转一圈可以打三下。

选择了45°，原因：它的下降角度小，齿轮少，效率快。

总结：6个电机(11W)用在底盘，1个11W+1个5.5W给底盘，1个5.5W给吸。

日期：2023.10.17

记录员：

witnessed by:

Because the throwing speed is 33rpm (gear ratio 12:36), two options are discussed in the throwing platform:

1. The advantage of dropping the platform by 90°: it can hit directly into the Goal, but the speed when falling is relatively slow. The gear rotates once and hits up to twice.

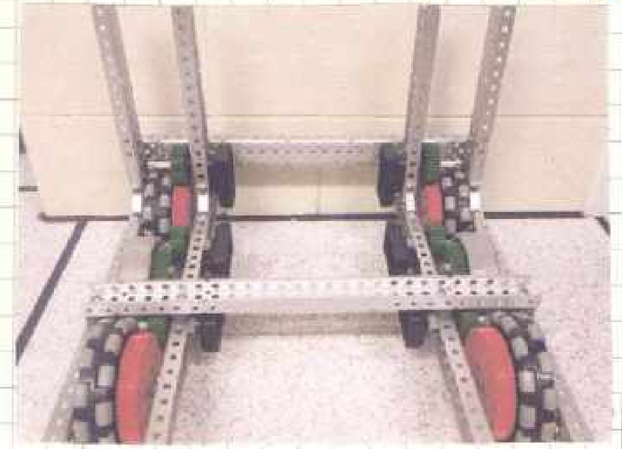
2. The drop of the platform drops by 45°. Advantages: The speed of the drop is 90° faster, and you can hit there times for a turn.

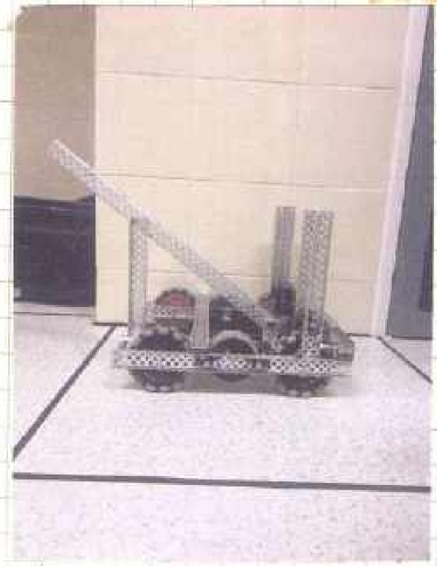
The reason is that it has a small drop angle, fewer gears, and fast efficiency.

Summary: 6 motors (11W) are used in the chassis, 1 11W + 1 5.5W for the chassis, and 1 5.5W for suction.

10月17日 ~ 10月22日 (17th Oct. ~ 22th Oct.) 框架搭建

Framework construction



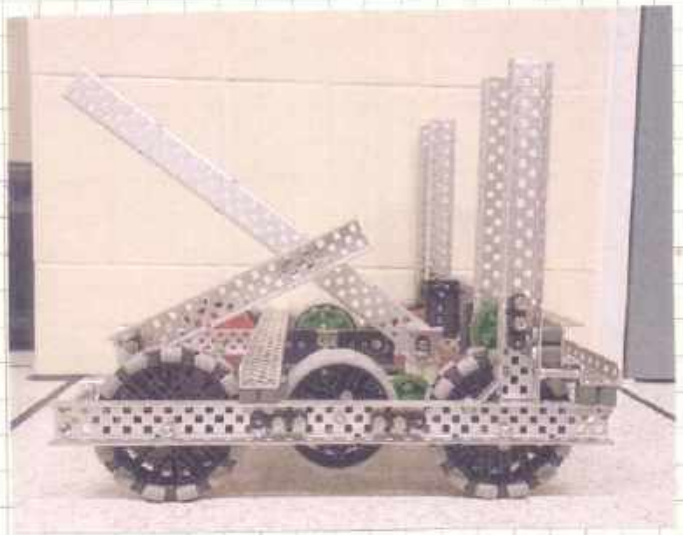


调整高度

把机器的最高点调整在高挂低杆的下方.

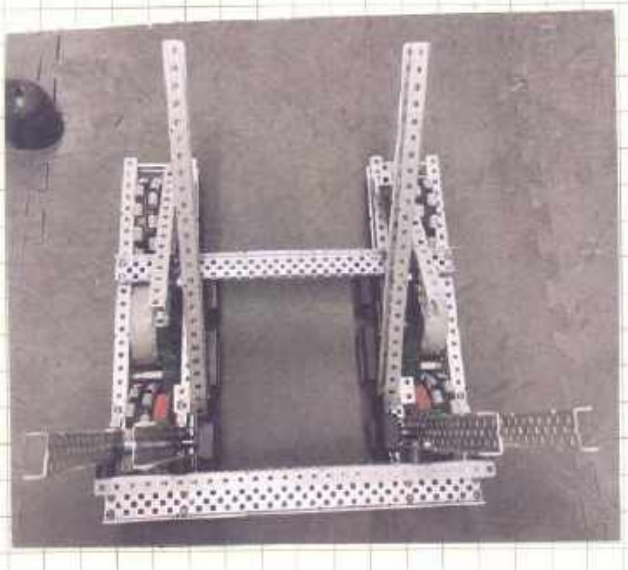
Adjust the height:

Adjust the highest point of the machine below the high hanging and low rod.



框架一侧

The side of the frame.



框架两侧完成图

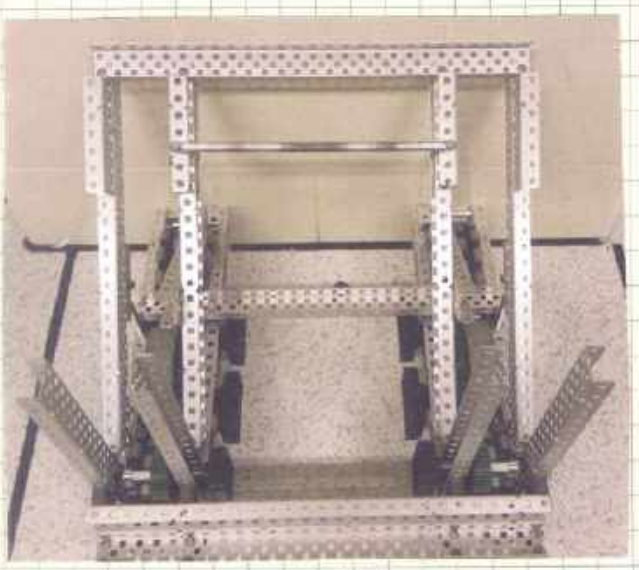
Complete the drawing on both sides of the frame

日期: 2023.10.23.
Date:

记录员:
Witnessed by: G

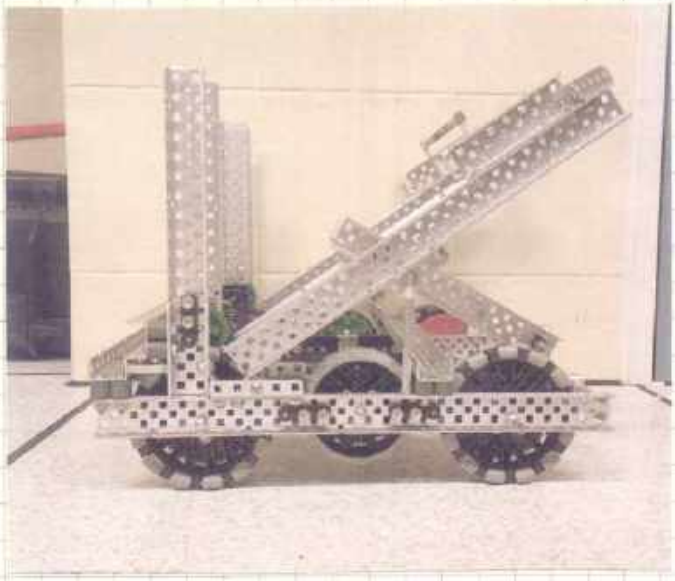
测试

- 图中标示的角度是否对位。
- Test: Whether the angle marked in the figure is in place.



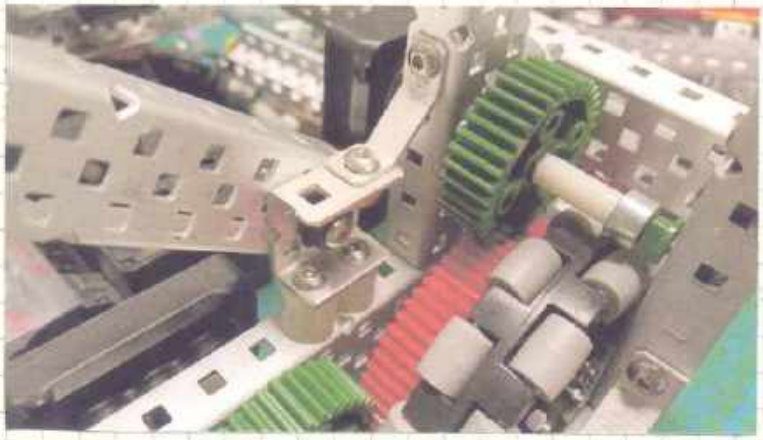
- 框架搭建完成
- Frame construction completion diagram.

- 测试：
  测试高度是否在高挂低杆下。
- Test:
  Test whether the height is under the high hanging and low rod.



框架完成侧面图

Frame completion side diagram



因上图抛台震动会导致螺丝松动，螺丝太多，松的机率更大.

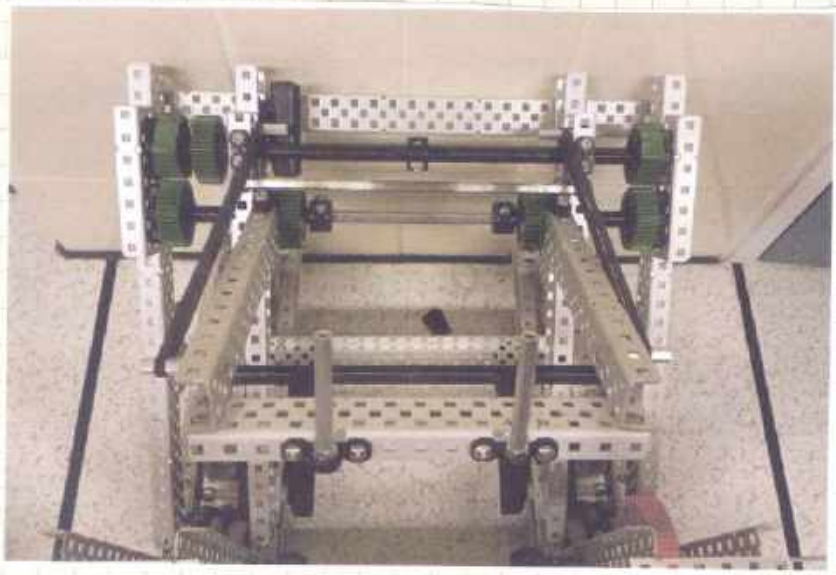
Because the vibration of the table in the picture above will cause the screws to loosen. If there are too many screws, the probability of loosening is greater.

所以减少了螺丝的数量，使得结构强度提高，且方便搭建手检查维修.

Therefore, the number of screws has been reduced, the structural strength has been improved, and it is covenient for the builder to check and repair.

日期：2023.10.23.
Date:

记录员：G
Witnessed by:



- 抛台结构图
- Throwing platform structure diagram.

- 因为5.5W的电机，速度为200rpm，所以先用12推24的齿轮，速度降至100rpm，再与11W的电机相连。两边速度相等。
- Because the 5.5w motor has a speed of 200rpm, first use 12 push 24 gears, reduce the speed to 100rpm, and then connect to the 11W motor, The speed on both sides is equal.

- 撞击点下凹，说明铝件强度不够，加了两块铁制零件，增加它的强度，使它不凹。
- The concaveness of the impact point indicates that the strength of the aluminum part is not enough. Two iron parts are added to increase its strength.

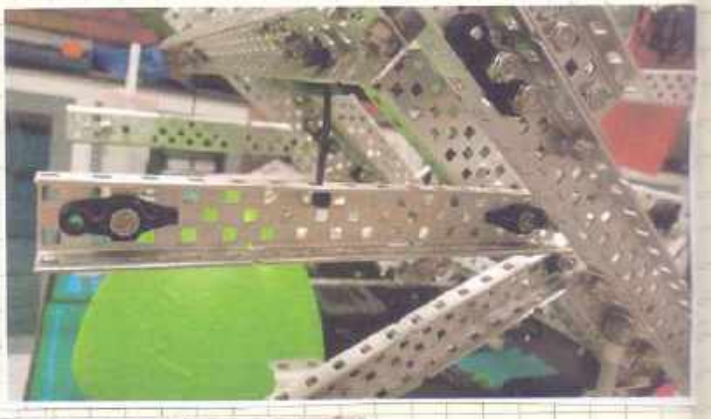
日期：2023.10.23
Date:

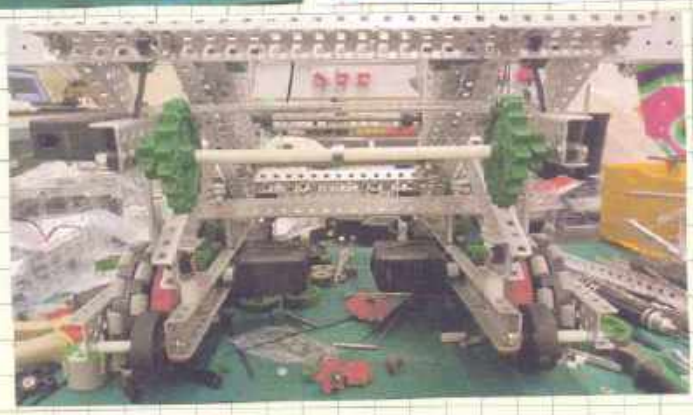
记录员：
Witnessed by:

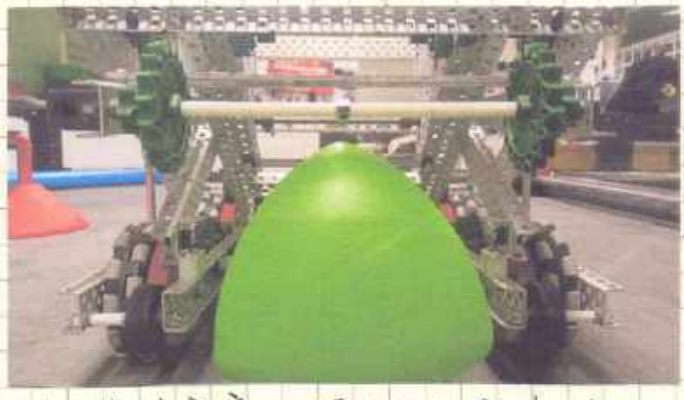
10月23日(23rd Oct.)

吸"Triball"的高度调整

Height adjustment of get "Triball"



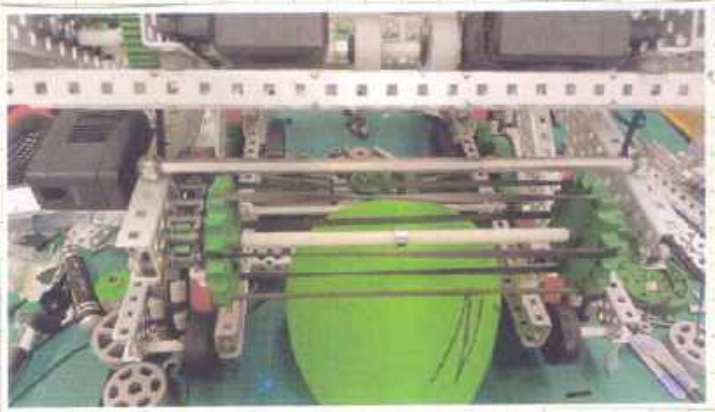




- 希望转动轴的高度刚好贴近"Triball"的高度，但图中并未完全贴切，所以再往下调半格.
- It's hoped that the height of the rotating axis is just close to the height of "Triball", but it's not completely close in the picture, so it is adjusted downward by half a grid.

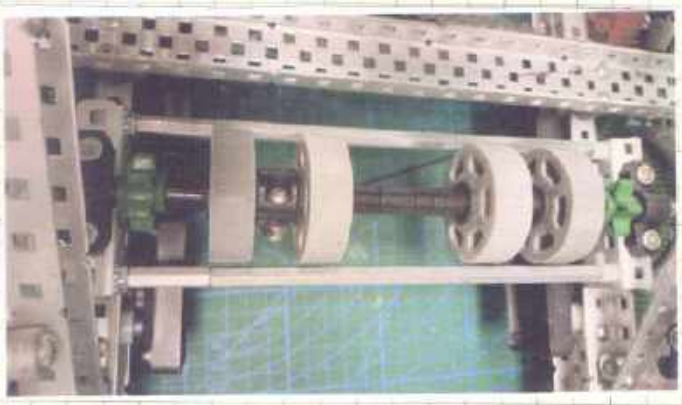
日期 Date: 2023.10.26

记录员 Witnessed by:



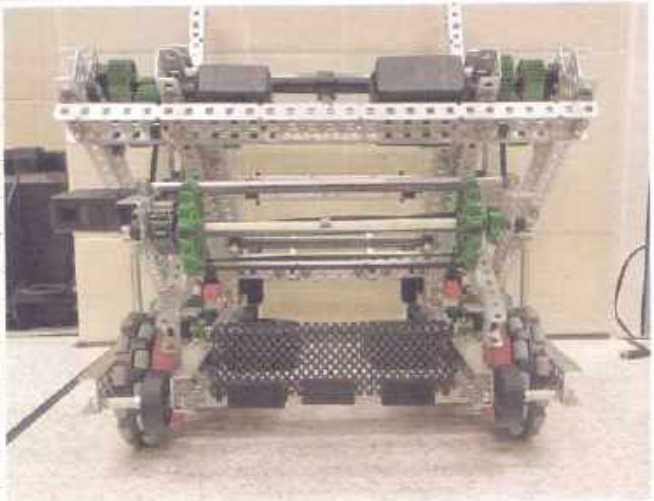
- 测试后调整高度
- Adjust the height after the test.

- 理想效果：机器前面抬起来，刚好可以令"Triball"脱离机器.
- Ideal effect: Lift up the front of the machine, and you can just get "Triball" out of the machine.



- 把"Triball"送上抛台的结构(From: 2022~2023我们队伍的二代机).
- Send "Triball" to the platform (From: 2022~2023 our team's 2nd machine).

- 搭建完成图
- Construction completion drawing.



日期: 2023.10.26
Date:

记录员:
Witnessed by:

10月30日 (30th Oct)

临时会议 11

Temporary meeting

● 主题：是否吸"Triball"

因为在搭建过程中发现，把"Triball"吸上抛台，所需要的空间很大。(若增加空间，则无法过低杆).

● Theme: Whether to suck "Triball".

Because in the process of construction, it was found that there was a lot of space needed to suck "Triball" on the platform. (If you increase the space, you can't pass the low pole).

● 吸：

在自动15s，一次抛一个"Triball"到得分区.

● 不吸：

1. 中间两个"Triball"可以直接推，
2. Skill不需要吸
3. 导入也可以人手放入抛台.

总结：综合各个方面，决定不吸"Triball".

日期：2023.11.1
Date:

记录员：
Witnessed by:

● Suction:

At 15s of automatic, throw a "Triball" to the scoring area at a time.

● Don't suck:

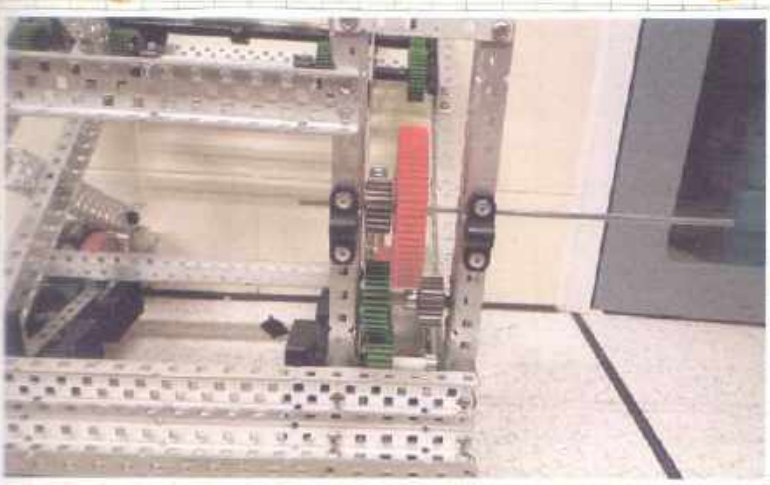
1. The middle two "Triball" can be pushed directly.
2. Skill does not need to suck.
3. The introduction can also be put into the throwing table by hand.

Summary: Combining all aspects, it's decided not to suck "Triball".

11月1日 ~ 11月5日 (1St Nov. ~5th Nov.)

高挂会议及搭建

High-level meeting and Construction



● 高挂齿轮组

负责将底盘的力传到齿轮上面,发现此结构不适合我们机器。所以我们打算自己测试.

● High-hanging gear set:

Responsible for passing the force of the chassis to the gear and finding that this structure is not suitable for our machine, so we plan to test it ourselves.

日期: 2023.11.1
Date:

记录员:
witnessed by:

60rpm

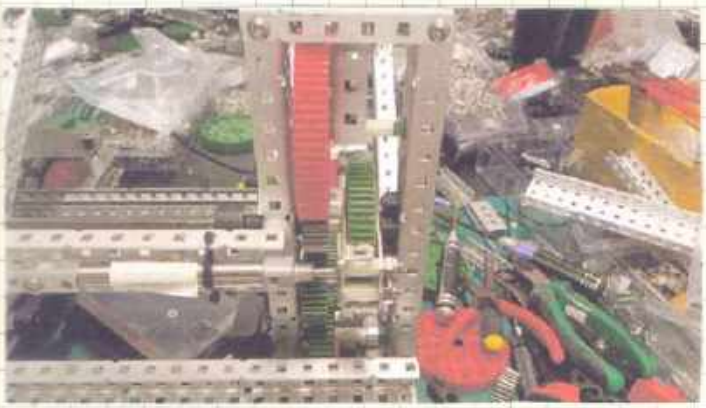
40rpm

(1)改进：因为60rpm的力＜40rpm的，我们需要更大的力，所以我们选用40rpm.

(1) Improvement: Because the force of 60rpm is less than 40rpm, we need more force, so we choose 40rpm.

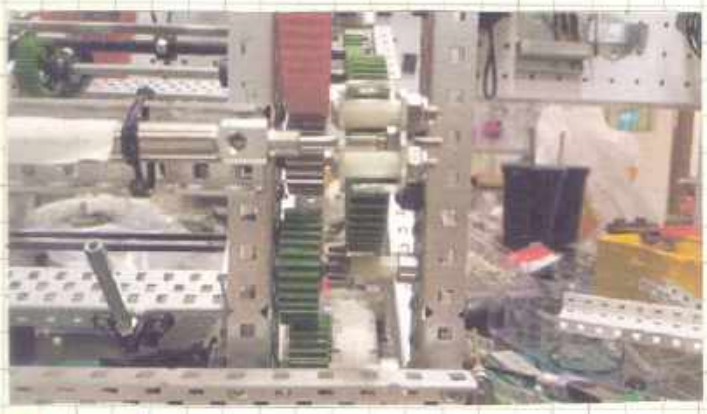
日期：2023.11.3
Date:

记录员：
Witnessed by:



高挂结构单边搭建完成图.

Completion diagram of single-sided construction of high-hanging structure.

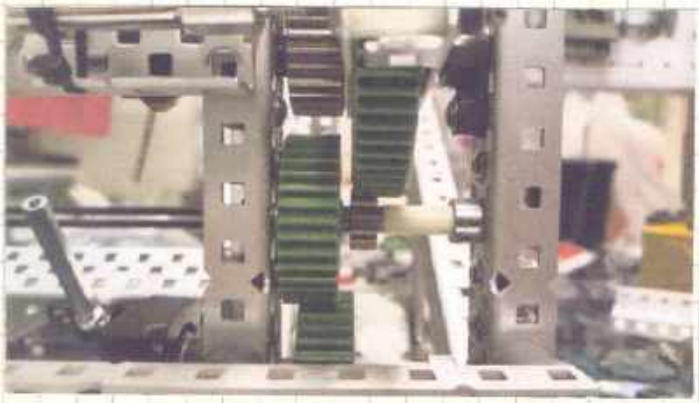


推出:

赛局开始前,机器推开60齿,断开底盘与高挂的连接。不论机器怎样移动,两个高挂的爪都不会出现偏移.

Launch:

Before the game starts, the machine pushes open 60 teeth and disconnects the connection between the chassis and the high hanging. No matter how the machine moves, the two high-hanging claws will not shift.



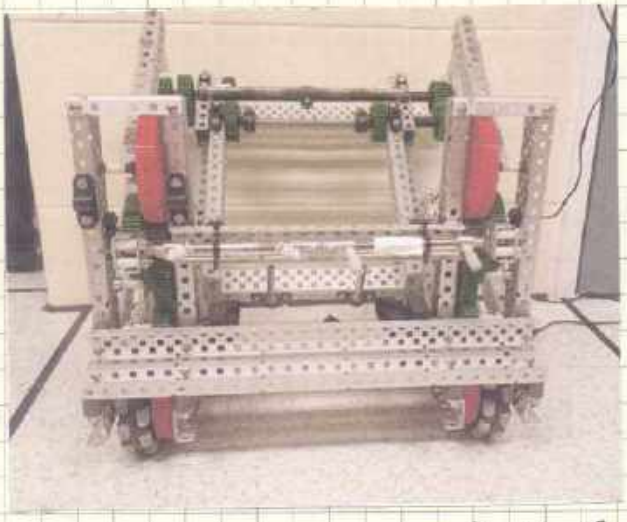
推入:

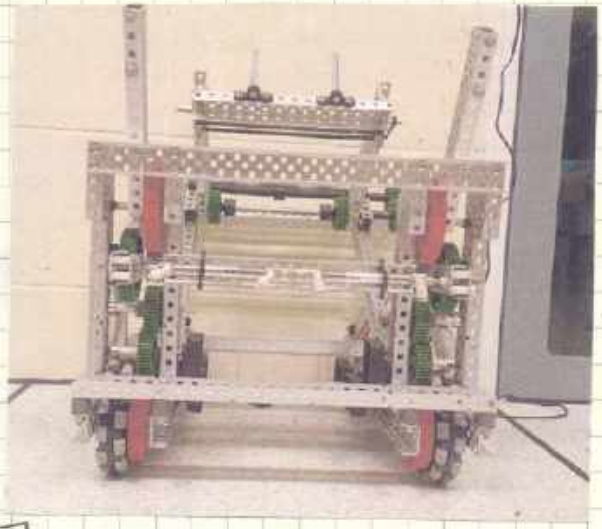
当我们需要高挂时,气动将60齿收回,使底盘与高挂相连,齿轮组合并,机器向后时,高挂杆升起,向前时,高挂杆下降,拉动整台机器.将36齿的角磨平,气动推出或推入时较轻松,12齿与36齿易咬合

Push in:

When we need high hanging, the pneumatic pulls back the 60 teeth, so that the chassis is connected to the high hanging, and the gear group is merged. When the machine is backward, the high hanging rod rises, and when forward, the high hanging

rod falls and pulls the whole machine. The angle of 36 teeth is flattened, which is easier when pneumatic pushing or income, and it's easier to bites between 12 teeth and 36 teeth.





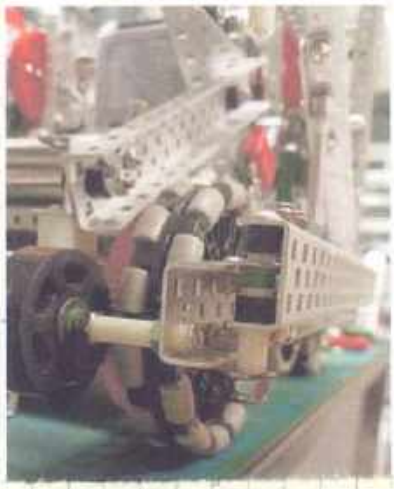
高挂展示图

High hanging display picture.

11月6日～11月7日（6th Nov. ～ 7th Nov.）

双翼搭建

Double-Wing Construction

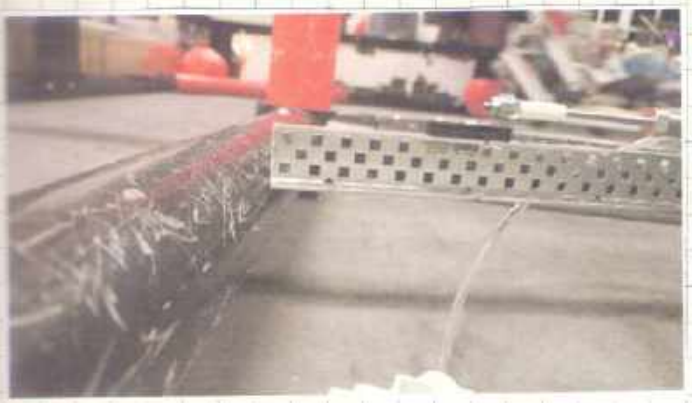


日期：2023.11.5
Date:

记录员：
Witnessed by:

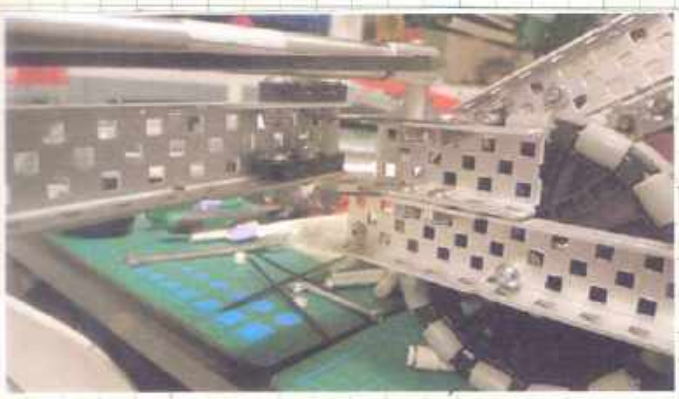
用135°的铁质零件，把双翼往外衍生一格，避免像一代机一样，侧翼与底盘的铝件有摩擦。

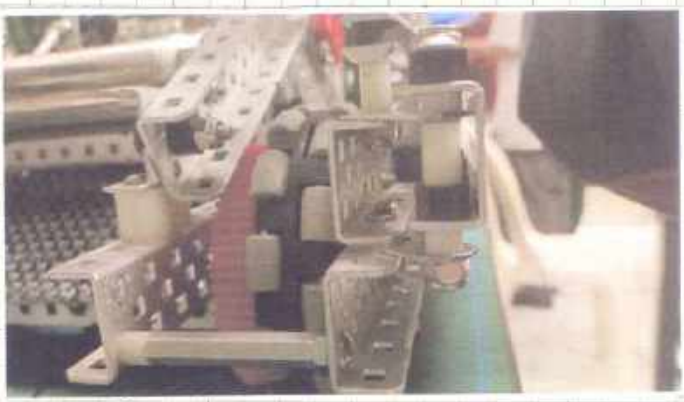
Use 135° iron parts to extend the wings outward to avoid friction between the flank and the aluminum parts of the chassis like a 1st machine aircraft.



测试高度，我们自动想用翼碰高挂杆，但是翼低於黑色管没那么容易碰到。唯一办法是将机器骑在黑管上，相对麻烦，最理想是不用骑在黑管上，打开双翼就能碰到。

Test height: We automatically want to touch the high hanging rod with the wing, but the wing is not so easy to touch if it is lower than the black tube. The only way is to ride the machine on the black tube, which is relatively troublesome. Ideally, you don't have to ride on the black tube and open the wings to touch it.





改善：调高双翼，其实不骑在黑管上，打开双翼也能碰到高挂杆。

Improvement: If you turn the wing up, in fact, you don't ride on the black tube. If you open the wings, you can also touch the high hanging rod.

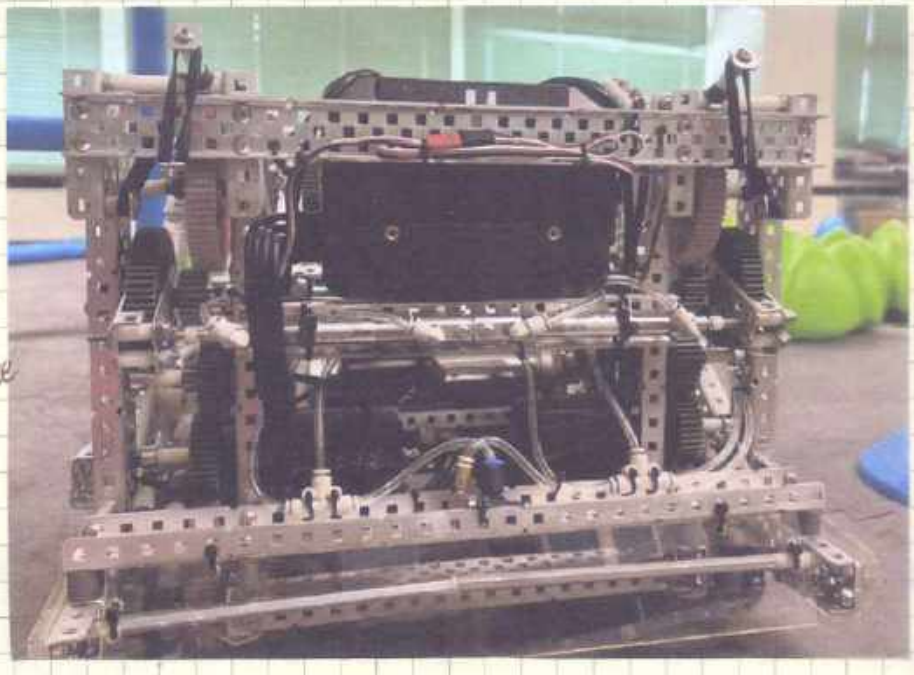
日期：2023.11.6
Date:

记录员：
Witnessed by:

机器成品图1(2代) 2nd
Machine finished product drawing

●机器正面图

● Front view of the machine



●机器背面图

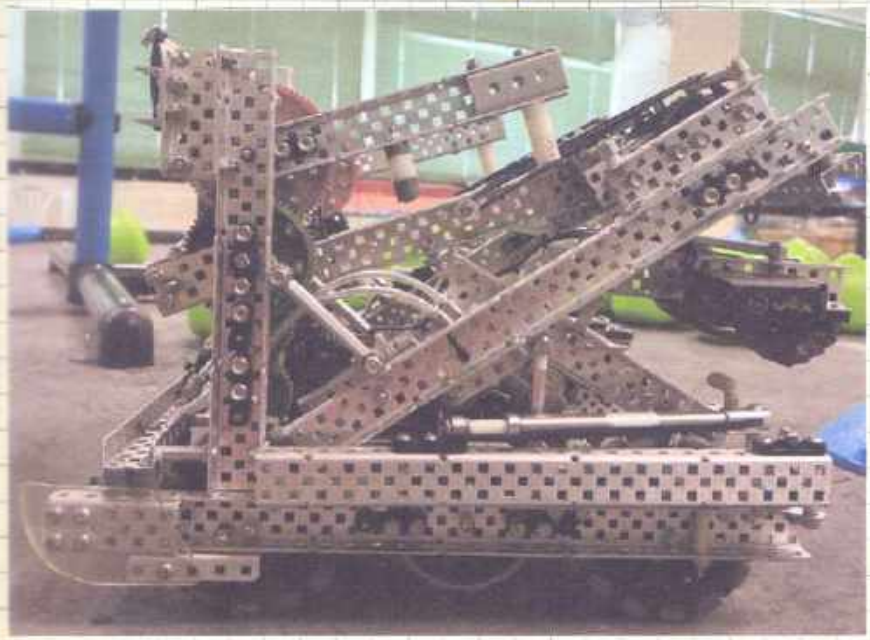
● The picture on the back of the machine

日期: 2023.10.8
Date:

记录员:
Witnessed by.

机器成品图2（2代）

2nd Machine finished product drawing



机器右侧图

The picture on the right side of the machine

机器仰视图

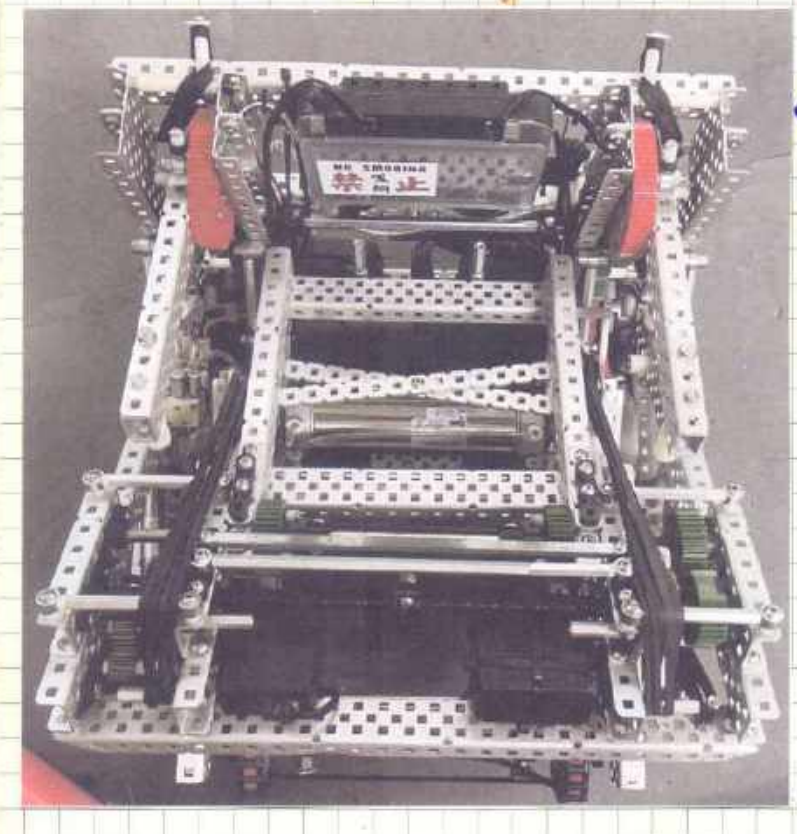
Machine up view

日期：2023.11.7
Date:

记录员：G
Witnessed by:

机器成品图3(2代)

2nd Machine finished product drawing

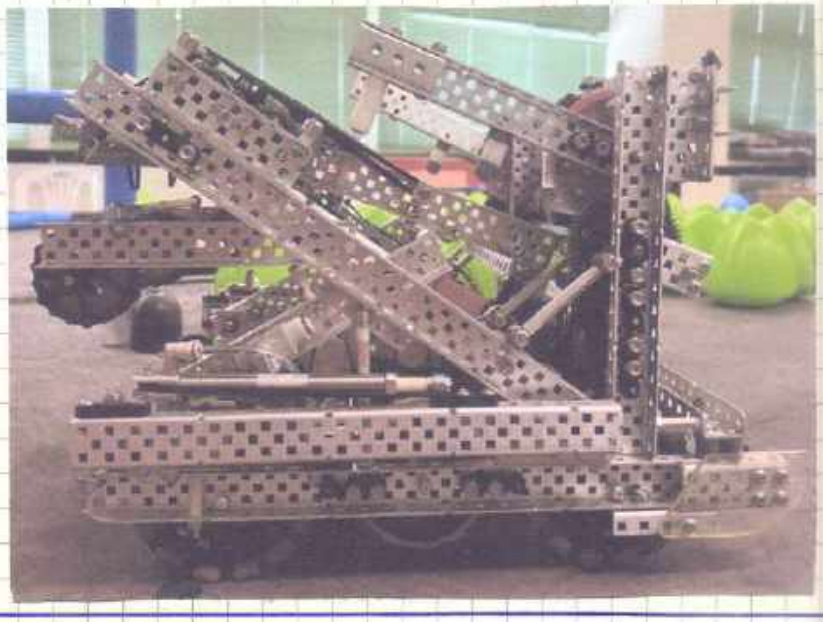


机器俯视图

Machine top-down view.

机器左侧图

The picture on the left side of the machine.

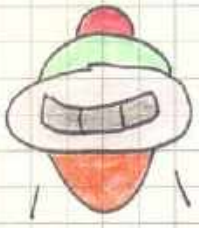


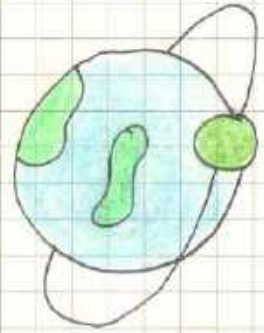
日期: 2023.11.7
Date:

记录员:
Witnessed by:

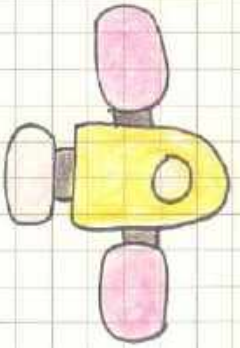
二代机花絮图

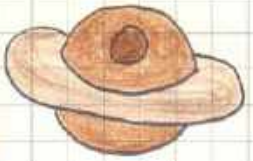
2nd Machine behind the scenes picture

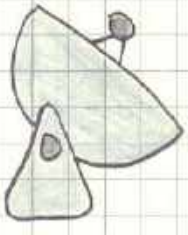


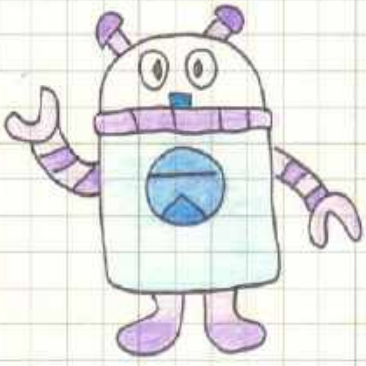


二代机编程









手动编程 Manual Programming

```
task rc_auto_loop_task_Controller1(rc_auto_loop_function_Controller1);
```

```
if(Controller1.ButtonL2.pressing()){
  Ring1.spin(fwd, 100, pct);
}
else if(Controller1.ButtonL1.pressing()){
  Ring1.spin(reverse, 100, pct);
}
else{
  Ring1.stop();
}
```

```
if(Controller1.ButtonR1.pressing()){
  ProjG.spinFor(fwd, 80, degrees, false);
  wait(0.5, sec);
  ProjG.spin(fwd, 100, pct);
  waitUntil(Shoot.pressing());
  ProjG.stop();
}
```

```
if(Controller1.ButtonR2.pressing()){
  ProjG.spin(fwd, 100, pct);
  waitUntil(Shoot.pressing());
  ProjG.stop();
}
```


```
if(Controller1.ButtonUp.pressing()){
  hh();
}
```

```
if(Controller1.ButtonX.pressing()){
  hend.set(true);
}
```

```
if(Controller1.ButtonDown.pressing()){
  ProjG.spinFor(forward, 80, degrees, false);
}
```

```
else if(Controller1.ButtonA.pressing()){
  hend.set(false);
}
```

```
if(Controller1.ButtonLeft.pressing()){
  LG.setStopping(hold);
  RG.setStopping(hold);
}
```

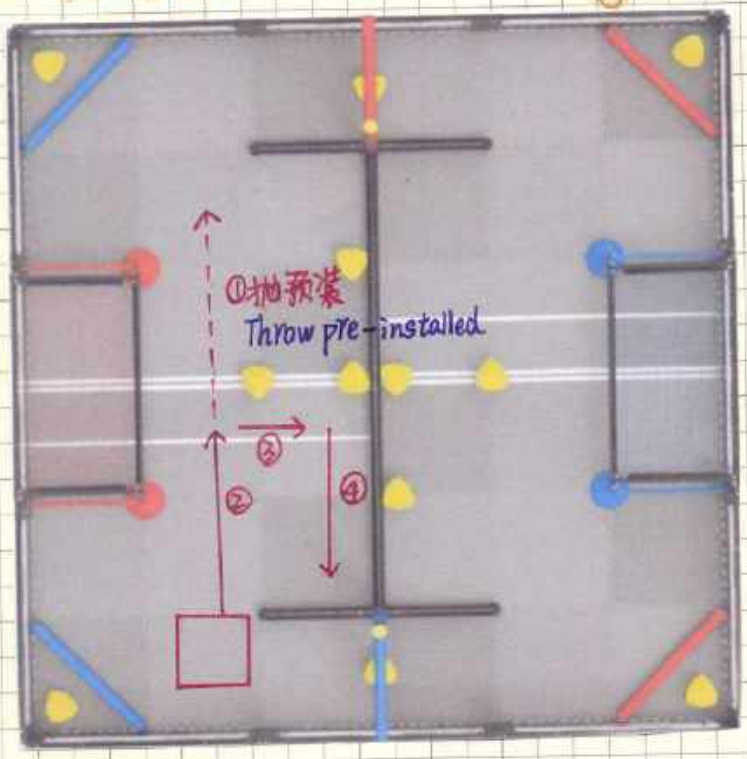
```
if(Controller1.ButtonY.pressing()){
  End1.set(true);
}
```

```
else if(Controller1.ButtonRight.pressing()){
  LG.setStopping(coast);
  RG.setStopping(coast);
}
```

```
else if(Controller1.ButtonB.pressing()){
  End1.set(false);
}
```

自动编程：左边自动1

Automatic Programming: Left automatic 1



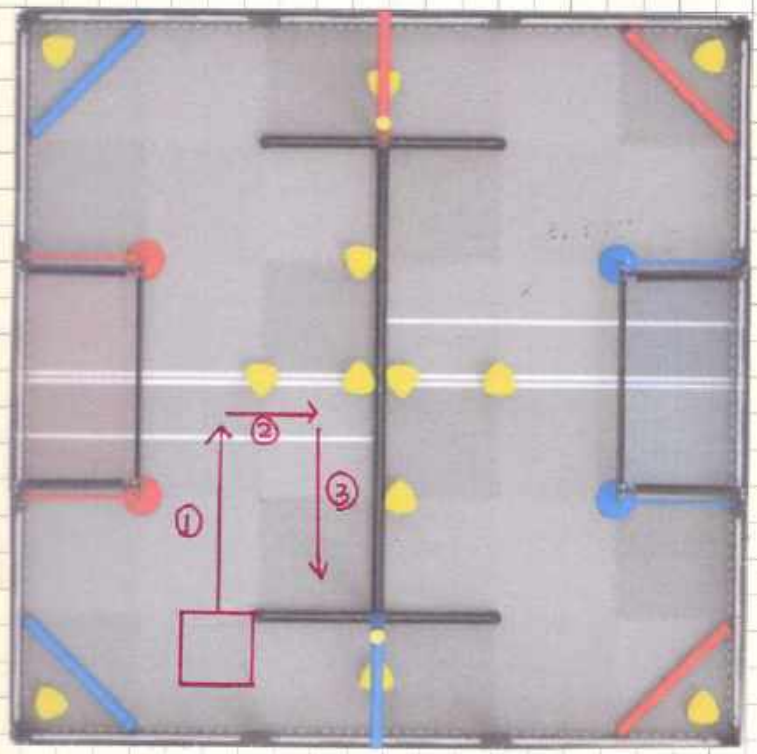

```
void Left1(){//左1
gd();
chassis.drive_distance(2);
wait(0.1, sec);
chassis.turn_to_angle(120);
wait(0.2, sec);
chassis.drive_distance(-10);
hend.set(true);
wait(0.1, sec);
chassis.drive_distance(6);
wait(0.1, sec);
hend.set(false);
Ring1.spin(fwd, 100, pct);
chassis.right_swing_to_angle(90);
wait(0.1, sec);
chassis.drive_distance(6);
chassis.right_swing_to_angle(76);
chassis.drive_distance(17);
hend.set(true);
wait(0.1, sec);
ProjG.spin(fwd, 100, pct);
waitUntil(Shoot.pressing());
ProjG.stop();
```

```
int gd(){
    while (true) {
        ProjG.spinFor(forward, 80, degrees, false);
      wait(0.5, sec);
        ProjG.spin(fwd, 100, pct);
        waitUntil(Shoot.pressing());
        ProjG.stop();
        break;
   wait(0.5, sec);
   }
   return 0;
}
```


日期：2023.11.9
Date：

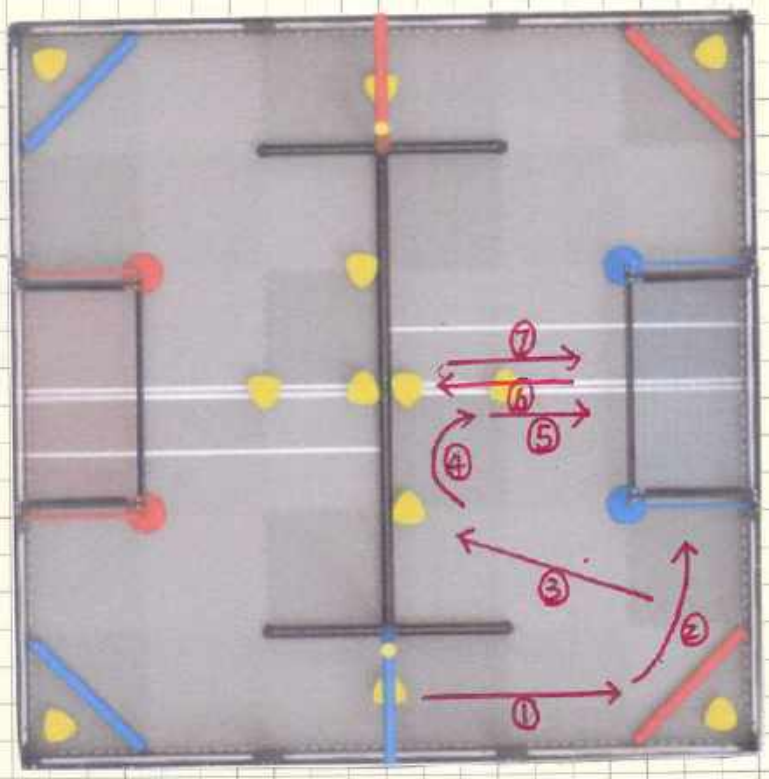
记录员：
witnessed by:

左边自动2. Left automatic 2




```
void Left2(){//左2
ProjG.spinFor(forward, 80, degrees, false);
wait(0.2, sec);
chassis.drive_timeout=1000;
chassis.drive_distance(26);
wait(0.1, sec);
chassis.turn_to_angle(-90);
wait(0.1, sec);
Ring1.spin(fwd, 100, pct);
wait(0.3, sec);
chassis.drive_distance(-10);
hend.set(true);
wait(0.1, sec);
chassis.turn_to_angle(0);
Ring1.stop();
wait(0.1, sec);
chassis.drive_distance(-10);
wait(0.1, sec);
chassis.turn_to_angle(-90);
wait(0.1, sec);
chassis.turn_to_angle(-180);
hend.set(false);
wait(0.1, sec);
chassis.drive_distance(10);
hend.set(true);
chassis.drive_distance(8);
wait(0.1, sec);
ProjG.spin(fwd, 100, pct);
waitUntil(Shoot.pressing());
ProjG.stop();
```

右边自动1 Right automatic 1

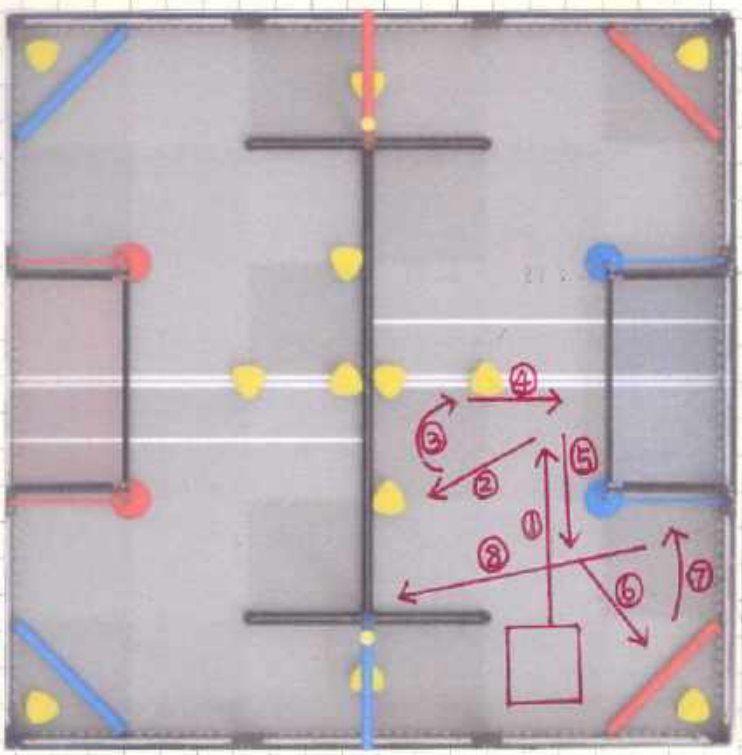



```
void Right1(){//右1
Ring1.spin(reverse, 100, pct);
wait(0.2, sec);
chassis.drive_distance(-20);
wait(0.1, sec);
chassis.turn_to_angle(-225);
wait(0.15, sec);
hend.set(true);
chassis.drive_distance(12);
chassis.right_swing_to_angle(-265);
wait(0.1, sec);
hend.set(false);
chassis.drive_distance(20);
Ring1.stop();
chassis.drive_distance(-10);
wait(0.1, sec);
Ring1.spin(reverse, 100, pct);
chassis.turn_to_angle(20);
chassis.drive_distance(30);
wait(0.2, sec);
chassis.drive_distance(-4);
wait(0.1, sec);
chassis.left_swing_to_angle(179);
chassis.left_swing_to_angle(180);
wait(0.1, sec);
hend.set(true);
chassis.drive_distance(24);
Ring1.stop();
wait(0.1, sec);
hend.set(false);
chassis.drive_distance(-6);
chassis.turn_to_angle(12);
Ring1.spin(reverse, 100, pct);
wait(0.1, sec);
chassis.drive_distance(20);
wait(0.2, sec);
chassis.drive_distance(-6);
wait(0.1, sec);
chassis.turn_to_angle(180);
wait(0.1, sec);
hend.set(true);
chassis.drive_distance(21);
Ring1.stop();
hend.set(false);
chassis.drive_distance(-10);
```


日期：2023.11.10
Date:

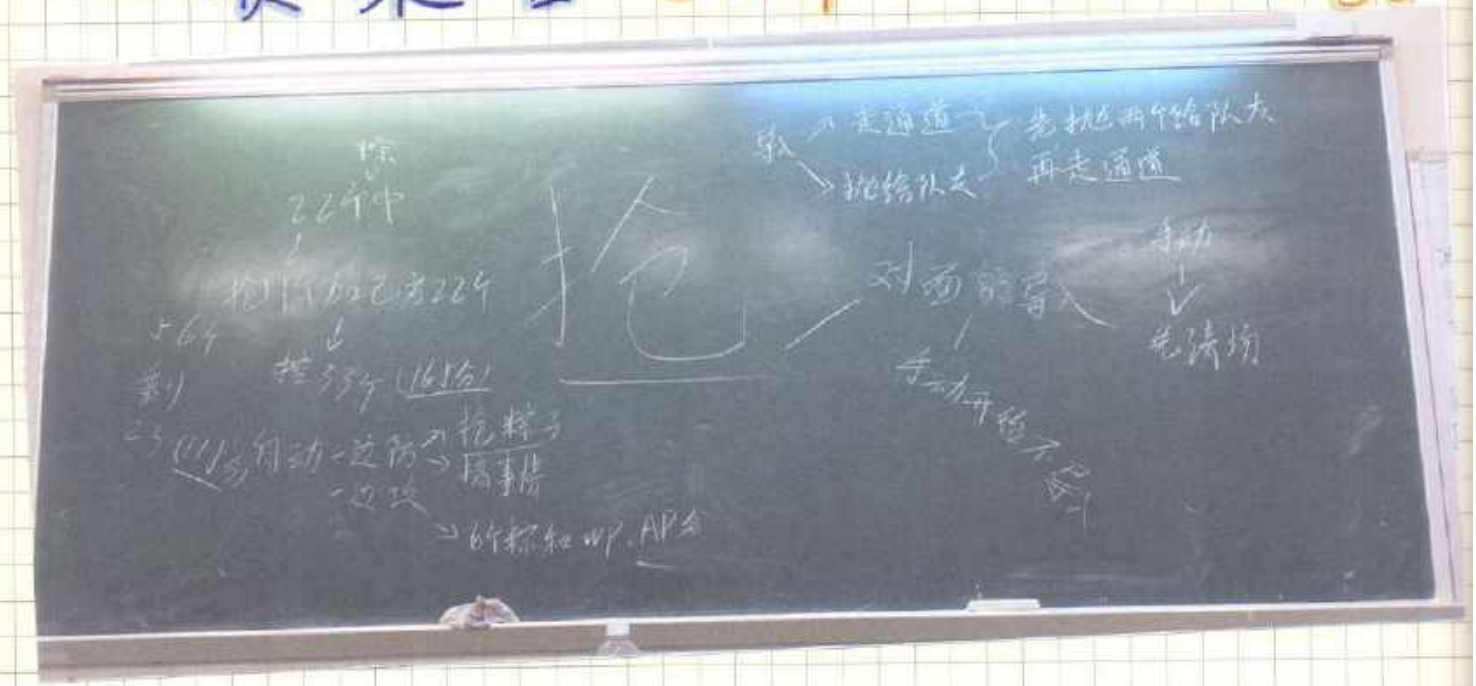
记录员：
witnessed by:

右边自动2 Right automatic 2.




```
void Right2(){//右2
Ring1.spin(reverse, 100, pct);
chassis.drive_distance(24);
chassis.turn_to_angle(90);
chassis.drive_distance(9);
chassis.drive_distance(-8);
wait(0.1, sec);
chassis.turn_to_angle(-123);
wait(0.1, sec);
chassis.drive_distance(18);
chassis.left_swing_to_angle(-90);
wait(0.1, sec);
chassis.drive_distance(-10);
wait(0.1, sec);
hend.set(true);
chassis.left_swing_to_angle(80);
chassis.left_swing_to_angle(92);
wait(0.1, sec);
chassis.drive_distance(24);
wait(0.1, sec);
hend.set(false);
chassis.drive_distance(-7);
Ring1.stop();
chassis.turn_to_angle(-2);
chassis.drive_distance(-20);
chassis.turn_to_angle(110);
hend.set(true);
chassis.drive_distance(14);
chassis.turn_to_angle(-30);
hend.set(false);
wait(0.1, sec);
chassis.drive_distance(7);
chassis.right_swing_to_angle(-90);
chassis.drive_distance(30);
hend.set(true);
wait(0.1, sec);
chassis.drive_distance(5);
chassis.right_swing_to_angle(-80);
```

比赛策略 Competition Strategy



- 比赛策略：抢对面的导入，手动开始不导入。
- 例：对面有22个导入，我们尽量抢一半(11个)加上我方的22个，我方主要控制33个，让对方少于我方的"Triballs".

- Competition strategy: Grab the introduction of the opposite side, and don't start manually.
- There are 22 introductions on the opposite side. We try to grab half (11) plus 22 of ours. We mainly control 33, so that the other party is less than our "Triballs".

- 自动：
- 一个攻击一个防守(赛前与队友讨论).
- 防：抢"Triballs" 或打乱对面节奏.
- 攻：夺得6个"Triballs"和WP、AP分.

- Automatic
- One attack and one defense (discuss with teammates before the game
- Prevention: Grab "Triballs" or disrupt the opposite rhythm.
- Attack: Won 6 "Triballs" and WP and AP points

日期：2024.11.9
Date:
记录员：G
Witnessed by:

● 导入：

1. 走高挂低杆通道

2. 抛给队友

我们先抛两个给队友，再导入后走低杆通道.

● Introduction:

1. Go high and hang the low bar channel.

2. Throw it to your teammates.

Let's throw two to our teammates first, and then take the low-pole channel after importing it.

● 手动：

先清对方进攻区的"Triballs"，再配合队友把场地中的"Triballs"推进得分区.

● Manual:

First, clear the "Triballs" in the opponent's attack area, and then cooperate with your teammates to push the "Triballs" in the field into the scoring area.

11月25日(25th Nov.) ● 第五届粤港澳青少年机器人大赛.

● The 5th Guangdong-Hong Kong-Macao Youth Robot Competition.

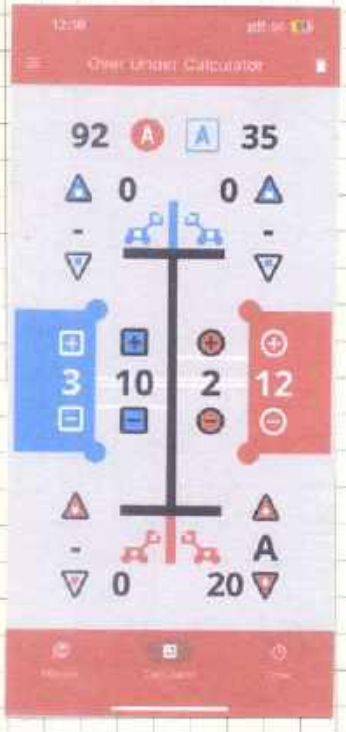
● 获得冠军及一等奖

● Won the champion an 1st prize.

日期：2023.11.26 Date:

记录员：G Witnessed by:

赛况 Match Result

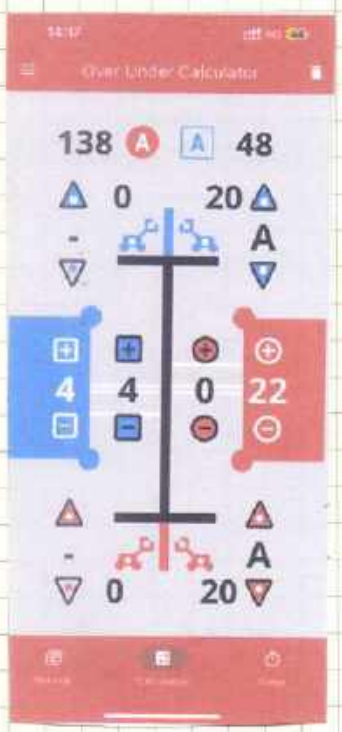


Q8

W

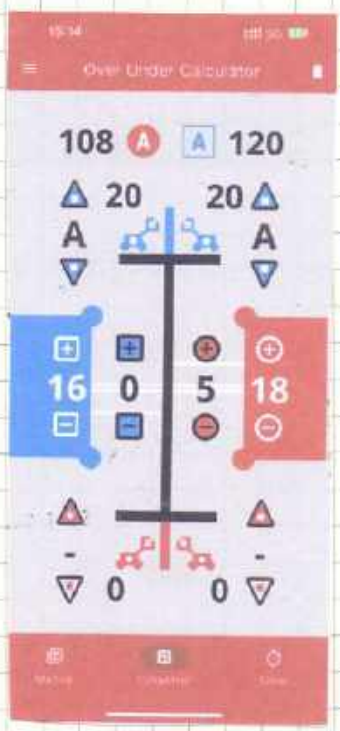
Q 11

W



Q20

W

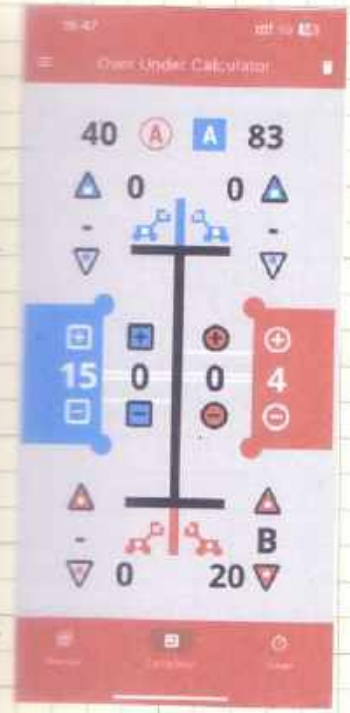


Q24

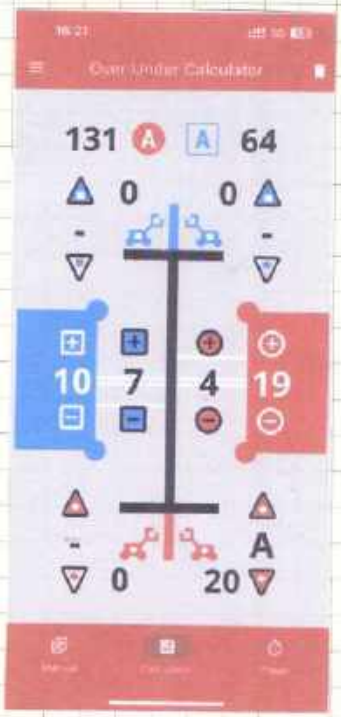
W

日期: 2023.11.28.
Date:

记录员:
Witnessed by:



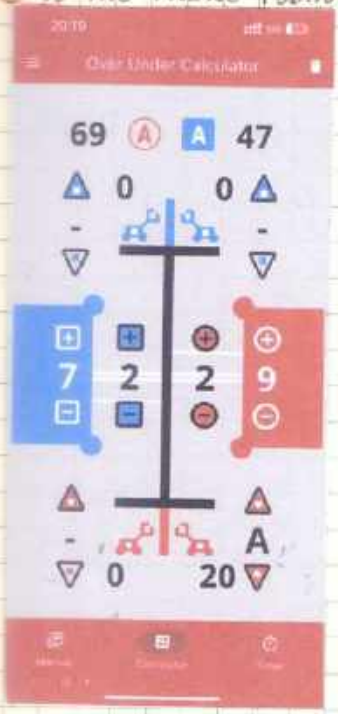
Q31

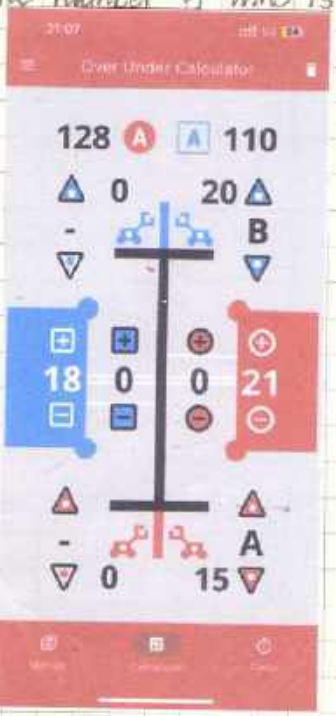


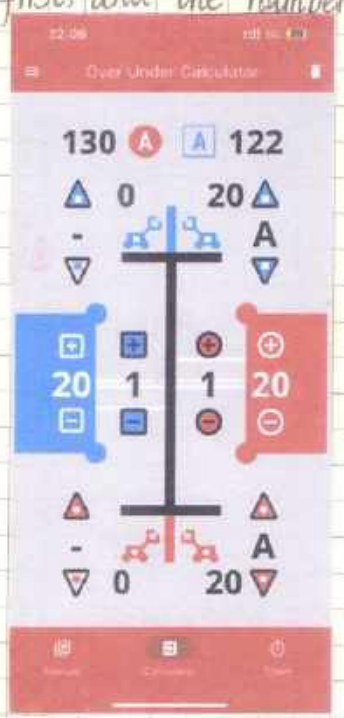
Q44

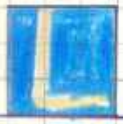
冠亚季赛 Champions League Season

- 循环赛先比赢的次数，赢的次数一样比最好成绩.
- In the round robin competition, the number of wins is compared first, and the number of wins is also compared to the best result.









日期：2023.11.27
Date：

记录员：
Witnessed by

三代机

3rd machine

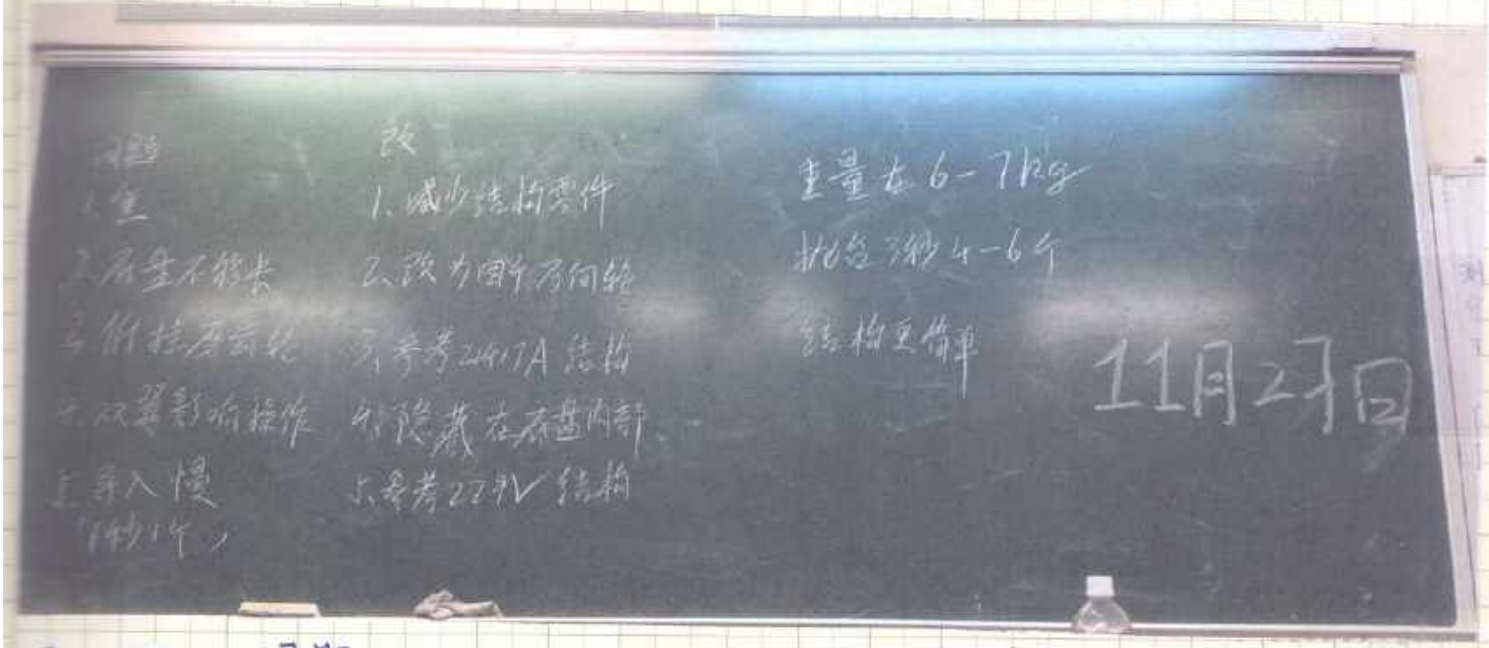
搭建

construction

11月27日 (27th Nov.)

会议12(二代机问题)

Meeting 12 (2nd machine problem)



● 二代机问题:

1. 机器过重(7.9KG)
2. 底盘不够长
3. 低挂会磨齿轮
4. 双翼的位置影响操作
5. 机器导入抛出Triballs速度慢

● Problems with the 2nd machine:

1. The machine is to heavy. (7.9kG).
2. The chassis is not long enough.
3. Low-hanging grinding gear.
4. The position of the wings affects the operation.
5. The machine is slow to throw Triballs.

● 改善:

1. 减少结构零件(二代机太过于追求结实抗撞).
2. 6个轮(2个胶轮 + 4个万向轮)改为4个万向轮.
3. 低挂从齿轮改为气动(From. 2141A).
4. 双翼隐藏在底盘内部(从贴着底盘外围到底盘上面,减少底盘左右长度,方便过通道.)
5. 改变机器导入抛出结构(From. 229V).

日期: 2023.11.28.
Date:

记录员: G
witnessed by:

Improvement:

1. Reduce structural parts (2nd aircraft too pursues strong and anti-collision).
2. 6 wheels (2 rubber wheels + 4 universal wheels) to 4 universal wheels.
3. Low hanging changed from gear to pneumatic (From: 21417A).
4. The wings are hidden inside the chassis (from the outside of the chassis to the bottom plate, reduce the left and right length of the chassis, which is convenient to cross the channel.)
5. Change the machine to introduce the throwing structure (From: 229V).

21417A

229V.

预测

1. 重量在6~7KG.
2. 导入抛出速度约3s达到4~6个.
3. 结构更简单.

Prediction

1. The weight is 6~7 KG
2. The input throwing speed is about 3s to reach 4 to 6.
3. The structure is simpler.

11月28日 (28th Nov.)

会议13(底盘构思).

Meeting 13 (Construction of the chassis).

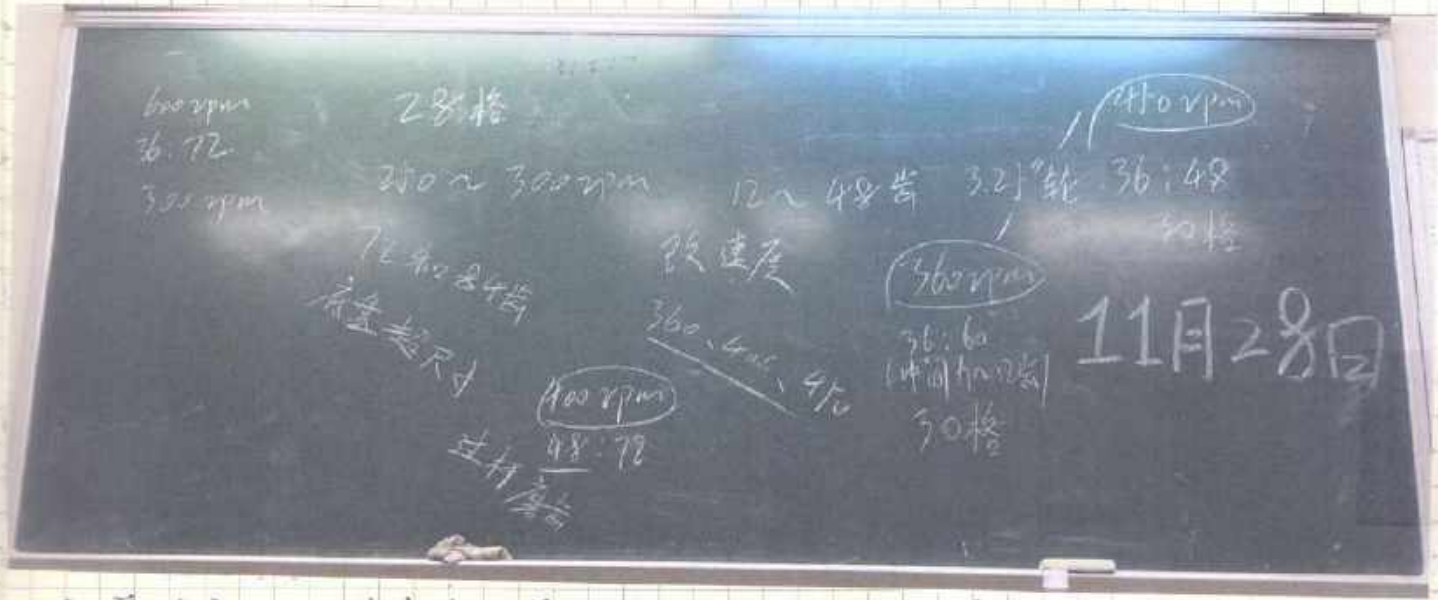
1. 底盘尺寸28×29格.(二代机).
2. 底盘齿轮36:12,速度为300rpm.

因为齿轮比如果为12:84,底盘就会超尺寸,所以只可以加12~48齿的齿轮且确保底盘单边的齿轮为单数。算出来的底盘速度会是360, 400, 450rpm三种.

日期: 2023.11.28.
Date:

记录员:
Witnessed by:

1. The chassis size is 28×29 (2nd machine).
2. The chassis gear is 36:72, and the speed is 300rpm.
   - Because if the gear ratio is 78:84, the chassis will be oversized, so only 12 to 48 gears can be added and the gears on one side of the chassis can be singular. The calculated chassis speed will be 360, 400, 450rpm.



- 底盘速度400rpm的齿轮比是48:72，我们一代机底盘为400rpm，所以我们知道过通道低杆会磨齿轮(不采用).
- 底盘速度360rpm的齿轮比是36:60(中间+12齿)底盘长度30格可以运用(可选).
- 底盘速度450rpm的齿轮比是36:48，底盘长度30格可以运用(可选).
- 因为我们的策略是抢Triballs，需要速度快，所以我们选择底盘速度为450rpm.

! 会议结论：底盘选择30格×29格，底盘速度450rpm，齿轮比是36:48，搭配3.25英吋的万向轮.

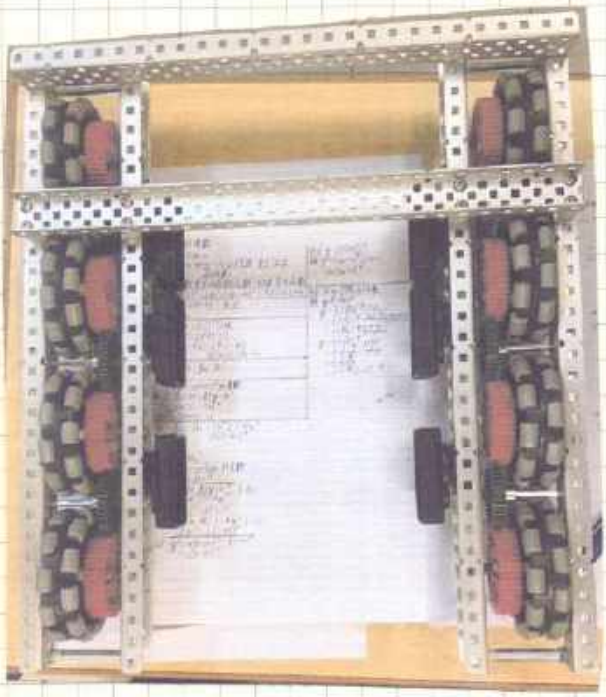
- The gear ratio of the chassis speed of 400 rpm is 48:72, and the chassis of our first generation is 400rpm, so we know that the low rod of the channel will grind the gear (not used).
- The gear ratio of the chassis speed of 360rpm is 36:60(middle +12 teeth) and the chassis length of 30 grids can be used(optional).

- The gear ratio of the chassis speed of 450rpm is 36:48, and the chassis length of 30 grids can be used (optional).
- Because our strategy is to grab Triballs, it needs to be fast, so we choose the chassis speed of 450rpm.

! Conclusion of the meeting: The chassis is 30×27 grids, the chassis speed is 450 rpm, the gear ratio is 36:48, and it's equipped with a 3.25-inch universal wheel.

11月29日～12月1日(29th Nov. ~ 1st Dec.)

底盘搭建 Chassis Construction



- 三代机底盘尺寸是30×27格，底盘齿轮比是36:48，底盘速度为450rpm.
- 加长了底盘长度，可以减少底盘翘头翘尾的机率(2022～2023赛季经验).

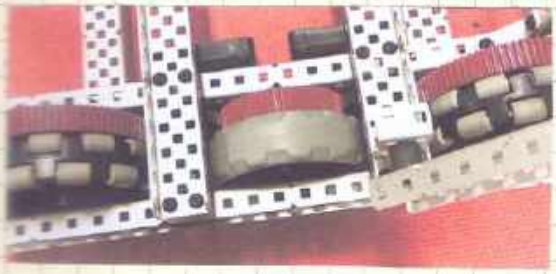
- The chassis size of the 3rd machine is 30×27 grids, the gear ratio of the chassis is 36:48, and the speed of the chassis is 450rpm.
- The increase in the length of the chassis can reduce the probability of the chassis upturned (experience in the 2022~2023 season).

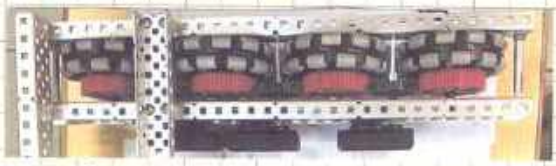
- 底盘测试(7KG负重)：就算底盘负重7KG的哑铃，也完全没有翘头翘尾的情况。且与其他队伍搭建完的机器对比，我们机器负重7KG速度仍然较快。

- Chassis Test (7KG load): Even if the chassis weight is 7KG, there is no warp at all. And compared with the machines built by other teams, our machine is still faster with a weight of 7K

● 测试后发现的缺点：

1. 底盘在转弯时会飘移，因为我们的机器底盘中间没有定向轮。
2. 过杆的时候，因为力小，如果底盘卡在中杆上，会很难冲过去。
3. 底盘结构(轴锁)距离太近，齿轮太多，若底盘出现问题，难找出真正问题去维修，需要一个一个拆开才能够发现问题。





● 底盘结构拥挤

● Chassis structure is crowded.

● 万向轮　● Universal wheels.

● Disadvantages found after testing.

1. The chassis will be drift when turning, because there is no directional wheel in the middle of our machine chassis.
2. When crossing the pole, because the force is small, if the chassis is stuck in the middle pole, it will be difficult to rush over.
3. The chassis structure (shaft lock) is too close and there are too many gears. If there is a problem with the chassis, it's difficult to find the real problem to repair. It needs to be disassembled one by one to find the problem.

12月2日(2nd Dec.)

会议14(框架会议)

Meeting 14 Framework meeting

- 二代机框架缺点：
  1. 框架结构多而且复杂.
  2. 框架重量重;
  3. Triballs 无法送上抛台.

- Disadvantages of 2nd machine framework:
  1. There are many and complex frame structures;
  2. The frame is too heavy.
  3. Triballs can't sent to the table.

- 我们本来打算参考229V的抛台结构：抛台24:72的齿轮比，速度为33rpm。
- 但是因为齿轮太大会导致抛台结构太高，会出现二代机一样的问题(抛台与高挂杆存在极限高度)，所以我们没有直接运用他们的齿轮比，而是采用了12:36的齿轮比，速度为33rpm。齿轮较小，抛台结构会低一点，不存在抛台和高挂杆有极限高度的问题。

- We originally planned to refer to the 229V throwing platform structure: the gear ratio of throwing platform 24:72, the speed is 33rpm.
- Because the gear is too large, the throwing platform stucture will be too high, and the same problem will occur in the 2nd machine (the throwing platform and

日期: 2023.12.3 Date:
记录员: witnessed by.

the high hanging rod have a limit height), so we did not directly use their gear ratio, but adopted a 12:36 gear ratio with a speed of 33rpm. The gears are small, and the throwing platform structure will be lower. There is no problem of the limit height of the throwing platform and the high hanging rod.

- 需要进行抛与吸的距离的实验(理想效果):
  1. 抛台下降一半时,抛台能够顶着Triballs;
  2. 抛台完全下降,就可以送上抛台.

- Experiments on the distance between throwing and suction need to be carried out (ideal effect):
  1. When throwing the lower half of the stage, the throwing platform can be topped by Triballs;
  2. If the throwing platform is completely lowered, it can be sent to the throwing platform.

12月3日 ~ 12月7日(3rd ~ 7th Dec)

框架搭建

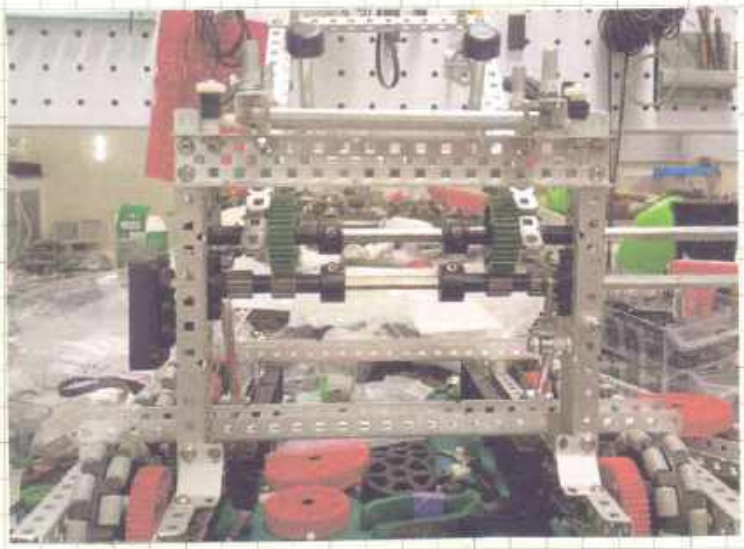
Framework Construction.

- 抛台尝试用一代机的结构(1×1的铝件),但是发现铝件硬度不够,在手动测试时有出现几次弯曲的现象,所以还是改用了1×2的铝件。
- 因为抛射结构太靠前,搭建好的低抛台在底盘外面,我们担心比赛时会容易把低抛台撞弯,所以我们将抛射结构往后移了一格,令低抛台在底盘里面,不容易被撞.

- The throwing table tried to use the structure of a 1st machine (1×1 aluminum part), but found that the aluminum part was not hard enough, and there were

several bending phenomena during the manual test, so I changed to 1×2 aluminum parts.

4. Because the projectile structure is too forward, the built low throw platform is outside the chassis. We are worried that it will be easy to bend the low throw platform during the game. So we moved the projectile structure back by one grid, so that the low throwing platform is in the chassis, which is not easy to be hit.



4. 抛台高度：将框架的两条铝件对比一代机减少一格。

4. 因为在粤港澳比赛中发现，我们的二代机的高度是刚刚好抵住高挂杆，是极限位置。如果场地不合规格（例如场地边框在地垫外，高挂杆会低一点），就会过不了通道。所以我们减少了一格，框架高度与高挂杆不再是极限位置，过通道限制减少。

日期：Date: 2023.12.8

记录员：Witnessed by:

- Throwing platform height: reduce the two aluminum parts of the frame by one grid compared with the 1st machine.
- Because in the Guangdong-Hong Kong-Macao competition, it was found that the height of our 2nd aircraft was just against the high pole, which was the limit position. If the site doesn't meet the specifications (for example, if the site border is outside the floor mat, the high hanging rod will be lower), it will not be able to pass the drift. Therefore, we have reduced the frame height and high hanging rod no longer the limit position, and the cross-drift limit is reduced.

- 框架收起状态 - The frame is closed

- 框架伸展状态 - Frame stretching state

1. 将5.5W电机装在框架两边，使框架两边重量相等。
2. 5.5W电机本来的速度为200rpm，效率不高，所以我们加用12:6的链齿，使它速度提升一倍为400rpm.

1. Install the 5.5W motor on both sides of the frame so that the weight on both sides of the frame is equal.
2. The original speed of the 5.5W motor is 220 rpm, and the efficiency is not high, so we add 12:6 chain teeth to double its speed to 400 rpm.

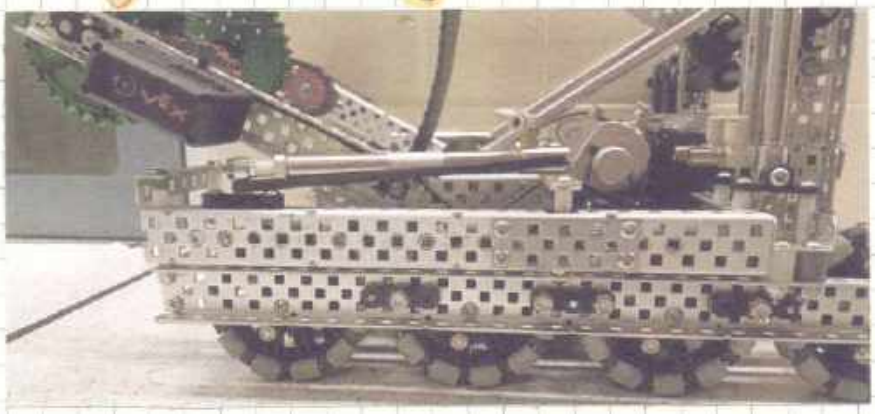
网的作用：一代机时在比赛中一直出现Triballs到抛台下面卡住，导致抛台下不去，也无法让Triballs出来，无法得分，只可以进行干扰。而增加了网，在抛台未下去的时候，网会撑起，起到拦住Triballs的作用，使它无法到抛台下面卡住。

The role of the net: Triballs always appear in the game and get stuck under the throwing platform, resulting in the failure of the throwing platform, and the inability to let the Triballs come out, unable to score, and can only interfere. And the net is added. When the platform is not down, the net will be supported and plays a role in stopping the Triballs, so that it can't get stuck under the platform.

12月8日～12月9日(8th ~ 9th Dec.)

双翼会议及搭建

Double-wing meeting and Construction

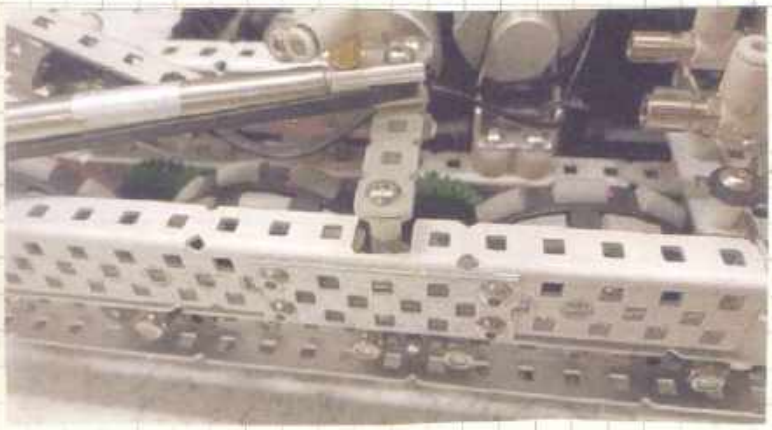


用了四个3.25-inch的万向轮，底盘高度降低，我们需要把双翼的高度上移，不可以在底盘外面。因为比赛中，双翼在底盘外面，会突出从而影响过通道(例如：会顶住场地边缘)，所以我们把三代机的双翼隐藏在底盘内部，不影响操作及过通道。

日期：2023.12.9
Date:

记录员：
Witnessed by:

With four 3.25-inch universal wheels, the height of the chassis is reduced. We need to move the height of the wings up, not outside the chassis. Because in the game, the wings are outside the chassis, which will protrude and affect the passageway (for example, it will hold the edge of the field), so our 3rd of aircraft hides the wings inside the chassis, which will not affect the operation or affect the drift.



我们把双翼切了一个缺口，因为有缺口之后就不会因为六角柱顶住，而影响双翼完全收进底盘。

但是因为铝件切了缺口，会导致铝件硬度降低，所以我们增添了两个铁制零件，令双翼的铝件硬度提高。

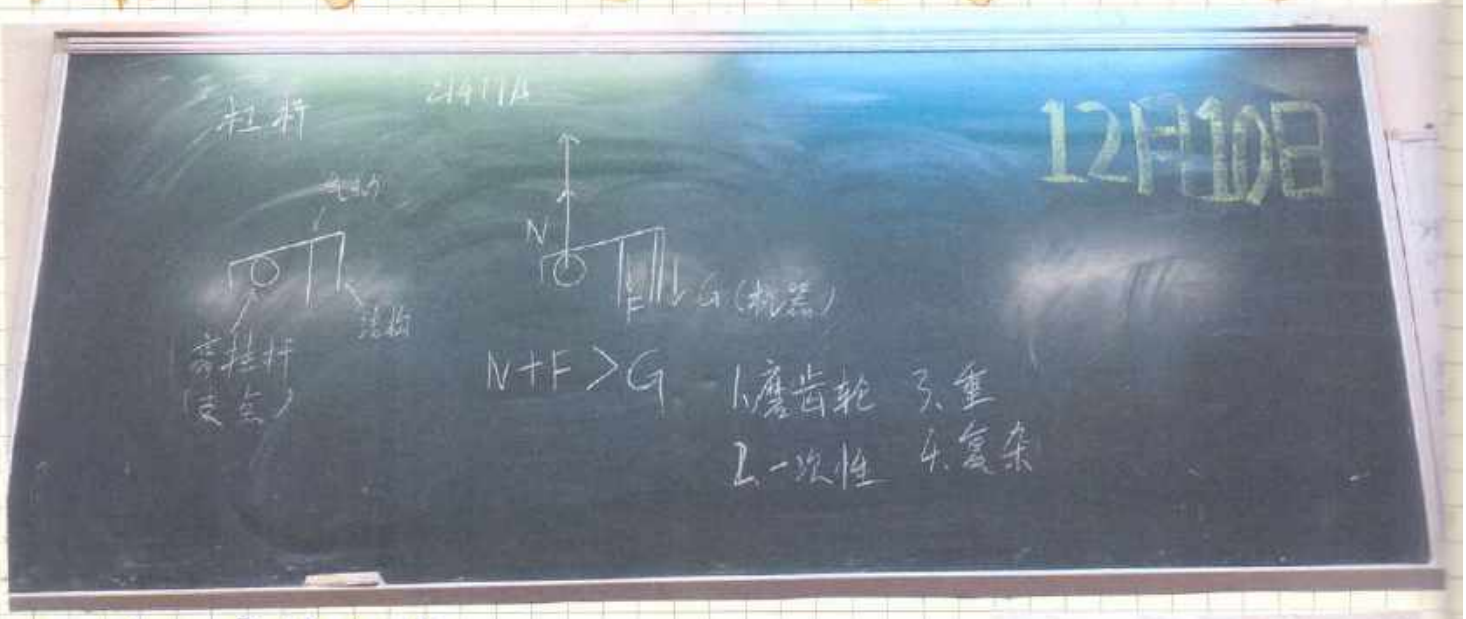
We cut a gap in the wings, because after there is a gap, the wings will not be completely closed into the chassis because of the hexagonal column.

Because the aluminum part cut the notch, the hardness of aluminum part will be reduced, so we added two iron parts to improve the hardness of the aluminum part of the two wings.

12月10日 (10th Dec.)

会议15(高挂会议)

Meeting 15 (high-hanging meeting)



⑴二代机高挂缺点：

1. 高挂齿轮组中的铁12齿易磨损齿轮.
2. 不可循环用：一场比赛中只可以按一次高挂按键，因为锁是自动打开的，高挂结构只可以上升，不可以下降.
3. 重：因为齿轮组重，所以加重了整台机器的重量.
4. 复杂：齿轮组的结构复杂.

⑴ High-hanging disadvantages of the 2nd machine:

1. Iron 12-tooth wear gears in the high-hanging gear group.
2. Non-recyclable: The high-hanging button can only be pressed once in a game, because the lock is automatically opened, and the high-hanging structure can only rise and cannot be lowered.
3. Weight: Because the gear set is heavy, the weight of the whole machine is increased.
4. Complexity: The structure of the gear set is complex.

日期 Date: 2023.12.11

记录员 Witnessed by: G

改善：

1. 不用二代机的齿轮组，改用气动来进行高挂(用四根气动杆，每边各两个).
2. 气动原理：用气动可以令机器高挂结构在上升之后也可以下降(不会因为误触整场用不了高挂).
3. 气动好处：场控不会影响气动，因为是用气压住高挂结构。

Improvement:

1. Without the gear set of the 2nd machine, use pneumatic for high-hanging (with four pneumatic rods, two on each side).
2. Pneumatic principle: Using pneumatics can make the machine's high-hanging structure rise or fall (it will not be impossible to use high-hanging in the whole field due to accidental contact).
3. Aerodynamic benefits: Field control will not affect pneumatic, because the high-hanging structure is used to hold the air pressure.

N为支持力，G为重力，F为气动给的力。

1. 当N+F>G时就可以上升高挂结构；
2. 当N+F<G时可以令高挂结构下降；
3. 当高挂结构锁定时，所有力=0.

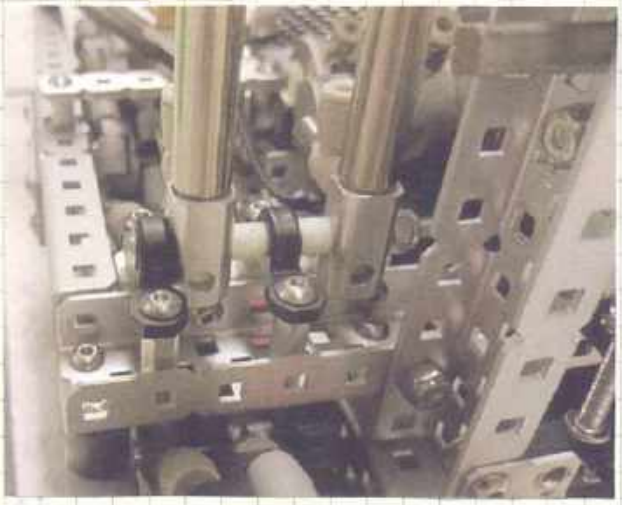
N is the support force and G is the gravity. F is the force given by pneumatic.

1. When N+F>G, you can rise the high-hanging structure,
2. When N+F<G, the high-hanging structure can be lowered.
3. When the high-hanging structure is locked, all forces =0.

12月11日 ~ 12月16日 (11th ~ 16th Dec.)

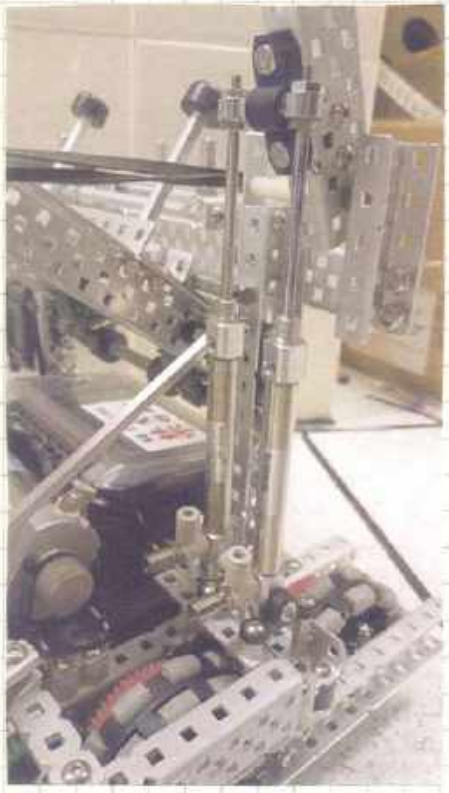
高挂搭建

High-mounted Construction



用气动时，高挂杆收缩需要一定空间，所以我们用轴承座，撑起一定高度，使在运用气动时，高挂杆有足够活动的空间，不被顶住。

When pneumatic, the high-hanging rod needs a certain space to shrink, so we use the bearing seat to support a certain height, so that when using pneumatic, the high-hanging rod has enough space to move and is not supported.



使用气动时，高挂杆伸出状态

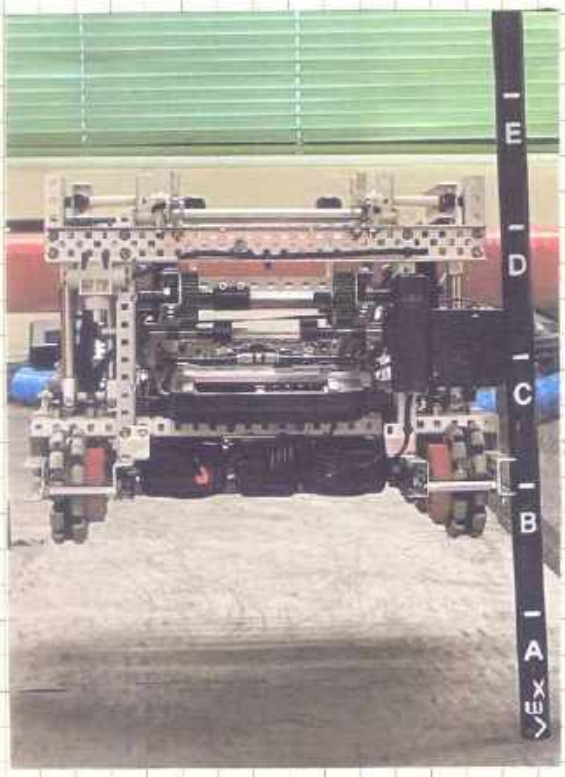
When using pneumatic, the high-hanging rod is in a state of protruding.

高挂锁定状态

High-hang lock state

日期: Date: 2023.12.12

记录员: Witnessed by: G



我们2代机的高挂等级是A级，3代机的高挂等级达到B级.

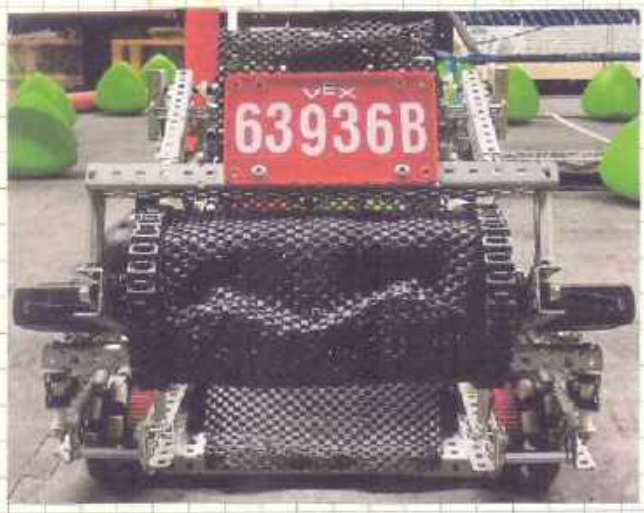
The high-hanging level for our 2nd aircraft is A level, and the high-hanging level of the 3rd aircraft reaches B level.

日期: 2023.12.17
Date:

记录员: G
witnessed by:

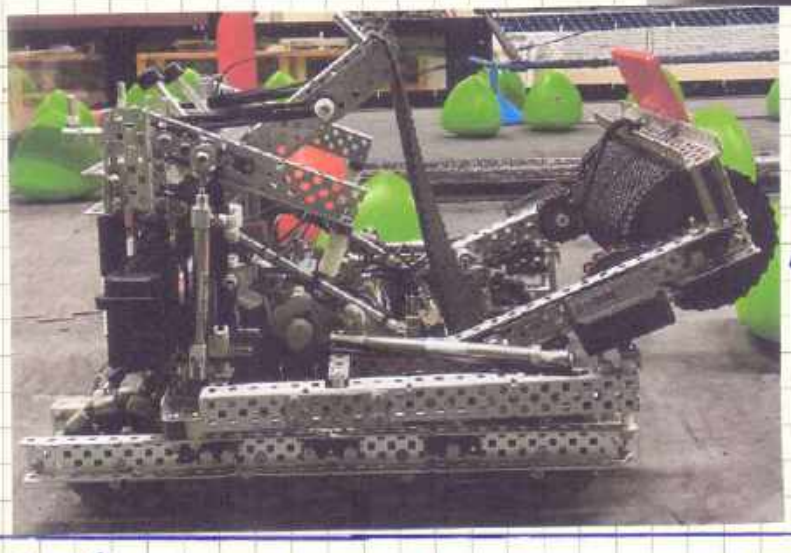
机器成品图1(3代)

2nd Machine finished product drawing



- 机器正面图
- Front view of the machine

- 机器背面图
- The picture on the back of the machine



- 机器右侧图
- The picture on the right side of the machine

日期: 2023.12.19
Date.

记录员
witnessed by.

机器成品图2(3代)

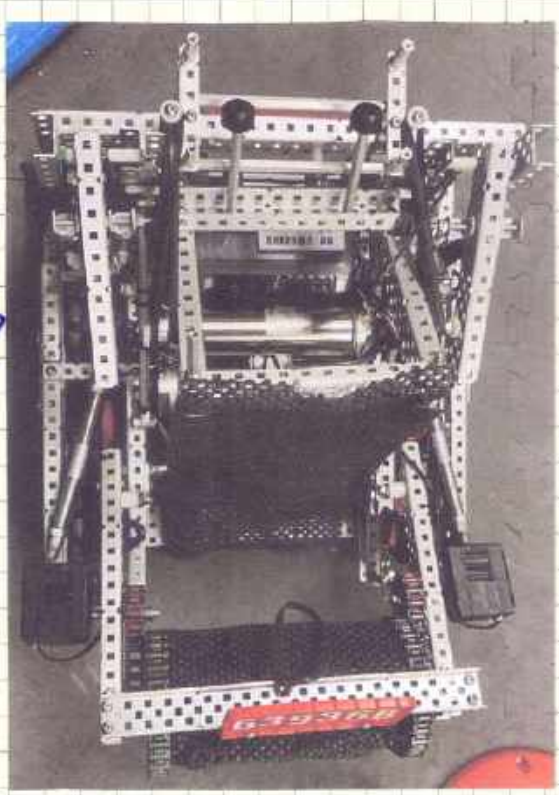
2nd Machine finished product drawing

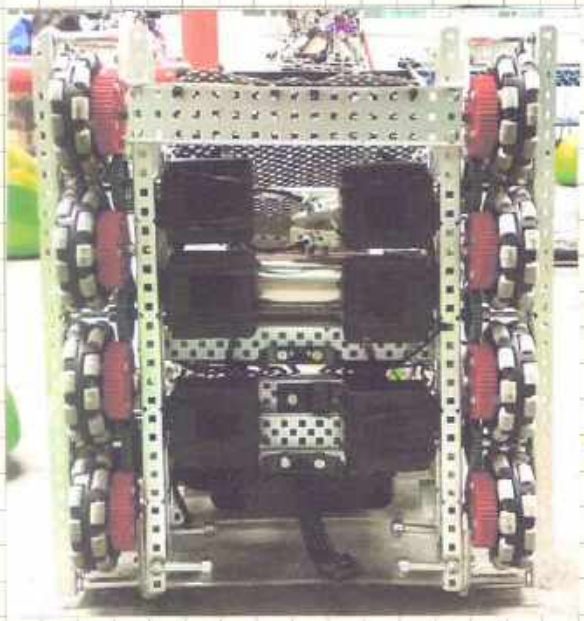
机器左侧图

The picture on the left side of the machine

机器俯视图

Machine top-down view





机器仰视图

Machine up view

日期: 2023.12.19
Date:

记录:
Witnessed by:

三代机

3rd machine

编程

Programming

12月20日 ~ 12月28日(20th ~ 28th Dec.)

手动编程

Manual Programming

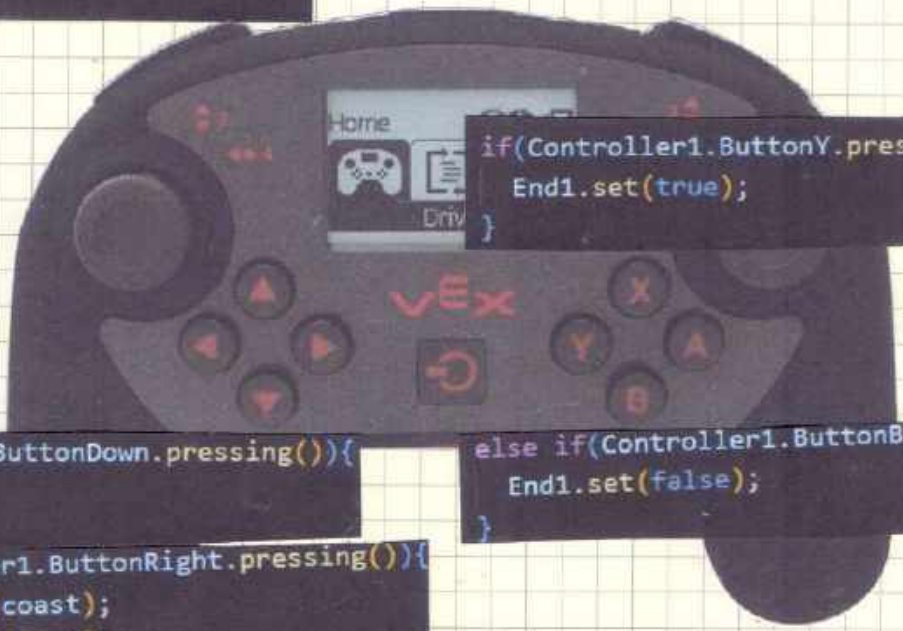
```
task rc_auto_loop_task_Controller1(rc_auto_loop_function_Controller1);
```

```
if(Controller1.ButtonL1.pressing()){
  RingG.spin(fwd, 100, pct);
}
else{
  RingG.spin(reverse, 100, pct);
}
```

```
if(Controller1.ButtonL2.pressing()){
  hend.set(true);
}
else{
  hend.set(false);
}
```

```
if(Controller1.ButtonR1.pressing()){
  ProjG.spinFor(fwd,90, degrees, false);
  wait(0.2, sec);
  ProjG.spin(fwd, 100, pct);
  waitUntil(Shoot.pressing());
  ProjG.stop();
}
```

```
if(Controller1.ButtonR2.pressing()){
  ProjG.spinFor(fwd, 60, degrees, false);
}
```




```
if(Controller1.ButtonY.pressing()){
  End1.set(true);
}
```

```
if(Controller1.ButtonDown.pressing()){
  ProjG.stop();
}
```

```
else if(Controller1.ButtonB.pressing()){
  End1.set(false);
}
```

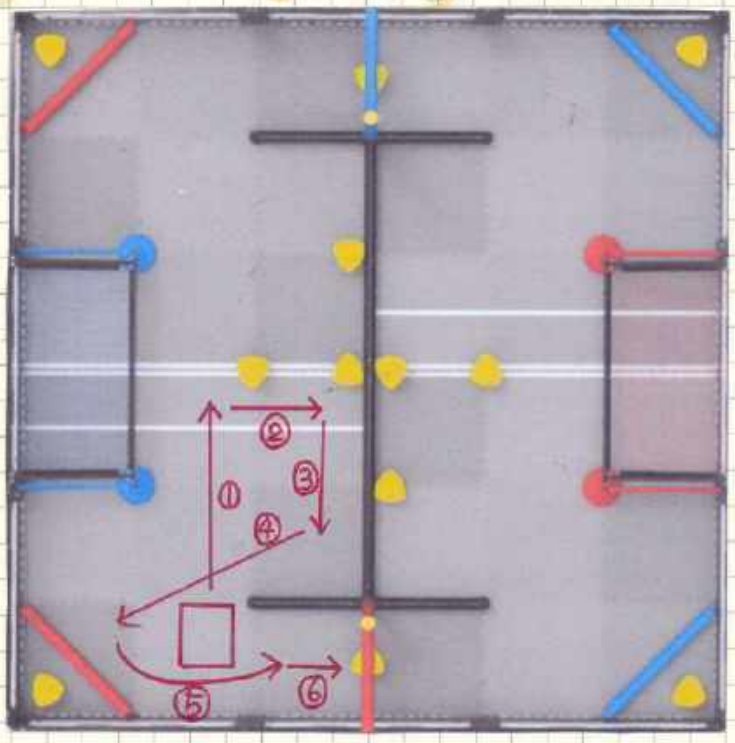
```
else if(Controller1.ButtonRight.pressing()){
  LG.setStopping(coast);
  RG.setStopping(coast);
}
```

```
if(Controller1.ButtonLeft.pressing()){
  LG.setStopping(hold);
  RG.setStopping(hold);
}
```

自动编程：左边自动1

Automatic Programming: Left automatic1

```
void Left1(){//左1
ProjG.spin(fwd, 100, pct);
wait(0.2, sec);
ProjG.stop();
chassis.drive_distance(22);
wait(0.1, sec);
chassis.turn_to_angle(-90);
hend.set(true);
RingG.spin(fwd, 100, pct);
wait(0.1, sec);
chassis.drive_distance(-9);
RingG.stop();
wait(0.1, sec);
chassis.turn_to_angle(0);
wait(0.1, sec);
chassis.drive_distance(-9);
wait(0.1, sec);
chassis.turn_to_angle(-125);
hend.set(false);
wait(0.1, sec);
chassis.drive_distance(20);
hend.set(true);
wait(0.1, sec);
chassis.turn_to_angle(-250);
wait(0.1, sec);
hend.set(false);
RingG.spin(fwd, 100, pct);
chassis.drive_timeout=1800;
chassis.drive_max_voltage=3;
chassis.drive_distance(26);
chassis.turn_to_angle(-268);
chassis.drive_distance(7.5);
hend.set(true);
```

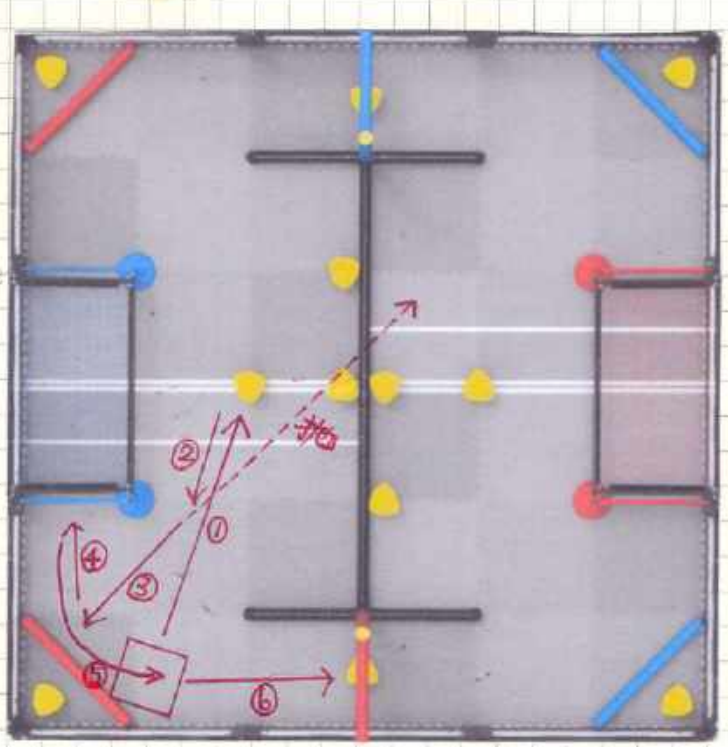


日期：2023.12.29
Date.

记录。
Witnessed by.

左边自动2 Left automatic 2

```
void Left2(){//左2
ProjG.spin(fwd, 100, pct);
wait(0.2, sec);
ProjG.stop();
hend.set(true);
wait(0.2, sec);
hend.set(false);
task a=(gd);
RingG.spin(reverse, 100, pct);
chassis.drive_distance(28);
wait(0.2, sec);
chassis.drive_distance(-12);
wait(0.1, sec);
chassis.turn_to_angle(-120);
RingG.stop();
wait(0.1, sec);
chassis.drive_distance(13);
gd();
wait(0.1, sec);
chassis.turn_to_angle(-195);
wait(0.1, sec);
chassis.drive_distance(-7);
wait(0.1, sec);
chassis.drive_distance(6);
wait(0.1, sec);
chassis.right_swing_to_angle(-245);
wait(0.1, sec);
hend.set(true);
chassis.drive_distance(11);
wait(0.1, sec);
chassis.right_swing_to_angle(-275);
hend.set(false);
wait(0.1, sec);
RingG.spin(fwd, 100, pct);
chassis.drive_distance(15);
hend.set(true);
```

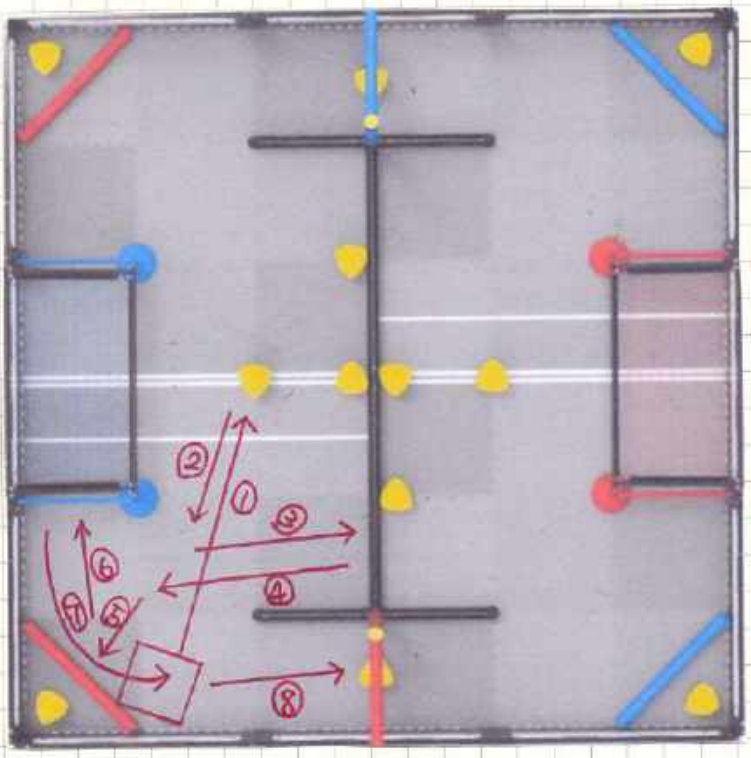


日期: Date: 2023.12.29

记录员: Witnessed by: Gracie

左边自动3 Left automatic 3

```
void Left3(){//左2
ProjG.spin(fwd, 100, pct);
wait(0.2, sec);
ProjG.stop();
hend.set(true);
wait(0.2, sec);
hend.set(false);
RingG.spin(reverse, 100, pct);
chassis.drive_distance(28);
wait(0.1, sec);
chassis.drive_distance(-9);
RingG.stop();
wait(0.1, sec);
chassis.turn_to_angle(75);
wait(0.1, sec);
RingG.spin(fwd, 100, pct);
chassis.drive_max_voltage=6;
chassis.drive_distance(15);
wait(0.1, sec);
RingG.stop();
chassis.drive_max_voltage=12;
chassis.drive_distance(-10);
wait(0.1, sec);
chassis.turn_to_angle(55);
wait(0.1, sec);
chassis.drive_distance(-15);
wait(0.1, sec);
chassis.turn_to_angle(162);
wait(0.1, sec);
chassis.drive_distance(-8);
wait(0.1, sec);
chassis.drive_distance(6);
wait(0.1, sec);
chassis.right_swing_to_angle(-245);
wait(0.1, sec);
hend.set(true);
chassis.drive_distance(11);
wait(0.1, sec);
chassis.right_swing_to_angle(-275);
hend.set(false);
wait(0.1, sec);
RingG.spin(fwd, 100, pct);
chassis.drive_distance(16);
hend.set(true);
```

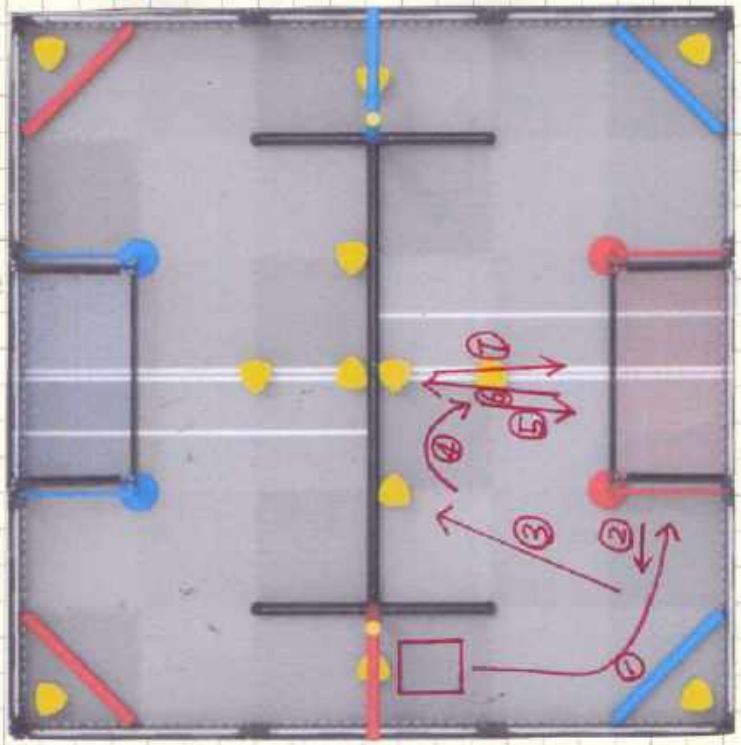


日期: Date: 2023.12.29

记录员: Witnessed by: G

右边自动1 Right automatic 1

```
void Right1(){//右1
ProjG.spin(fwd, 100, pct);
wait(0.2, sec);
ProjG.stop();
RingG.spin(reverse, 100, pct);
wait(0.1, sec);
chassis.drive_distance(-17);
wait(0.1, sec);
chassis.turn_to_angle(-225);
RingG.stop();
wait(0.15, sec);
hend.set(true);
chassis.drive_distance(9);
RingG.spin(fwd, 100, pct);
chassis.right_swing_to_angle(-268);
hend.set(false);
chassis.drive_distance(12);
chassis.drive_distance(-9);
RingG.stop();
//wait(0.1, sec);
chassis.turn_to_angle(24);
RingG.spin(reverse, 100, pct);
//wait(0.1, sec);
chassis.drive_distance(24);
wait(0.1, sec);
chassis.drive_distance(-4);
RingG.stop();
wait(0.1, sec);
chassis.left_swing_to_angle(179);
chassis.left_swing_to_angle(180);
RingG.spin(fwd, 100, pct);
hend.set(true);
wait(0.1, sec);
```



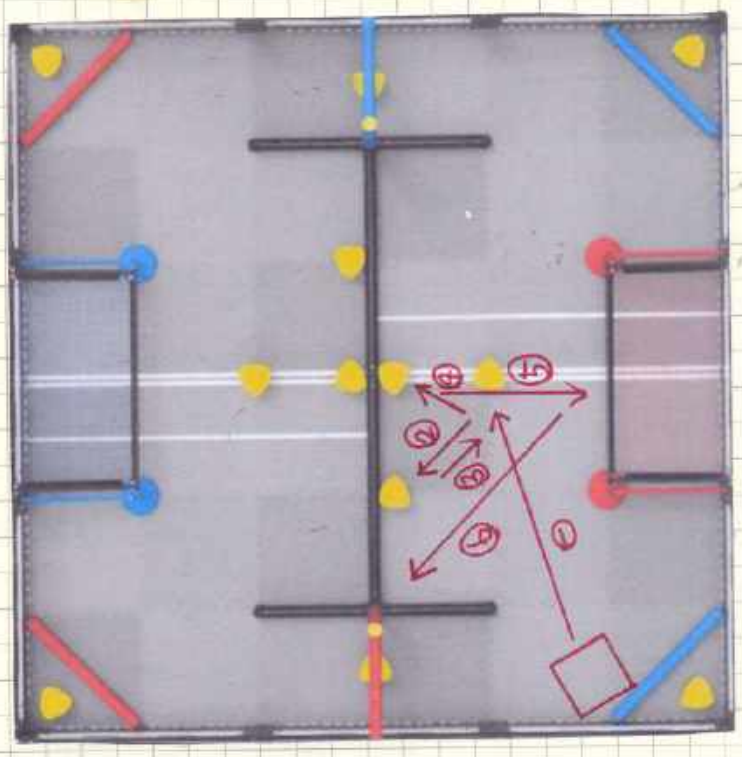

```
chassis.drive_distance(6);
RingG.stop();
wait(0.1, sec);
hend.set(false);
chassis.turn_to_angle(20);
RingG.spin(reverse, 100, pct);
wait(0.1, sec);
chassis.drive_distance(8);
wait(0.05, sec);
RingG.stop();
chassis.drive_distance(-4);
wait(0.1, sec);
chassis.turn_to_angle(180);
wait(0.15, sec);
hend.set(true);
RingG.spin(fwd, 100, pct);
chassis.drive_distance(13);
wait(0.05, sec);
chassis.drive_distance(-6);
wait(0.05, sec);
chassis.turn_to_angle(-60);
chassis.drive_distance(15);
chassis.left_swing_to_angle(10);
chassis.right_swing_to_angle(15);
```

右边自动2 Right automatic 2

```
ProjG.spin(fwd, 100, pct);
wait(0.2, sec);
ProjG.stop();
hend.set(true);
wait(0.3, sec);
hend.set(false);
RingG.spin(reverse, 100, pct);
chassis.drive_timeout=1500;
chassis.drive_distance(32);
wait(0.1, sec);
RingG.stop();
chassis.drive_timeout=850;
chassis.drive_distance(-3);
wait(0.1, sec);
chassis.turn_to_angle(103);
RingG.spin(fwd, 100, pct);
wait(0.4, sec);
RingG.stop();

chassis.turn_to_angle(-52);
wait(0.1, sec);
RingG.spin(reverse, 100, pct);
chassis.drive_distance(9);
wait(0.1, sec);
RingG.stop();
chassis.drive_distance(-7);
chassis.turn_to_angle(103);
RingG.spin(fwd, 100, pct);
wait(0.4, sec);
RingG.stop();

chassis.turn_to_angle(-112);
wait(0.1, sec);
RingG.spin(reverse, 100, pct);
chassis.drive_distance(10);
wait(0.1, sec);
chassis.drive_distance(-6);
RingG.stop();
chassis.turn_to_angle(103);
RingG.spin(fwd, 100, pct);
hend.set(true);
wait(0.1, sec);
chassis.drive_distance(13);
hend.set(false);
wait(0.1, sec);
```



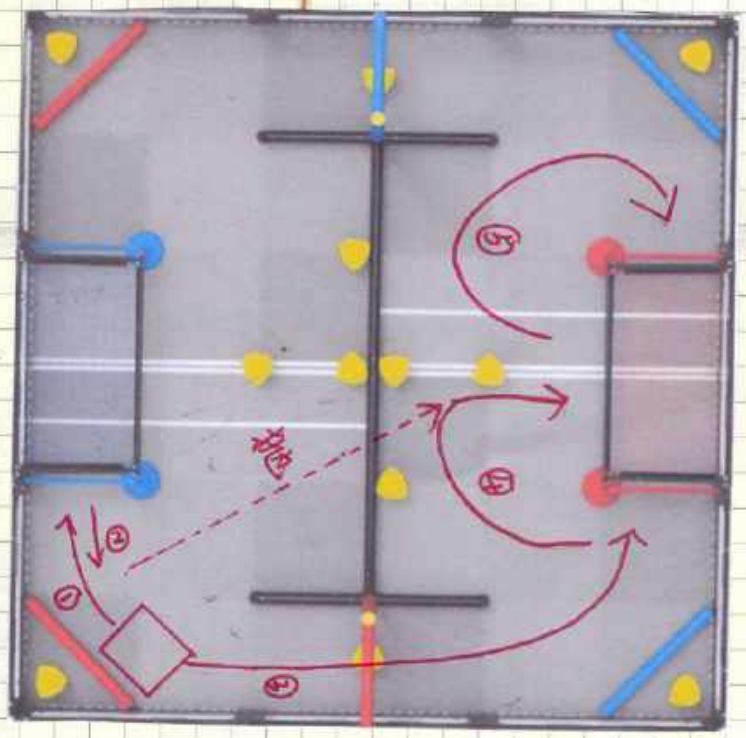

```
chassis.drive_distance(-5);
RingG.stop();
chassis.turn_to_angle(10);
wait(0.1, sec);
chassis.drive_distance(-14);
wait(0.1, sec);
chassis.turn_to_angle(135);
RingG.spin(reverse, 100, pct);
chassis.drive_distance(9);
hend.set(true);
wait(0.1, sec);
chassis.right_swing_to_angle(20);
RingG.stop();
wait(0.2, sec);
hend.set(false);
RingG.spin(fwd, 100, pct);
chassis.drive_distance(13);
```


日期: 2023.12.7
Date:

记录员: G
Witnessed by:

技能赛 Skills competition

```
void Skill(){
  chassis.drive_distance(-9);
  chassis.right_swing_to_angle(45);
  chassis.drive_distance(-10);
  ProjG.spin(fwd, 100, pct);
  wait(0.2, sec);
  ProjG.stop();
  wait(0.1, sec);
  chassis.drive_distance(8);
  chassis.turn_to_angle(120);
  chassis.drive_distance(3);
  gdu();
  ProjG.stop();
  wait(0.1, sec);
  chassis.drive_distance(-2);
  ProjG.spin(fwd, 100, pct);
  waitUntil(Shoot.pressing());
  ProjG.stop();
  chassis.turn_to_angle(0);
  wait(0.1, sec);
  chassis.drive_distance(10);
  wait(0.1, sec);
  chassis.turn_to_angle(-46);
  RingG.spin(fwd, 100, pct);
  wait(0.1, sec);
  chassis.drive_timeout=2500;
  chassis.drive_distance(38);
  wait(0.1, sec);
  chassis.right_swing_to_angle(-95);
  hend.set(true);
  chassis.drive_timeout=850;
  chassis.drive_distance(15);
  wait(0.1, sec);
  chassis.turn_to_angle(-122);
  chassis.drive_distance(7);
  wait(0.1, sec);
  hend.set(false);
  chassis.drive_distance(-9);
  wait(0.1, sec);
  chassis.turn_to_angle(165);
  hend.set(true);
  wait(0.1, sec);
  chassis.drive_distance(18);
  wait(0.1, sec);
```




```
chassis.left_swing_to_angle(260);
wait(0.1, sec);
chassis.drive_distance(6);
wait(0.1, sec);
chassis.left_swing_to_angle(315);
chassis.drive_distance(13);
wait(0.1, sec);
chassis.drive_distance(-20);
wait(0.1, sec);
chassis.turn_to_angle(260);
wait(0.1, sec);
chassis.drive_distance(4);
wait(0.1, sec);
chassis.left_swing_to_angle(315);
chassis.drive_distance(13);
```

日期: Date: 2023.12.9

记录员: G
Witnessed by.

12月29日～1月2日（29th Dec. ~ 2nd Jan.）

● 亚洲公开赛 ● Asian Open

赛况 Match Result

号码 Number	颜色 Colour	结果 Result	原因 Reason
Q16	蓝	W	●因为对手的机器叠牌上场，被DQ，所以我方蓝方获胜。 ●问题：橡皮筋勾住导致无法得分 ● Because the opponent's machine stacked cards on the field and was DQ, our blue own. ● Problem: The rubber band is hooked, which makes it impossible to score.
Q35	红	L	● 自动未准备好 ● Automatically not read.
Q45	蓝	L	● 被撞翻 ● Overturned
Q61	红	W	
Q75	红	W	
Q99	蓝	W	

日期 Date: 2023.12.31

记录员: G

Q114	蓝	L	
Q136	红	L	

12月30日(30th Dec.)

面试 Interview

- 对比华南赛的面试，我们汲取了经验，在面试中合理分配时间。
- Compared with the interview of the South China Competition, we have learned from experience and allocated time reasonably in the interview.

日期: 2023.12.31
Date:

记录员:
Witnessed by:

1月1日(1st Jan.) 获得高中组「精彩奖」

Won the 'Amaze Award' of the high School

- "精彩奖"奖杯
- 'Amaze Award' trophy

赛后总结: Competition Summary

- 比赛中需要分工明确,和队友要沟通策略。
- In the game, the division of labor needs to be clearer, and the teammates should communicate strategies.

日期: Date: 2024.1.1

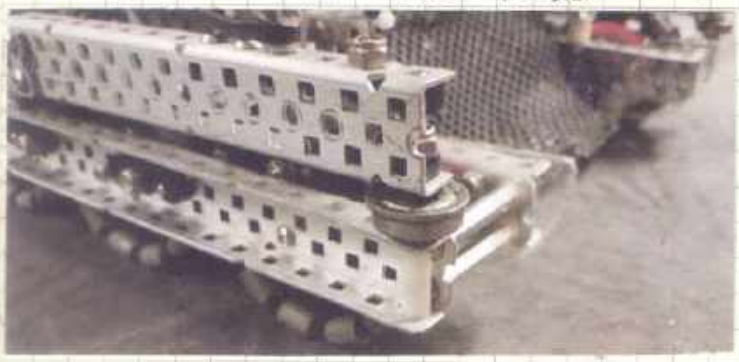
记录员 witnessed by: G

1月3日~1月5日(3rd~5th Jan)

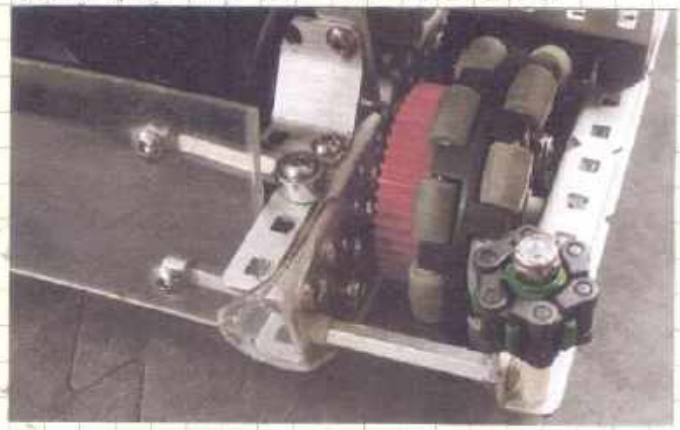
三代机修改

3rd machine modification

- 我们在比赛中发现了机器的几个小问题，并进行了临时会议及更改。

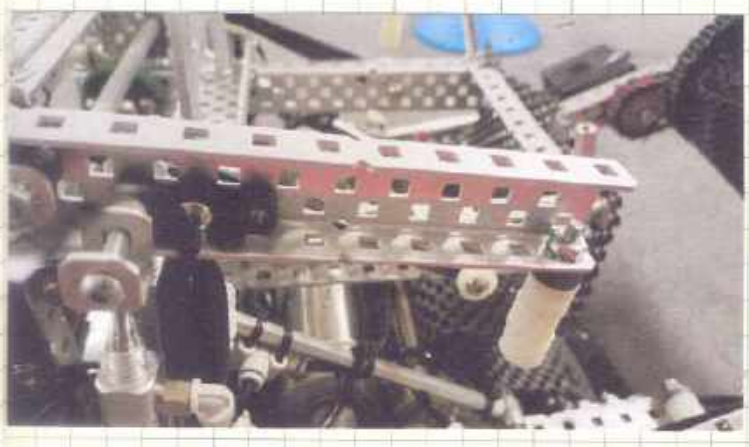


- 机器正面导向
- Machine front orientation



- 机器背面导向
- Machine back orientation

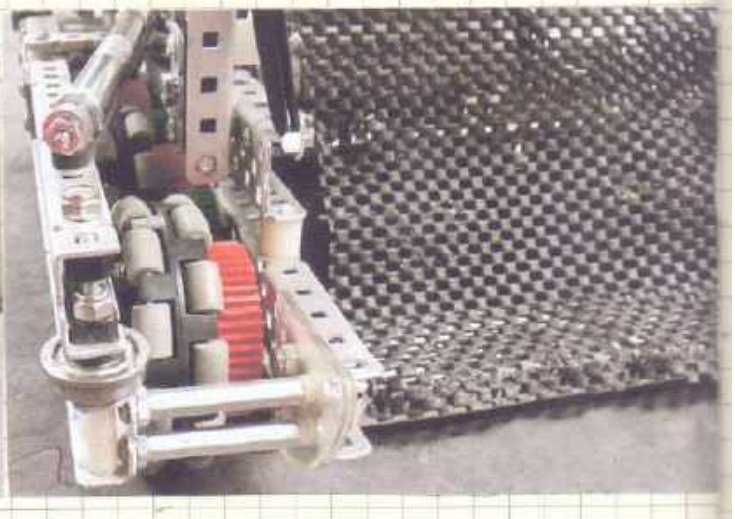
- 在亚洲公开赛面试时，评审员给我们提出了加导向的意见。作用是在过通道时不会卡在场边，而会贴着场边走。
- During the interview at the Asian Open, the judges gave us addtional guidance. The fuction is that when crossing the drift, it will not get stuck on the side of the field, but will walk on the side of the field.



- 我们在比赛中发现高挂结构不平衡，所以我们打算把高挂手臂结构前移，使高挂结构重心向前。所以就把高挂手臂结构往前增加1格，使高挂时可以在高挂杆上平衡。
- We found that the high-hanging structure is unbalanced in the game, so we plan to move the high-hanging arm structure forward to move the center of gravity of the high-hanging structure forward. Therefore, add 1 grid

to the front of the high-hanging arm structure, so that the high-hanging can be balanced on the high-hanging rod.

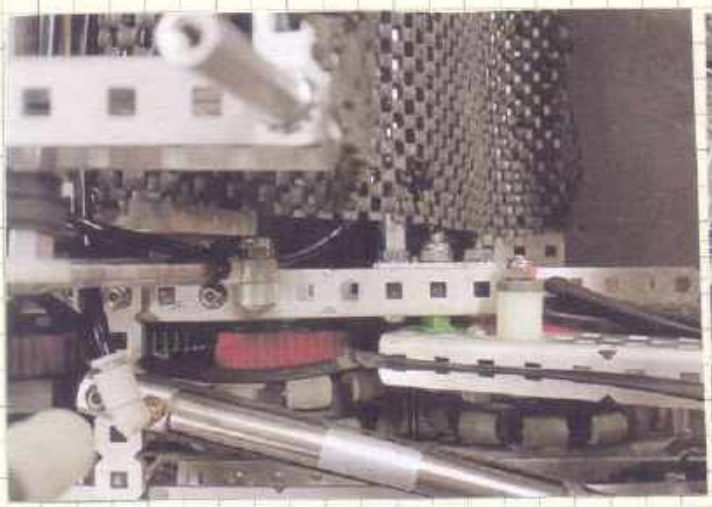
Before

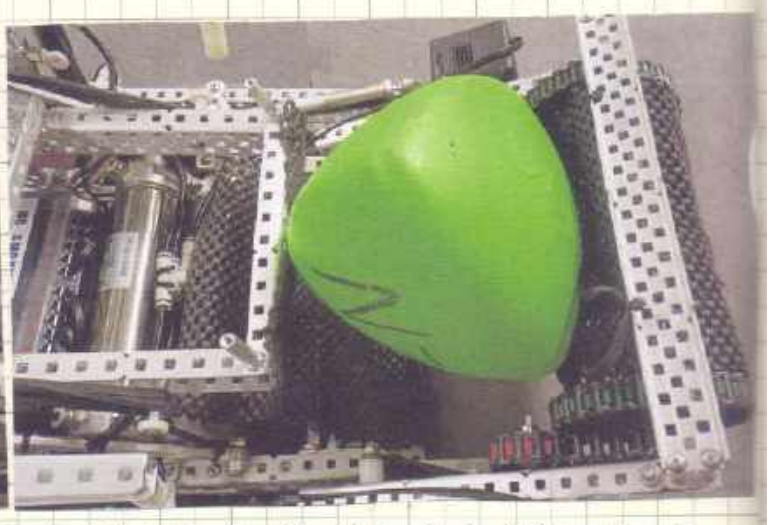


After.

● 我们拆了1×1的铝件，因为在亚洲公开赛时，六角柱和1×1的铝件导致双翼倾斜，无法用双翼得分。

● We removed the 1×1 aluminum part, because in the Asian Open, the hexagonal column and 1×1 aluminum part caused the wings to tilt and could not score with the wings.





● 在亚洲公开赛，导入Triballs时，我们发现Triballs在吸的上方会卡住，说明空间不够。所以我们把框架结构往前移一格，增加可容纳"Triballs"的空间。

日期: Date: 2024. 1. 4

记录员: Witnessed by: G

At the Asian Open, when Triballs were introduced, we found that Triballs would get stuck above the suction, indicating that there was not enough space. So we move the frame structure forward to increase the space that can accommodate Triballs.