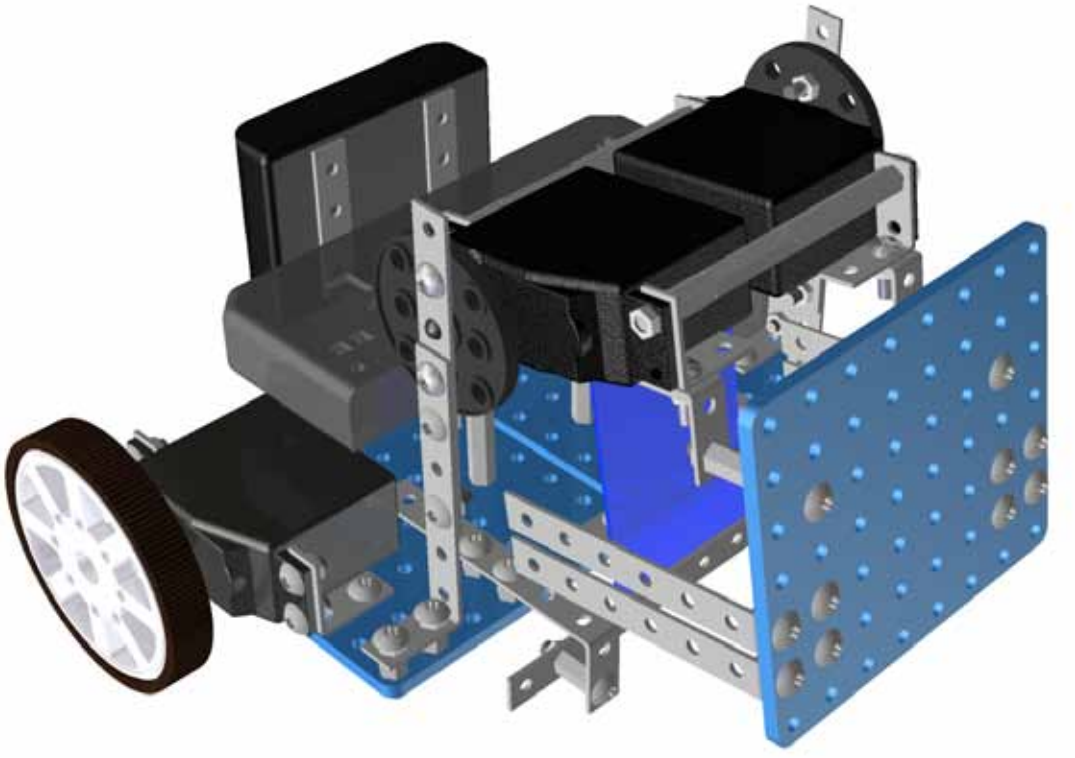
6. Handball Robot



Introduction and working principle

– An Elastic Body and Elastic Force

Handball Robot is a robot that is enabled to smack a ping–pong ball using polycarbonateplate' s elastic force. Elasticity is the tendency of solid materials to return to their original shape after being deformed. Elasticity–sensitive solid object is termed elastic body. One example of an elastic body is a spring and rubber band.

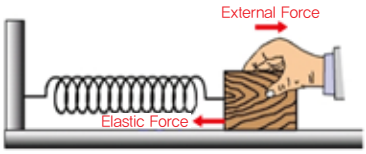


Figure 1.
Elastic Force of a spring

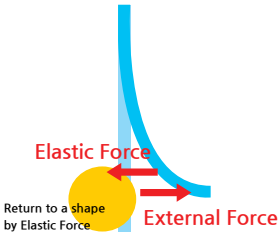


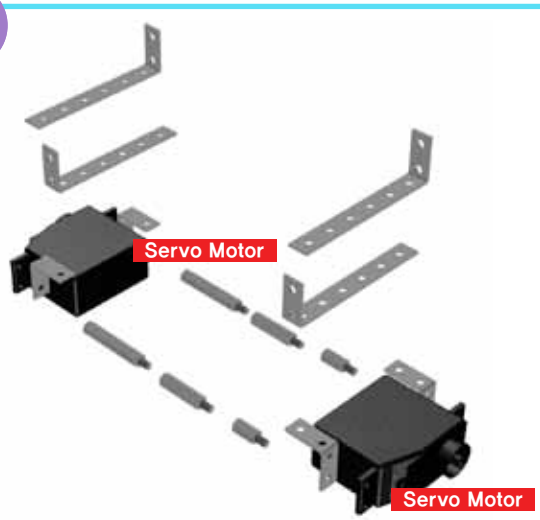
Figure 2. Elastic Force of
Polycarbonate Plate

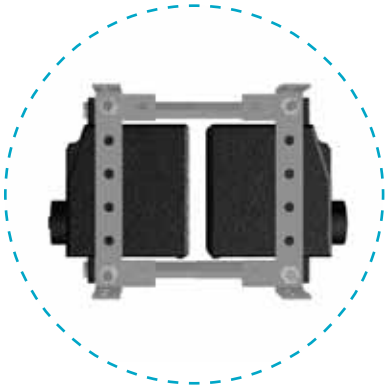
In Handball Robot, elastic force of Polycarbonate plate is used. When external forces are applied by servo motor, the Polycarbonate plate is stretched to a certain degree and elasticity is caused by the stretching in proportion to the stretched degree. When external forces are removed at the very moment, the elastic force is in inflicted to ping–pong ball to smack it.

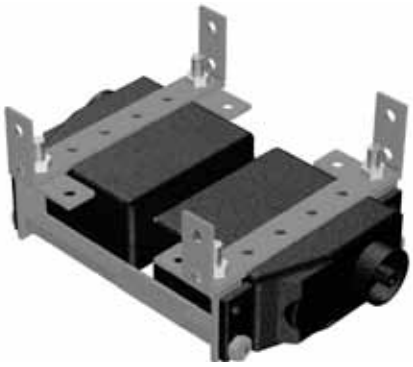
Such elastic force increases in proportion as external forces increases. Meanwhile, if overly increased external forces can be a stress beyond which the elastic body no longer behaves elastic and deformation of the body will take place. The critical point given to external forces as such is named Elastic Limit.

In contrast, some materials tend to undergo non–reversible changes of shape in response to applied forces. One typical example of these mate–rials is mud and lead. These are called plastic material.

1







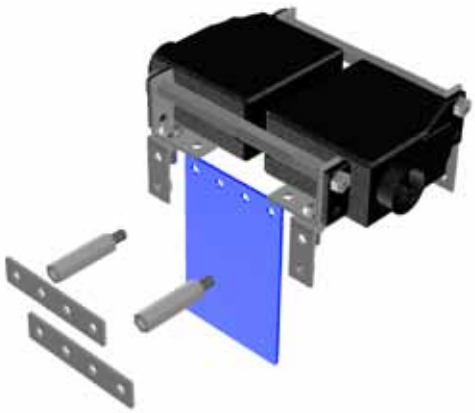
X 4

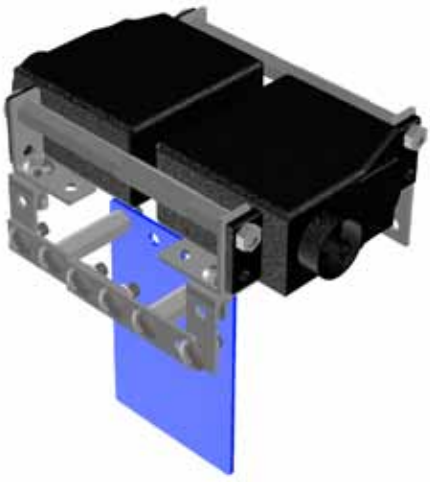
X 2
20mm

X 2
10mm

X 2
30mm

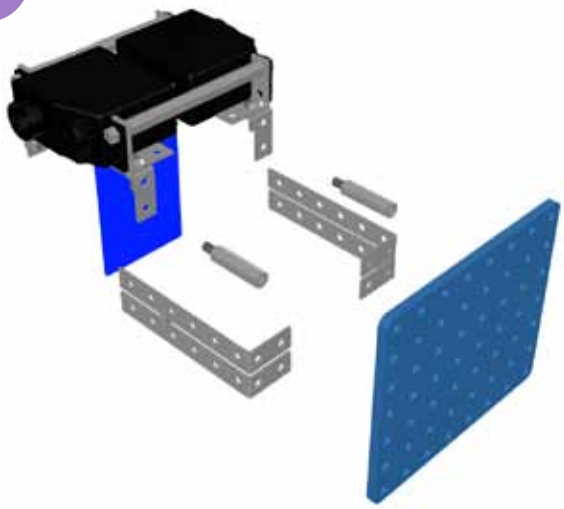
2

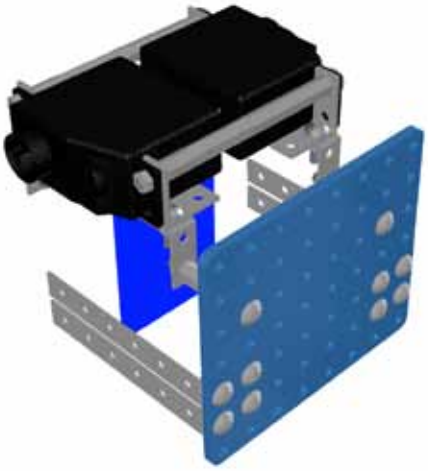




X 2
20mm

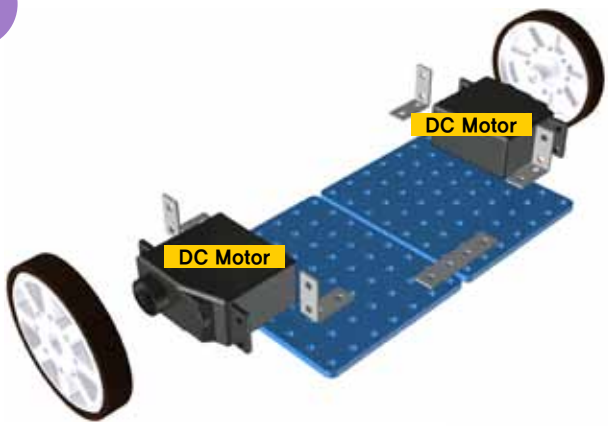
3

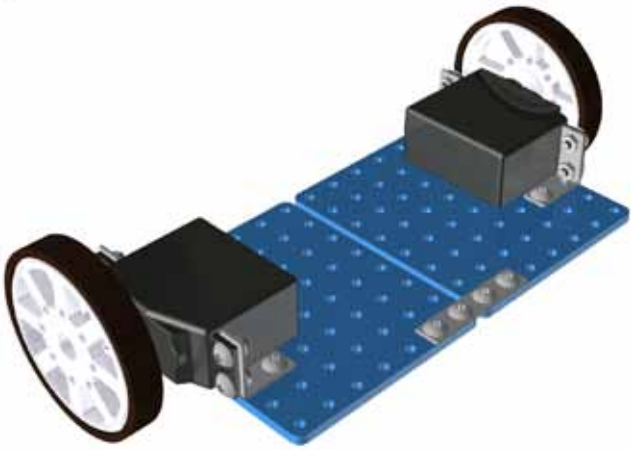




20mm X 2

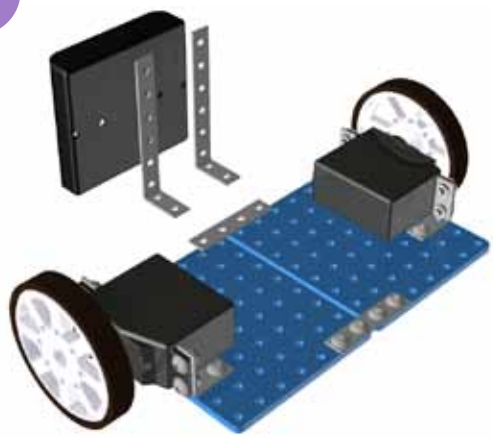
4

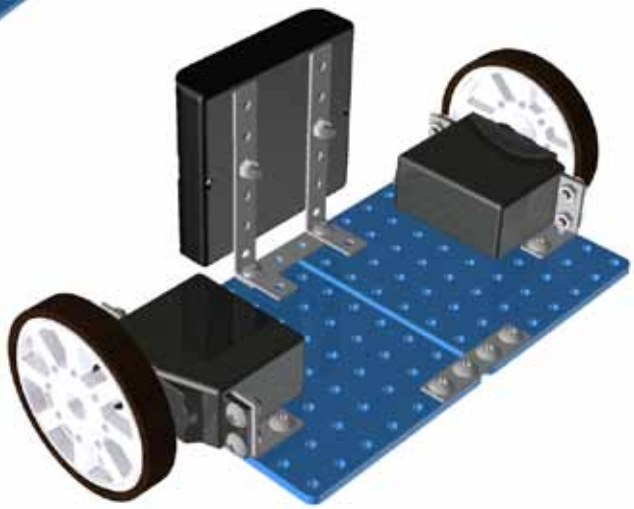




X 2

5





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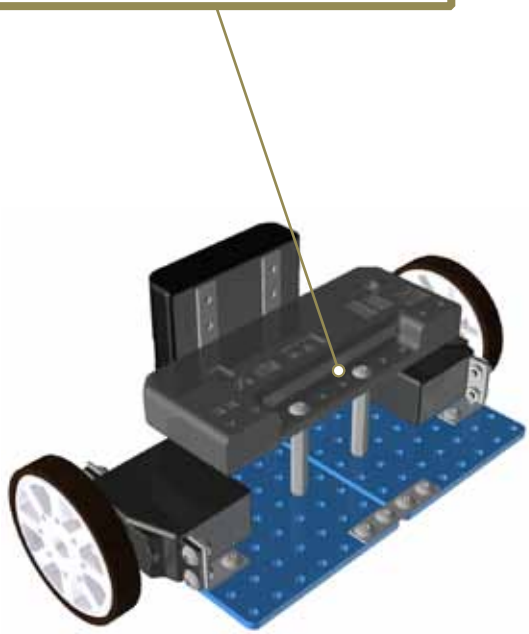
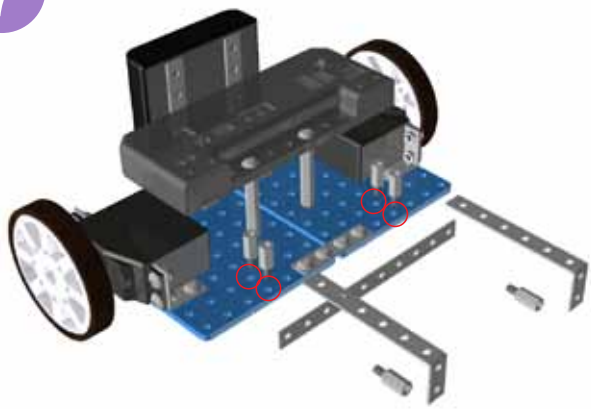
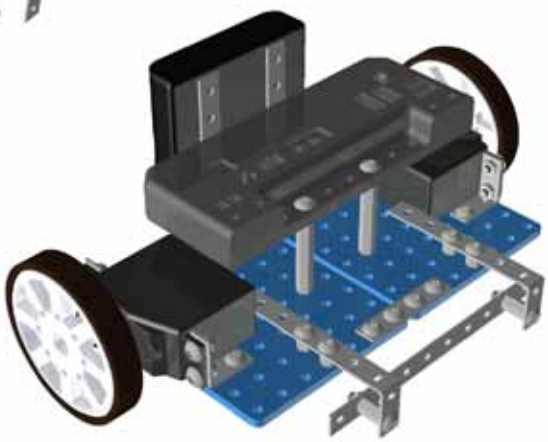


30mm X 2

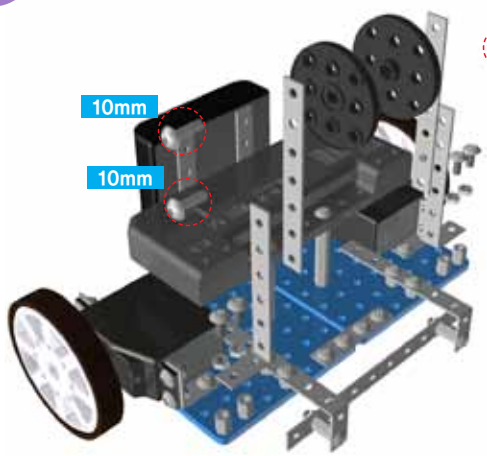
7

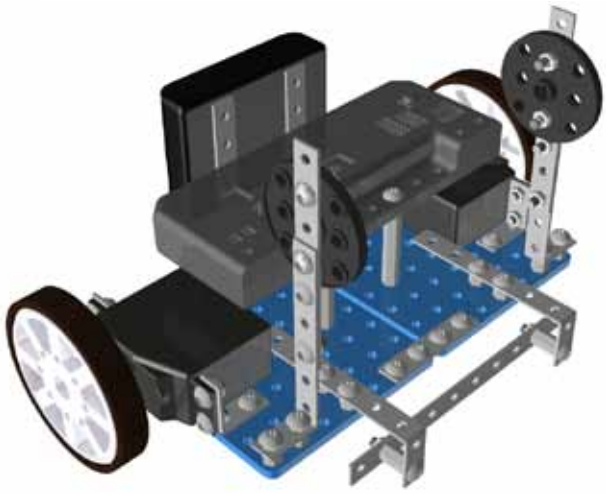




X 6
10mm

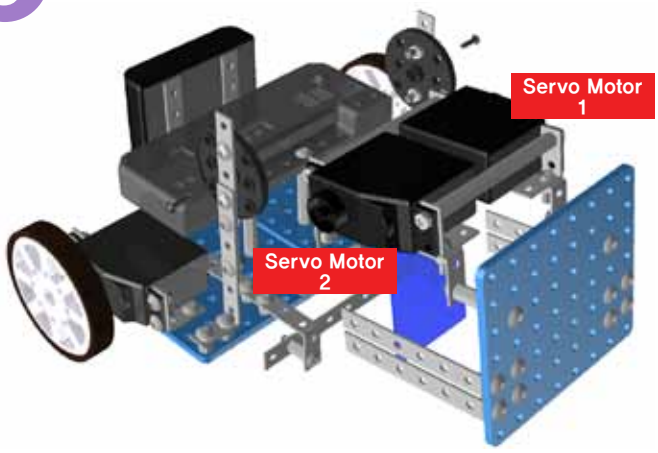
8

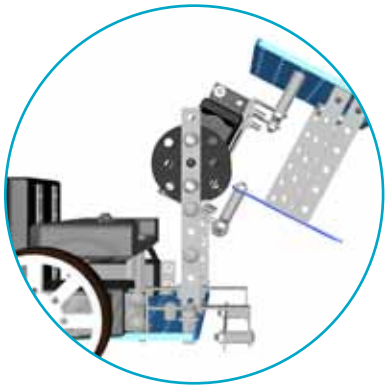




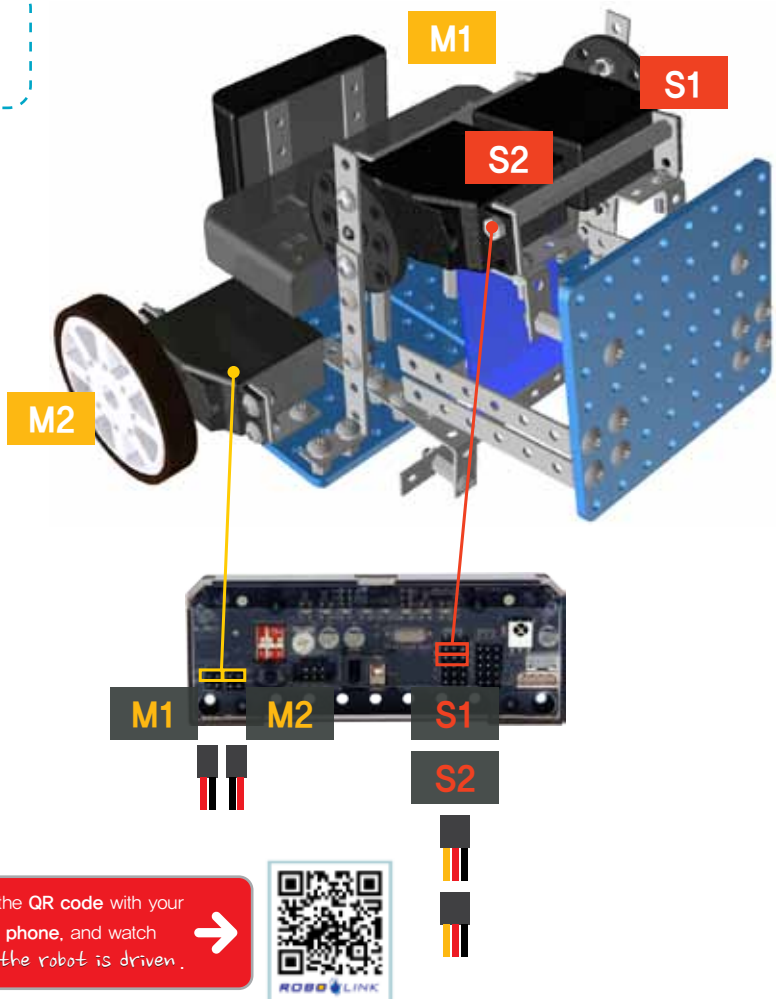
X 4
X 4
7mm

9





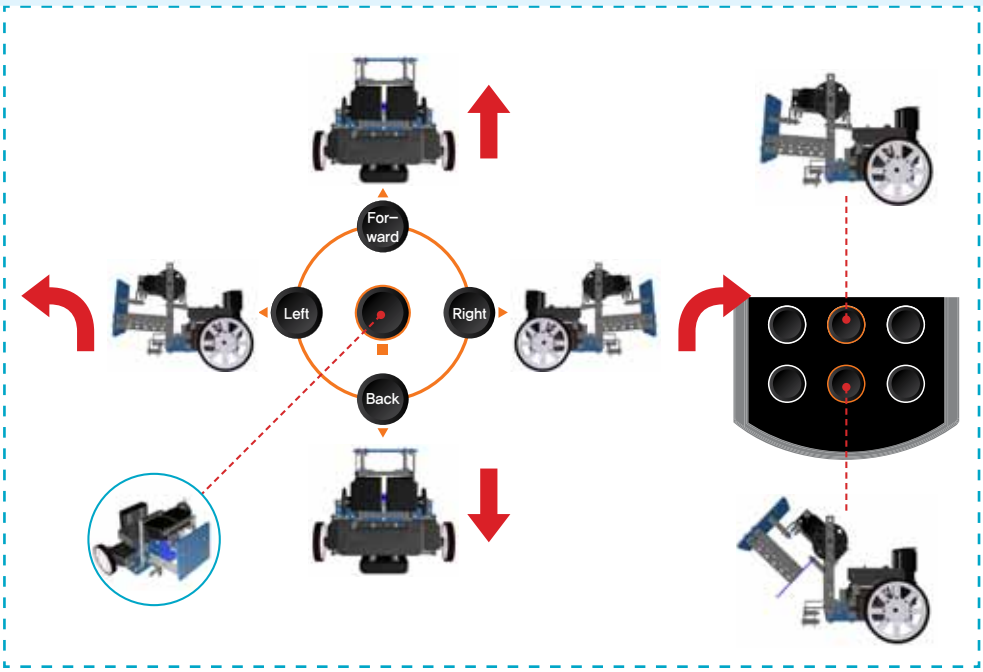
X 2

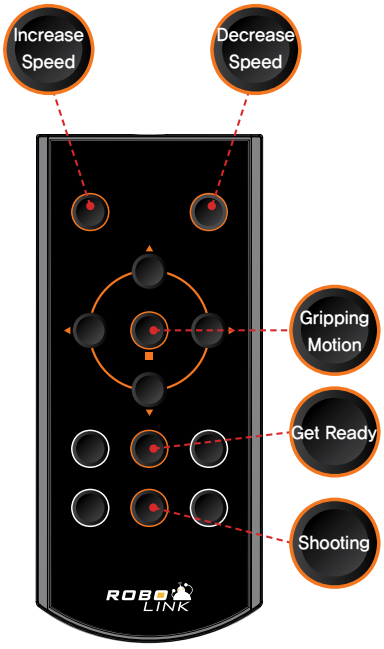


Scan the **QR code** with your **Smart phone**, and watch How the robot is driven.

For driving Handball Robot, select and press program mode 6.

In Smart Rokit Step 2, program is due to be running on with number 2 toggle of DIP switch turned upward. In other words, Smart Rokit Step 2 basically uses channel number 3. Refer to '2. Channel set-up for remote control' in page number 15 that gives you more in details for further reference.





When the speed increases, a bright-ness of the light increases.

When speed is high

When speed is low

Play the Game!

– Handball Robot Game

Requirements : a number of ping-pong balls, a twin of goal posts within the dimension of 10cm in height and 20cm in lengths, and an arena surrounded with a wall of 1.5m in width, 1m in length and 5cm in height.

1. Form a group of teams, each team consisted of 2 players. Draw a half-way line, or center line, of the arena, dividing it one for opponent's half and the other for our team's half.

2. Each team's robots shall not cross the center line, and, if a robot's two wheels all have crossed the line, it shall be considered to be disqualified.

3. Spread the ping-pong balls all over the arena randomly, with a minimum of three balls deployed in each team's half of the playing surface. Before a game is started, put the Handball Robot players in designated place. 1 to 2 minutes of play time is suitable for a game.

4. As soon as the game begins, let the Handball Robot move to catch a ping-pong ball. After the robot catches a ping-pong ball, make it smack the ball. Who has scored highest number of goals at the end of game wins the game.

5. The ping-pong ball hit by the opponent with no goal can be held by our team player to smack a goal-in.

6. If the player holds a ping-pong ball and does not make a try to smack it for 10 seconds and longer, and if every single pion-pong ball stays in a team's half of the playing surface and the player of the team fails to smack a ball to the opponent's half, either penalty or disqualification may be applied.

7. It may be more interesting if additional points are given to the scorer when a different colored ping-pong ball is goaled in.