Team Description Paper

League Name:	RoboCupJunior OnStage Preliminary
Age Group:	Primary
Team Name:	Funny Birds
Team Website:	-
Participants Name:	Igor Andreev Maxim Belotelov Mikhail Vakulin Makar Trofimov
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Date:	10/10/2020
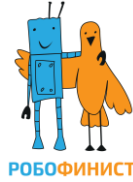
Team Description Paper

RoboCupJunior OnStage Preliminary

Igor Andreev, Maxim Belotelov, Mikhail Vakulin, Makar Trofimov

Team Name: Funny Birds

Secondary school №83 from a town Seversk Tomsk Region Russia

1. **Abstract:** The document contains information about the team's line-up Funny Birds, participating in the competition `RoboCupJunior OnStage `, and the description of show equipment.

   The project's plot:
   The Queen bird is walking along the waterfall. Funny but a bit persistent baby bird is flying around the Queen bird making it discontent (the eyes sparkle red). The guard tree, throwing fruits, scares the baby bird away. The meeting a Serious birds made the Queen bid happy (the eyes get blue) and it laid an egg.

2. **Introduction**

   a. **Team Background:** The team participates in a competition for the first time.

      Maxim Belotelov has engineered and programmed `waterfall` and `bird's head`, preparing of our team's presentation.

      Igor Andreev has engineered and programmed `A tree with a catapult` and have shot video of our team's presentation.

      Michail Vakulin has engineered and programmed `a bird with an egg`, and also created a sliding gear of an egg and worked with a Bitronics sensor.

      Makar Trofimov has engineered and programmed a 'bird's body', and also shot a technical presentation video, have video edited and have painted decorations.

   b. Team website (no)

c. Team photo (optional)

| Maxim Belotelov | Makar Trofimov | Igor Andreev | Michail Vakulin |

d. Previous RoboCup or other robotics experience:
Funny Birds team was created in January 2020 and had got ready to RoboCup Russia Open 2020 competition that hadn't taken place. The team participated in VRCAP 2020.

Team research

Strategy

The performance demonstrates the people and robots' cooperation. In our project we have used such recruitments as Mindstorms EV3 and BiTronics NeuroLab. Software: LEGO® MINDSTORMS® EducationEV3.
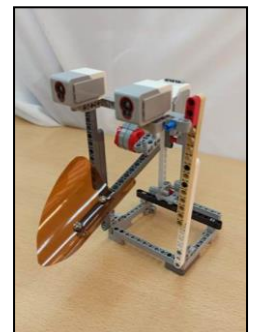
Three robots take place in a competition.

`Queen bird`

The main actor of a performance is a Queen bird.

The bird's `body` is made of sanitaryware tubes. This material is rather light so it's easy to make light volume constructions.

To control the bird's movement we use EV3 blocs which are controlled by 4 big servos. A touch sensitive tool is used to start up a software.

A 'head' and a 'beak' are made of plastic bottles.

The beak consists of two parts: the top of the beak is fixed. The bottom one sets into motion with one big servo. The bird's eyes are two color sensors which while the performance change eyes color (red-blue) depending on bird's mood.

The second EV3 bloc control 2 big servos that set wings into motion and 1 big servo that move a beak.

The third EV3 control the eggs appearance.
A signal from EV3 bloc controlling the neuralsensor which takes electromyogram transmit a signal by means of Bluetooth.

As long as the electromyogram signal exceeds legitimate value, servos that open the bird's front part and egg appearance will go off. The egg appearance is carried out with the help of a sliding mechanism.
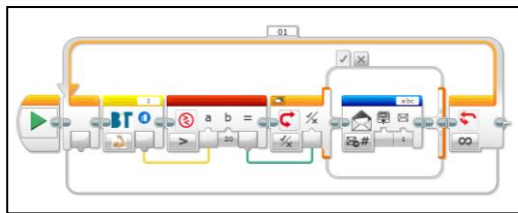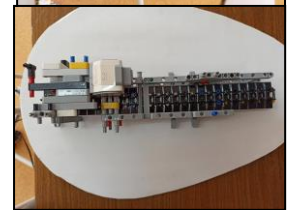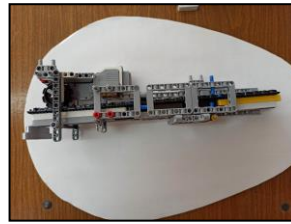
The problem:

The problem of bird's reference trajectory movement occurs while working with a robot. While placing the wheels from EV3 (the hub 43,2x26 mm, a grey 4634091 and low profile tyre, 56x28 mm, black 6035364) the trajectory of movement was different on different floor covering.

The solution:

The wheels were constructed from sprocket 40,7x15 mm, black 4582792 and track links 6014648 for stable movement

`Waterfall`

A 'waterfall' is conducted by one EV3 bloc and two big servos. Water movement starts after an impact on an ultrasonic sensor. Caterpillar tracks are attached to the linen. 2 servos which set tracks in movement are at the top of the waterfall. We can stop the waterfall by means of ultrasonic sensor impact. Water is drawn on a tissue.

The cliffs were drawn on cardboard. They function as an additional support.

The problem:

The top of a waterfall construction sagged because of a large width that's why the track tension was different. The canvas of the waterfall was displaced from the guides.
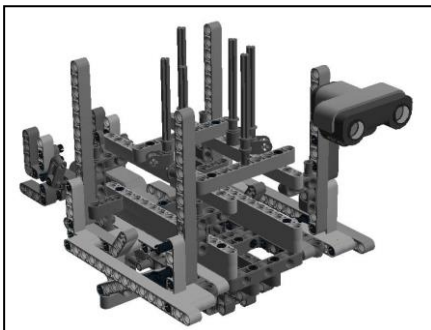
The solution:

the installation of additional supports for the upper part of the structure.

'A tree with a catapult'

The 'tree' is controlled by 1 EV3 bloc and 1 big servo which set a catapult into movement.

If the object appears in front of the ultrasonic sensor, a mechanism which consistently shoots balls into a target snaps into action. The balls are placed in a guide tube.
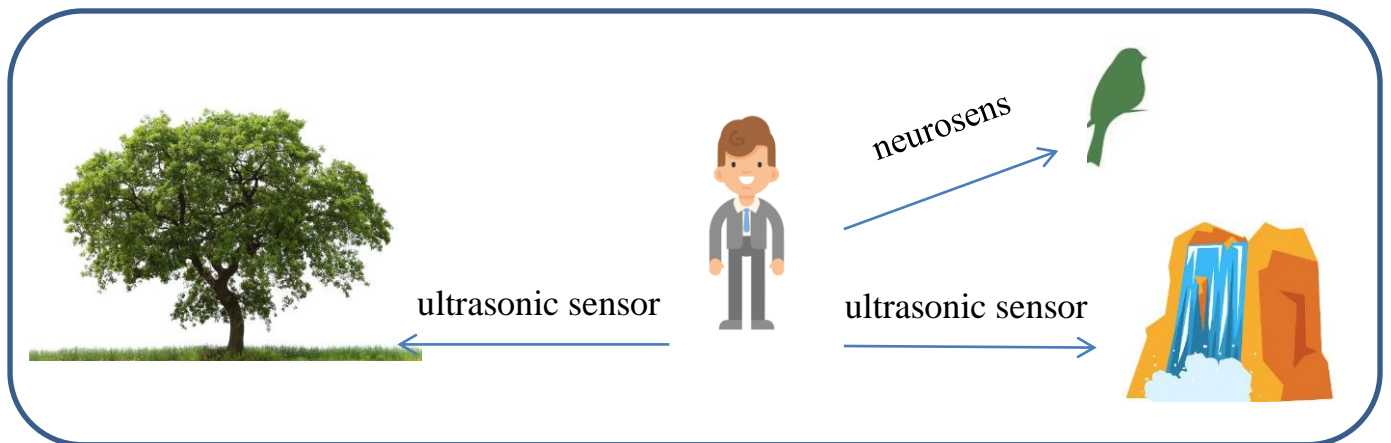
The problem:

The first version of the catapult had a low impact force and a side impact mechanism. The balls fell out, but did not fly in the right direction.

The solution:

To change the direction of the impact to increase the impact force. The catapult is made on the principle of a slingshot.

Robots and humans Interaction

Share your team's learning experience

During the preparation for the competition, the team mastered working with Bluetooth, solved the design problem associated with the development of mechanisms for the movement of water in the "Waterfall", the catapult of the "Tree", the mobility of the beak and wings of the "Bird", the appearance of the "Egg". We got acquainted with the BiTronicsNeuroLab neurosensors and applied in practice the neurosensor for taking electromyogram (EMG) readings.

Description of future work

The Funny Birds team plans to make the show more spectacular: master Arduino-based design and programming and apply it to Birds, add show characters, add control of robots using neurosensors and write a more interesting storyline.

Acknowledgements:

We would like to thank Secondary School Number 83 for the opportunity to study robotics and trainers Svetlana Salopova and Yuri Brakhnov for their help in organizing work on the project.

We are grateful to the organizers of RoboFinst for the opportunity to gain valuable experience while participating in the competition.