REGULATION OF THE “ROBOT SOCCER” COMPETITION

Level: Level 2. Category: for continuing
Platform: any

Participant age: from 12 to 19
Team: 2 people
Robots: autonomous robots
Used equipment: any platform, any details of the designers, including those made self-dependent.
Programming language: at the discretion of the team.

Task description

In “Robot Soccer” category competitions, a team of two autonomous mobile robots competes with another team in matches. Robots shall search for the ball, trying to score at the gate marked with color coding on a special playing field, similar to the real field for “big” Soccer. The robots used are completely autonomous, their creators develop the design and software.

Objectives

Competitors shall demonstrate their skills in programming, robotics, electronics and mechanics, the ability to work in a team, and also shall contribute to teamwork and the exchange of knowledge with other participants, regardless of culture, age or achievements in competitions. Everyone is expected to compete, learn, have fun and progress.

The design and programming of robots should be performed only by the participants.

Robots shall be designed and programmed exclusively by students, members of the team. Mentors, teachers, parents or companies should not be involved in the design, construction, assembly, programming and debugging of robots. To avoid problems and possible disqualification, it is imperative that teams necessarily comply with paragraphs 8.1.1, 8.1.2, 8.1.3 and all other points of the competition rules.

1 The rules of the game
1.1 Conducting game and game duration rules

Two teams of robots play Soccer against each other. Each team has two autonomous robots. The game consists of two rounds. The duration of each round is 10 minutes (time may be changed by the competition organizing committee). There is a 5-minute break between the rounds (time may vary by the organizing committee of the competition).

After the start of the half, the game clock does not stop during the entire half-time (unless the judge consults the organizing committee). Game time is monitored by a judge or assistant referee (see Clause 7.1).

Teams shall be at the playing field 5 minutes before the start of the game. The schedule of games does not take into account this time, so teams shall take into account in advance the time of their arrival at the playing field. Teams may be fined at the discretion of the referee for one goal for every 30 seconds late after the start of the game. In any case, with a difference in the game score for 10 goals, the game ends regardless of playing time.

1.2 Pre-match meeting (toss)

At the beginning of the first round of the game, the judge throws a coin. The team mentioned first on the list should name the guess side of the coin. The winning team guessing the fallen side of the coin can choose the right of the first strike (rally) at the beginning of the first round of the game or at the beginning of the second round. Do not guess the team gets another option. After the first round, teams change their goal. A team that did not play the ball at the beginning of the first round of the game, plays the ball at the beginning of the second round of the game.

1.3 Kick-off

Each round of the game begins with the introduction of the ball into the game. All robots shall be located on their side of the field. All robots shall be stopped. The referee puts the ball to the center field.

The point team places its robots on the field. Robots can not be placed behind the field line behind the gate or in the area of outs. Once installed, robots cannot be moved. After that, the other team places their robots in their own half of the field, and all the robots of the defending team should not be closer than 30 cm from the ball (outside the central circle). Robots can not be placed behind the field line behind the gate or in the area of outs. After placing the robots, they can not be rearranged to another location, except in cases where the judge asks them to rearrange, so that all robots are placed on the field in accordance with these rules.

At the command of the judge (usually with a whistle), all robots must be immediately launched by the team captains. Any robot that starts moving before the referee’s team will be removed by the judge from the field and declared as a damaged robot.

1.4 Human interference

Excluding the moment of first strike on the ball and the launch of robots, team members (people) should not touch robots. The offending team will be disqualified.

A judge or assistant referee can help the robots to “unravel”, but only if there is no fight for the ball, or if this situation was created due to the interaction of several robots (i.e., this is not an error in the design or programming one robot). The judge or his assistant can slightly push the robots so that they can move freely again.

1.5 Ball Movement

The robot shall not hold the ball. Holding the ball means a situation when the robot restricts any
independent movements of the ball. For example, the ball is fixed in the body of the robot, the robot surrounds the ball to prevent other robots from accessing it, or grabbing the ball with any part of the robot, etc. If the ball does not rotate while the robot is moving or the ball does not bounce when rolling on the robot the ball is held. The only exception to holding the ball is to use a rotating drum, which gives the ball a spin to hold it. Such a device is called dribbling. The opposing robots shall have simultaneous access to the ball.

1.6 Scoring

A goal is scored if the ball hits or touches the back wall of the goal. The goal is counted in any case - he was scored by the attacking or defending player. After the goal, the game is resumed from the center, where the team that misses a goal in their goal inflicts the first blow to the ball. Before introducing the ball into the game, all damaged or deleted robots can be returned to the game, provided that they are ready and fully functional.

1.7 Goalkeeper

The robot that first arrived in the penalty area of his team and is completely (all parts) in it is considered as a goalkeeper until he leaves the penalty area with any part.

1.8 Pushing

Inside the penalty area the goalkeeper takes precedence. Attacking robots should not push the goalkeeper in any direction. If the attacking striker and the goalkeeper touch each other, and at least one of them has contact with the ball, the ball is immediately moved by the referee to the nearest unoccupied neutral zone.
If a goal occurs as a result of such a pushing, then it is not counted.

1.9 Lack of progress

Lack of progress occurs if there is no progress in the game for a reasonable period of time, and the situation is unlikely to change. A typical lack of progress is when the ball is permanently stuck between several robots, or when the position of the ball and the robot does not change for a long time, or when the ball cannot be detected by all robots, or when all robots cannot access the ball.
The judge loudly counts up to five (if the length of the reference has not been changed in these competitions) and then announces “no progress” and moves the ball to the nearest unoccupied neutral zone. If moving the ball does not affect the situation of no progress, the referee can move the ball to different neutral zones.

1.10 Out

If the robot with its entire body leaves the game zone as a limited white line, it is considered out. When this situation arises, the robot receives a penalty for one minute and is removed from the field. The game does not stop.
The robot fined for an out is allowed to return to the field ahead of schedule when kick-off is injected. The countdown of one minute of fine begins from the moment the robot is removed from the field. In addition, any goal scored by a penalized team while the robot is on the field is not counted. Remote robot can be repaired by a team if required.
After the completion of the penalty time, the robot is placed on the field in an unoccupied neutral zone, closest to the place from which it was removed, and the robot should not be aimed directly at
the ball.
The judge may refuse to punish if the robot has been accidentally pushed out by any other robot. In this case, the judge may slightly push the robot to return to the field.
The ball can leave and return to the playing field. A judge may declare the position “out of reach of the ball” and move the ball manually to the nearest unoccupied neutral zone in the following cases:
1) the ball is in the out zone for too long, the referee out loud, loudly counts up to five (if the reference length was not changed in these competitions),
2) none of the robots can return the ball to the playing area without being completely inside the out zone,
3) the referee determines that the ball will not return to the playing area.

1.11 Damaged robots

If the robot is damaged, it shall be removed from the playing field and repaired before it can participate again. After removal and repair, the repaired robot must remain out of the field for at least one minute or until the next kick-off. If all robots are out, then all penalties are canceled and the match resumes with a neutral ball.

The robot is declared damaged when:
• he does not respond to the ball or cannot move (he lost parts, the power went off, etc.),
• he constantly drives into the goal or out of the playing field,
• It rotates on its axis.

Computers and repair equipment are not allowed in the play area during the game. As a rule, a team member must take a damaged robot to an “approved repair table” near the playground located inside the competition area. The judge may allow the calibration of the sensors of robots, computers and other tools on the playing field, only 5 minutes before the start of each round.

After repair, the robot is placed on the field in an unoccupied neutral zone, closest to the place from which it was removed, and the robot should not be aimed directly at the ball. A robot can only be returned to the field if its damage has been repaired.
If the referee notices that the robot has been returned to the field with the same breakage, he can remove the robot and continue the game, as if the robot had not returned.

Only the judge decides whether the robot is damaged. The robot can be removed or returned only with the permission of the judge.

If both robots from the same team are damaged, the game time does not stop and the team remaining on the field gets one point and rests until the opponent’s robots return to the field. The remaining team will also receive one point for every 30 seconds while the enemy robots remain damaged. As soon as the difference in the score reaches 10 goals or the game time ends, the game ends. However, this rule applies only if neither of the two damaged team robots was damaged as a result of the violation of the rules by the opposing team.

1.12 Group defense

Group defense is the situation when more than one robot of the defending team enters the penalty area and have a significant impact on the game.
In the case of “Group Defense”, the robot farther from the ball is moved to the nearest neutral zone. The judge can perform this action at any time when both robots are delayed in the penalty area.
If a group defense situation occurs again, the robot is considered damaged.
1.13 **Stoppage**

Fundamentally the game should not stop. The referee can stop the game in the event that the situation on the field or next to it requires consultation with the officials of the competition or in the event of a ball breakage when the substitution within reach of hand. When the referee stops the game, all robots shall be stopped and remain untouched on the field. The judge decides for himself how the game will continue: from the moment he was stopped or from the ball into the game.

2 **Team**

2.1 **General provisions**

The team consists of two participants. Team members and robots can not simultaneously play in two or more teams. Each team member carries his technical role.

Each team shall have a captain. The captain is the person responsible for communicating with the judges. The team can change its captain during the competition. Only two team members can be near the field during the games, one of which is the captain, the other his assistant.

2.2 **Deviation from regulations**

A team that does not comply with these rules is excluded from participation in competitions.

Anyone close to the playing field should not be dressed in orange, blue or yellow clothing. The judge has the right to request the team member to change clothes or replace him with another.

The judge has the right to interrupt the course of the game if he notices any kind of impact on what is happening on the field: colored clothes, IR radiation, camera flashes, mobile phones, computers, etc.

If the other team has any complaints, they must prove to the judge their claims. A team claiming that their robot is affected by colors shall present evidence of such an intervention.

3 **Robots**

3.1 **Number of robots**

Each team is allowed to have no more than two robots during the entire tournament. Replacing robots during a competition in a team or sharing robots between teams is prohibited.
3.2 Color noise

In order to avoid noise, it is forbidden to paint robots in orange, yellow, blue or any other color that can be confused with a guide (see 4.3). Orange, yellow, blue or any parts with field marking colors used in building the robot shall either be covered up by other parts from the perception of other robots, or they shall be covered with a film or painted in a neutral color.

The robot should not emit infrared light. However, optical sensors (for example, infrared distance sensors) can be used if they do not affect other robots. This shall be confirmed to the judge or a member of the organizing committee, if the complaint arises from the other team.

Infrared reflecting materials should not be used outside robots. If the robots are painted, the paint should be matte.

Minor parts reflecting infrared light can be used, but as long as it does not affect other robots. A team claiming that the other team’s robot, which reflects infrared light, affects their robot, shall show evidence of this intervention.

Robots must not interfere with other robots on the field. This must be demonstrated to a judge or a member of the organizing committee if the claim is made by another team.

3.3 Control

The use of any type of remote control during game play is not allowed. Robots shall be started and stopped manually by humans, but they shall be played only autonomously.

3.4 Communication

Robots should not use any communication methods except for communication between robots in a team using Bluetooth 2 or 3 class (distance not exceeding 20 meters) or via any other device for data exchange via 802.15.4 sheet (for example, ZigBee or XBee). Teams independently provide communication between robots. Reliability of communication is not guaranteed by the organizers.

3.5 Mobility

Robots must be designed in such a way as to ensure movement not only along one axis. Robots shall be able to move in any direction, for example, by turning. Robots shall respond to the ball by moving forward.
For example, it is not enough to protect the goal simply to move left and right along the goal line, it is necessary to move forward towards the moving ball. At least one robot in a team shall be able to move behind the ball and reach it at any point of the playing field, except when the team has only one robot on the field.

Robots shall be designed and programmed so that they do not enter the goal. Robots can use the bar for this. This rule applies to all robots on the field. Any robot that enters the goal 3 times within 20 seconds is considered damaged (see fig. Where Goal is the goal, Goalie is the goalkeeper, Striker is the attacker).

### 3.6 Stick availability

All robots shall have a solid stick in order to be able to quickly pick them up or put them on the field. The stick should be easily accessible, for example, on top of the robot. Handle dimensions can exceed the height limit of 22 cm, but the part of the stick that exceeds the height limit of 22 cm cannot be attached to the robot components.

### 3.7 Markers on top

Robots shall be labeled so that the judge can distinguish between them. Each robot shall have a white plastic circle with a diameter of at least 4 cm, mounted horizontally on top. This white circle will be used by the judge to record the sequence number on the robot using a marker (for whiteboard), so this white circle should be easily accessible and visible.

Before the game, the judge will assign sequence numbers for each robot and write them on the upper white circle.

Robots that do not have a white circle on top are not allowed to play.

### 3.8 Deviation from regulations

Robots that do not meet the above specifications can not participate in competitions. If violations are revealed during the game, the team will be disqualified from the current game. For repeated violation the team is suspended from participation in competitions.

### 4 Field

#### 4.1 Size of the field

The playing field has a size of 122 cm by 183 cm. The playing field is marked with a white line, which is part of the playing field. Around the playing field, behind the white line, there is a 30 cm wide out zone. The floor near the outer wall contains a slope with a base of 10 cm and an elevation of 2 cm so that the ball can return to the game when it is out. The overall dimensions of
the field, including the out zone, are 182 cm by 243 cm. The recommended height of the field is 70 to 90 cm from the ground.

4.2 Walls

The walls are located around the field, including the space behind the goal and the out zone. The height of the walls is 22 cm. The walls are painted matt black. On each side are color labels for orientation. Their sizes: 12 cm height and 21 cm width.

Orientation marks colors used:
- Green - RGB (0, 255, 0)
- Red - RGB (255, 0, 0)
- Cyan - RGB (0, 255, 255)
- Magenta - RGB (255, 0, 255)

The colors are chosen so that they differ as much as possible from the colors that have already been used on the field, especially the yellow and blue colors that signify the goal. Although the color of the carpet and one of the markers for orientation is painted green, but the color used for the carpet of the field should be much darker than that used for the marker.

The markers are located on the walls as follows: the green and red markers are located in the left and right corners behind the blue gates, the cyan and magenta landmarks are located in the left and right corners behind the yellow goals. At the edges and in the center of the long walls of the playing field there is a combination of markers for orientation (see the Annex for more information).

4.3 Goal

There are two goals near the short walls on the field. Internal door dimensions are 60 cm width, 10 cm height and 74 mm depth. The goal has a bar on top to prevent robots from entering the goal and provide the ability to check whether the ball has been scored. The height of the bar is 2 cm. The goal posts are put on the white line of the border of the playing field. The bar is located exactly above the white line.

The inner walls of the goal are painted: one goal is yellow, the other goal is blue. The outer surface is painted black.

4.4 Field cover

The floor of the playing field is covered with a dark green carpet on a solid flat surface. Carpet must wear-resistant, withstand wear from rotating wheels. All straight marking lines on the field shall be painted and have a width of 20 mm.

4.5 Neutral zones (points)

There are five neutral zones marked with dots on the playing field. One in the center of the field, the other four are located at a distance of 45 cm from each goal post to the center of the field along the long sides of the playing field. Neutral zones can be drawn with a thin black marker. They shall have a round shape with a diameter of 1 cm.

4.6 Center circle

On the playing field, the center circle is drawn. The circle has a diameter of 60 cm. It is drawn with a thin marker. The judges and captains are guided by it during the kick-off.
4.7 **Penalty zones**

In front of each goal there is a penalty area which is of 30 cm wide and 90 cm long. The penalty area is marked with a black line width of 20 mm. The line is a part of the penalty area. A robot is considered inside the penalty area when it is completely inside it.

4.8 **Lighting and magnetic field conditions**

The playing field shall be installed in such a place to have the minimal effect of external IR radiation and magnetic fields. However, perfect conditions cannot be guaranteed to participants. The teams of the participants shall be ready to carry out additional calibrations of the equipment directly on the field.

5 **Ball**

5.1 Specification for a soccer ball, see Annex I: Technical Specification for an IR soccer ball

5.2 For competitions, balls shall be provided by the organizers. Competition organizers do not provide balls for training.

6 **Code of conduct**

6.1 **Fair game**

Robots should not affect the opponent's robots and damage them during the game. Robots should not damage the playing field and the ball during the game. People should not allow intentional interaction on robots or damage to the field or ball.

6.2 **Behavior of participants**

All tournament participants shall control their emotions in the competition venues.

6.3 **Assistance to participants**

Mentors (teachers, parents, accompanying persons and other adults - members of teams) are not allowed to enter the working areas of students, with the exception of the special temporary permission to a member of the organizing committee. Only participants can be inside the work area. Mentors cannot touch, design, repair, or program member robots.

6.4 **Knowledge Sharing**

Participants shall understand that any technologies and educational developments shall be distributed among participants as a result of competitions. The exchange of knowledge between participants is supported by the organizers.

6.5 **Roboland Spirit**

It is expected that all participants, coaches, parents and all respect the mission of the competition "Robot Soccer." It doesn’t matter whether you won or lost, but it’s important how much you have learned and what you learned!
6.6 Violations / Disqualifications

Teams that violate the norms of behavior may be disqualified from participating in competitions. It is also possible disqualification of one participant or one robot from further participation in the competition.

In some individual, less serious cases of norms of behavior violation, it is possible to issue a warning to the team by showing a yellow card. In case of serious or repeated violations of the norms of behavior, the team is subject to immediate disqualification without warning, it is shown a red card.

7 Conflict Resolution

7.1 Judge and judge assistant

The referee is the person responsible for making decisions during the game in accordance with these rules, who may be assisted by the assistant referee.

During the game, decisions made by the referee or assistant referee are final. Any dispute with a judge or assistant judge may lead to a warning. If the dispute continues or other controversial arguments arise, this can lead to immediate disqualification and removal from the game.

At the end of the game, the result recorded in the sheet is final. The judge may ask the captains to add written comments to the sheet if they deem it necessary. These comments will be reviewed by the members of the organizing committee.

7.2 Rules clarification

An explanation of the rules can be made by the chief judge of the competition or members of the organizing committee, if necessary, even during the competition.

7.3 Changing Rules

If special circumstances arise, such as unforeseen problems or new robot opportunities, the rules can be changed by the chief judge of the competition together with members of the panel of judges and the organizing committee, if necessary, even during the competition.

7.4 Regulatory provisions

Competitions have regulations for defining competition procedures, such as competition mode, robot inspection, and a schedule. The regulations are part of these rules of the competition.

7.5 Image of the playing field
8 League rules

8.1 Rules

8.1.1 Size

The robots will be measured in a vertical position, therewith all the moving parts will be maximally pulled out. Robot specifications shall meet the following requirements:
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot diameter</td>
<td>No more than 22 cm</td>
</tr>
<tr>
<td>Height of the robot *</td>
<td>No more than 22 cm</td>
</tr>
<tr>
<td>Weight of the robot **</td>
<td>No more than 1100 gram</td>
</tr>
<tr>
<td>Ball tackle zone</td>
<td>No more than 3 cm</td>
</tr>
<tr>
<td>supply voltage ***</td>
<td>Not more than 12 volts</td>
</tr>
</tbody>
</table>

* The stick of the robot may exceed the specified dimensions.
** The weight of the robot is measured by taking into account the weight of the stick, but excluding the upper markers.
*** Teams should provide guard circuits for lithium-ion batteries.

The ball grasp zone is considered to be any internal space bounded by a robot and a straight surface attached to its protruding parts. This means that the ball should not go deeper into the concave surface of the robot by more than the specified depth. Moreover, another robot shall be able to take possession of the ball.

### 8.1.2 Restrictions

One robot can use only one camera. All commercial all-directional lenses/cameras are not allowed. Only all-directional lenses/cameras made by schoolchildren are allowed, which means that their design shall be the original work of the team. Teams that use them on their robots should tell how they made them before being quarantined. In these rules, “all-directional” is defined as the angle of view of more than 140 degrees horizontally or more than 80 degrees vertically. (These values correspond to the optical system of the human eye.)

Voltage boost circuits are permitted only for a kicker drive. The power supply of all other electrical circuits inside the robot can not exceed 12.0 volts.

Each robot shall be designed in such a way that it is possible to measure the voltage of the power supply units and its circuits, unless the nominal voltage is evident when inspecting the robot, its power supplies and connections.

Pneumatic devices only allow ambient air.

Kicker power can be tested at any time during the competition. During the game, the referee may ask to demonstrate a kick on the field before each half, when the damaged robot returns to the field after repair or when the ball will be introduced after the goal. If the judge has a serious suspicion that the kicker exceeds the permissible impact force, he may require an official measurement using the kicker impact power measurement device (see Annex II: The kicker impact power measurement device for details).

### 8.1.3 Construction

Robots shall be constructed exclusively by students of the team. Mentors, teachers, parents or companies cannot participate in the design, construction and assembly of robots.
To create a robot, you can use any robotic kit or modules as long as the design and construction are the original work of the team. This means that commercial kits can be used, but they shall be significantly modified by the team. It is forbidden to simply follow the assembly instructions or simply modify non-essential parts.

A manifestation of such violations is the use of commercial sets, which can be assembled basically in only one way, or the fact that robots from different teams, built from the same commercial set, all look and act the same.

Robots shall be designed in such a way that the captain could launch them without the help of another person.

Since contact with an enemy robot or dribbling may damage some parts of the robot, robots shall have reliable protection for their active elements made of resistant materials. For example, electrical circuits and pneumatic devices, such as pipes and bottles, shall have protection for humans and protection against direct contact with other robots. When batteries are carried or transported, it is recommended to use protective containers. Every effort shall be made to make sure that short-circuits and chemical or air leaks are not allowed in the robots.

8.1.4 Programming

Robots shall be programmed exclusively by team members. Mentors, teachers, parents or companies should not be involved in programming and debugging robots.

Any programming language, interfaces, and integrated development environments (IDE) can be used to program robots. The use of programs that are offered with commercial kits (especially examples of programs or presets), or fragments of such programs is not allowed. It is not allowed to use sample programs, even if they have been modified.

8.1.5 Inspections

Robots shall be tested and certified on competition day before the start of the first game. The Organizing Committee may conduct other examinations if necessary, including random examination that may occur at any time.

In a regular examination, it is checked:
8.1.5.1 Dimensions of the robot (see 8.1.1).
8.1.5.2 Voltage limits (see 8.1.2).
8.1.5.3 Impact power of the kicker, if the robot has a kicker. (See Annex II: Kicker power measuring device).

Teams can get technical interviews about their robots and the development process at any time during the competition.

8.1.6 Interview

During the competition, the organizing committee may begin to conduct interviews with team members. Teams shall bring robots, the source code of the programs used for their programming. During an interview, at least one member from each team should be able to explain the features of team robots, especially with regard to their designs and programming. The interviewer may ask the team to hold a demonstration. The interviewer
may also ask the team to write a simple program during the interview to make sure that the team can program their robot.

The Organizing Committee recommends conducting interviews at regional competitions.

8.1.7 International competitions

On competition days, as well as prior to the event, team members are solely responsible for checking and reading relevant information published by the organizing committee.

For the performance, safety of robots, teams and competitors are personally liable, as well as responsible in accordance with the Law of the Republic of Kazakhstan in any accidents caused by actions of team members or their robots.

The organizers of the competition are not responsible in the event of an failure or accident caused by the actions of team members or their equipment.

Annex I: Technical Specification for IR Soccer Ball

1.1. Preamble

For competitions, the organizing committee has determined the following technical specifications in a special collaboration with EK Japan and HiTechnic for a soccer ball that is resistant to interference, with low power consumption and resistant to mechanical shocks.

Manufacturers of these balls shall apply for certification, which gives the right to place a label on the balls of compliance with the competition.

Balls with these characteristics can be detected using special sensors from HiTechnic (IRSeeker - distance and angle information), as well as conventional IR receivers for IR remote control (TSOP1140, TSOP31140, GP1UX511QS, ... - ball detection with possible determining the distance).

1.2. Characteristics

1.2.1. Infrared radiation

The ball emits infrared (IR) light with a wavelength in the range of 920 nm - 960 nm, with a carrier frequency of 40 kHz. To minimize the irregularity of the output infrared radiation, the ball shall have a sufficient number of ultra-bright wide-angle LEDs.

1.2.2. Diameter

The diameter of the ball should be 74-75 mm. A balanced ball shall be used.

1.2.3. Drop test

The ball must withstand a normal game. As a test of strength, it shall endure free fall from a height of 1.5 meters onto a table or hardwood floor without damage.

1.2.4. Battery life
If the ball has a built-in rechargeable battery, then a new and fully charged one shall provide more than 3 hours of continuous use before the LED brightness drops to 90% of the original value. If replaceable batteries are used in the ball, new high-quality alkaline batteries must provide more than 8 hours of continuous use before the LED brightness drops to 90% of the original value.

1.2.5. Coloring

The ball shall be neutral in color. In particular, it should not have any green, blue or yellow color or any other color that can be confused with the marker of orientation (in order to avoid confusion with the colors of the field and the goal).

1.2.6. Official Ball of the Games

Currently there is one pulsed ball that was approved by the technical committee of Roboland-2019: Hitechnic infrared electronic ball (IRB 1005) in the pulsed radiation mode - MODE D (pulsed).
Annex II: Kicker power measuring device

The impact mechanisms of the robots (kickers) will be tested using the ball used in the league in which they participate.

II.1 Preamble

This device (see Fig. 1) allows you to determine the power of the impact mechanism of the robot. It is easy to assemble using ordinary materials.

The device allows you to measure the power of the impact mechanism of the robot with a length of up to 22 cm.

II.2 Necessary materials

Plastic board - a piece of A4 sheet size; M3 hairpin 40 mm long - 5 pieces;

Screw M3 - 10 pcs.

II.3 Device scheme

In order to print this scheme, make sure that the “Scale to fit” option is disabled in the program you are using for this purpose and print it at the current scale of 100%.

Note: On the device diagram, the line after the 22 cm mark is shown straight, while in the photo in fig. 4, this line is a curve. Both are suitable, but the curved line version requires a more difficult cut, while the attached version is easy to make.

II.4 Device assembly

The device is assembled in the following order:
1. Print the enclosed scheme.
2. Put off the scheme to the plastic board. Slanted lines (red in the diagram) should be straight.
3. Cut out the shape according to the resulting contour and drill holes in the marked places.
4. Connect the two walls with screws and 40 mm hairpin.

II.5 Impact Power Measurement

Power of the percussion mechanism measuring in the following order:

1. The ball is placed at the bottom of the slide, the robot is placed in front of the ball. The impact mechanism is aimed at the top of the slide.
2. The robot makes a single blow.
3. The distance is measured along the surface of the hill, on which the ball will rise. It should not exceed 22 cm.
Annex III: Color marker templates for orientation

The following four pages contain color templates for landmarks that should be placed on the walls of the field. When printing on plain A4 paper, they will have the dimensions specified in the rules. Although after printing on different printers, the color on the paper will be different, print these pages using the sRGB “printer profile” (color scheme) - this gives the best results.
V International Festival of Robotics, Programming and Innovative Technologies “RoboLand 2019”
REFERENCES

1. Competition on “Robot Soccer” category is held according to the RoboCupJunior Soccer Regulations
   The above regulation contains a translation of the regulations of the RoboCupJunior Soccer international stage. http://rcj.robocup.org/soccer.html Translation was made by S.V. Kosachenko