



TOHOKU
UNIVERSITY

Boeing Higher Education Program Progress Report

Tohoku University
T-Semi

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What is T-Semi?

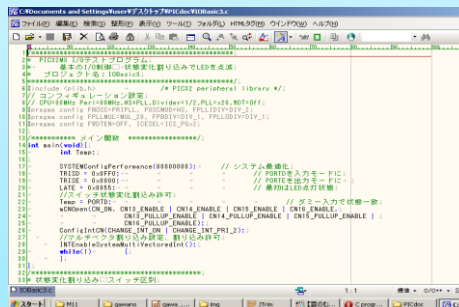
3 clubs belong to T-Semi

Material System Club



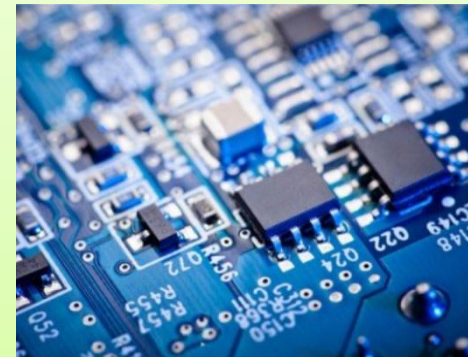
- Mechanical Design
- Mechanical Working

Technology Club of the Engineering Department



- Program
- System Integration

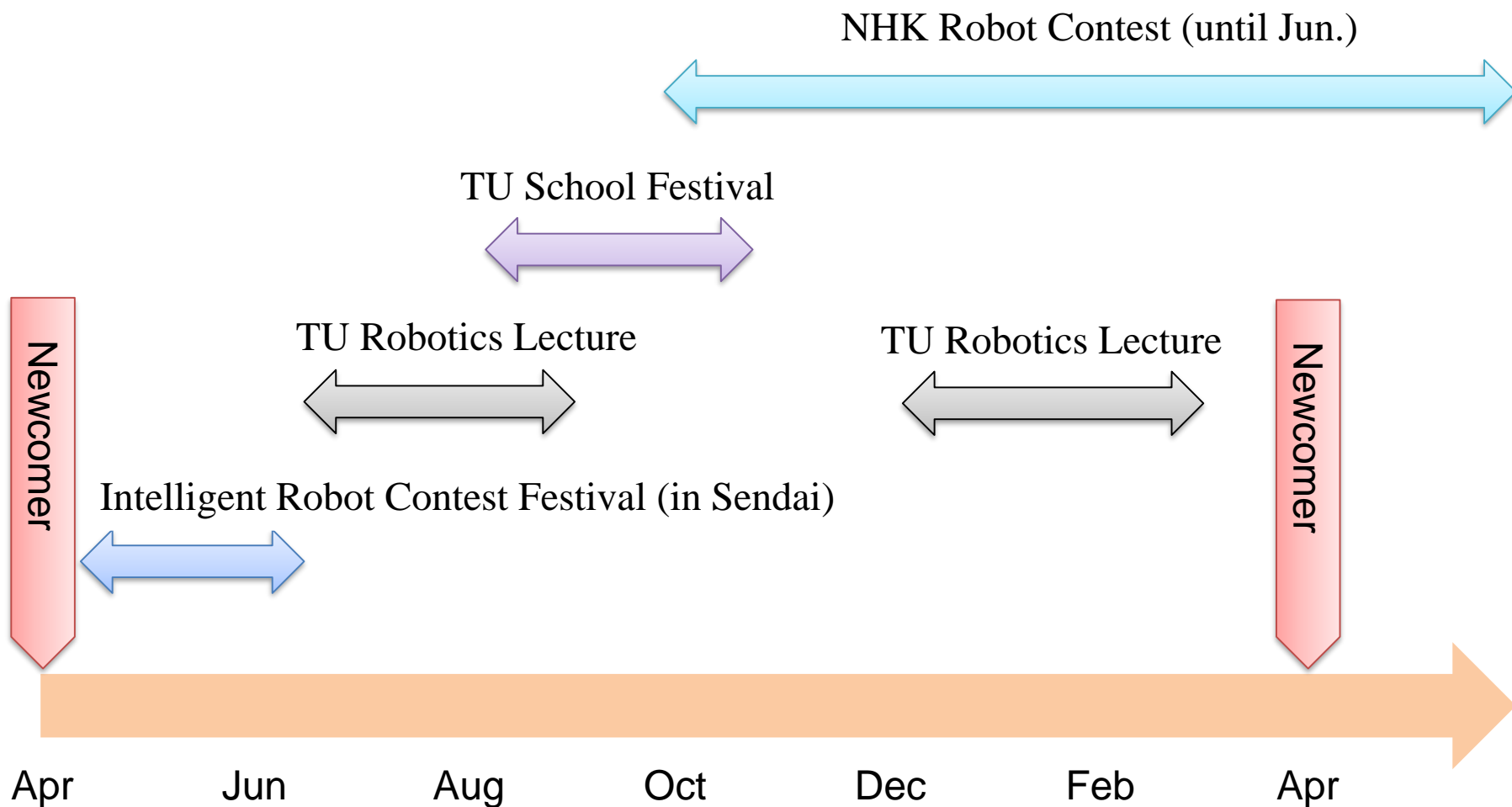
Automatic Control Club



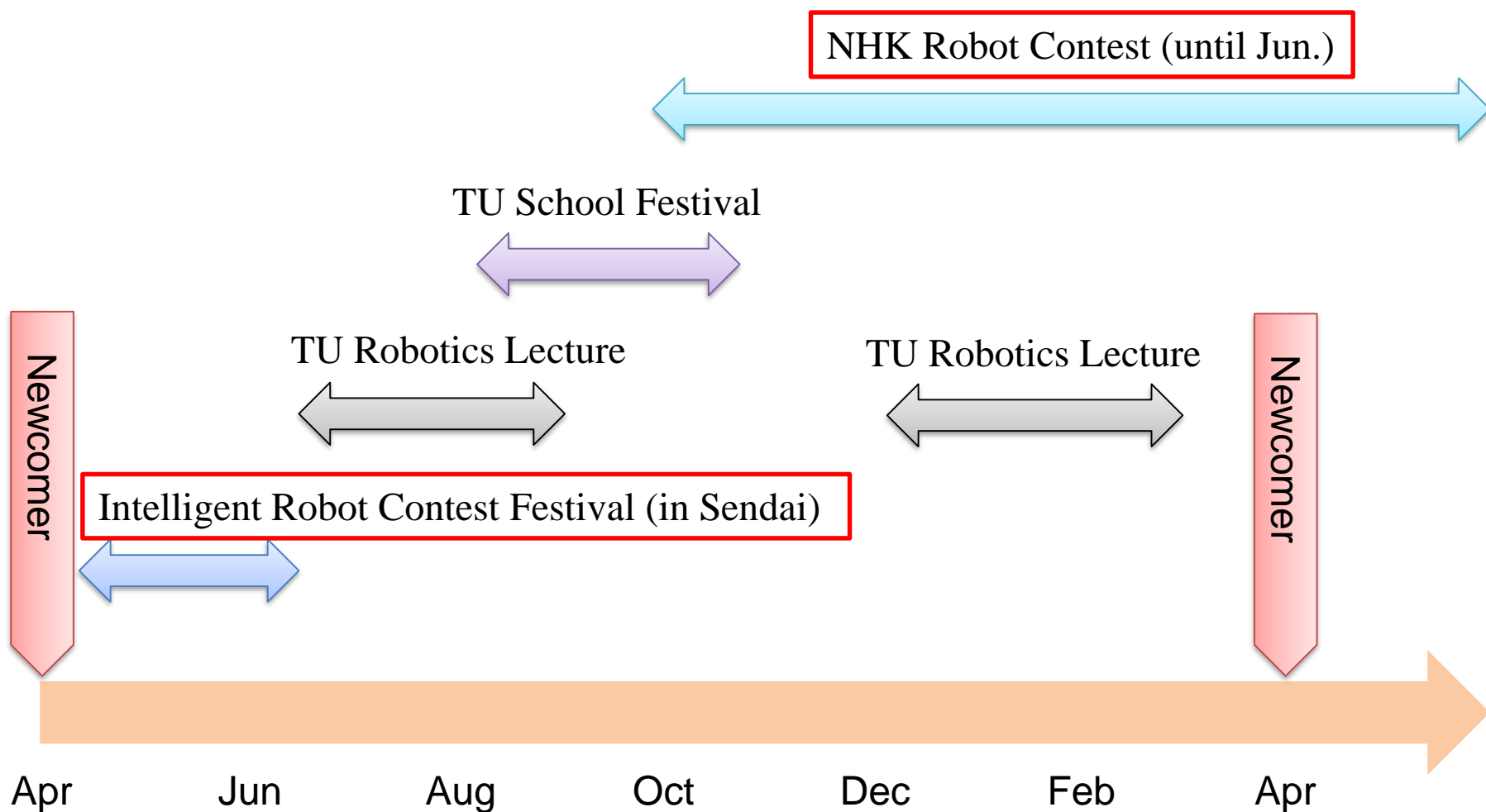
- Circuit
- Signal Processing

Each group has own strong field so we cooperate together to make best robots

Main Activity



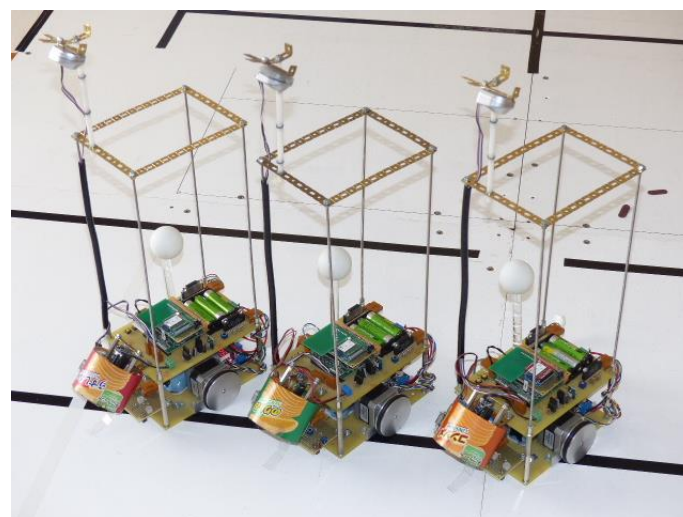
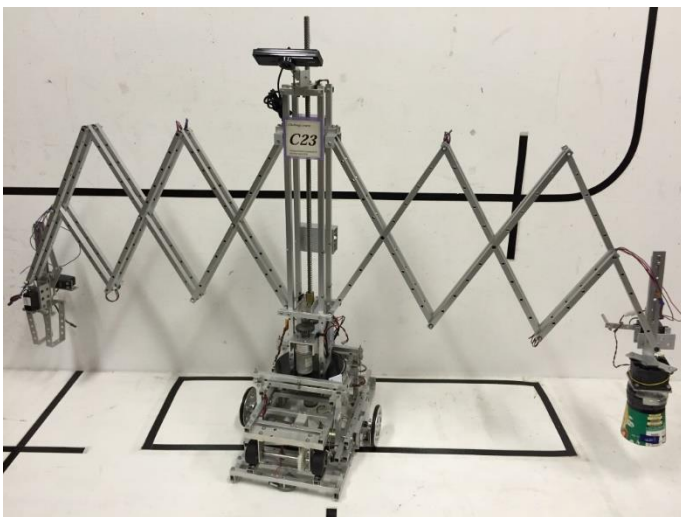
Main Activity



What is InRoF?

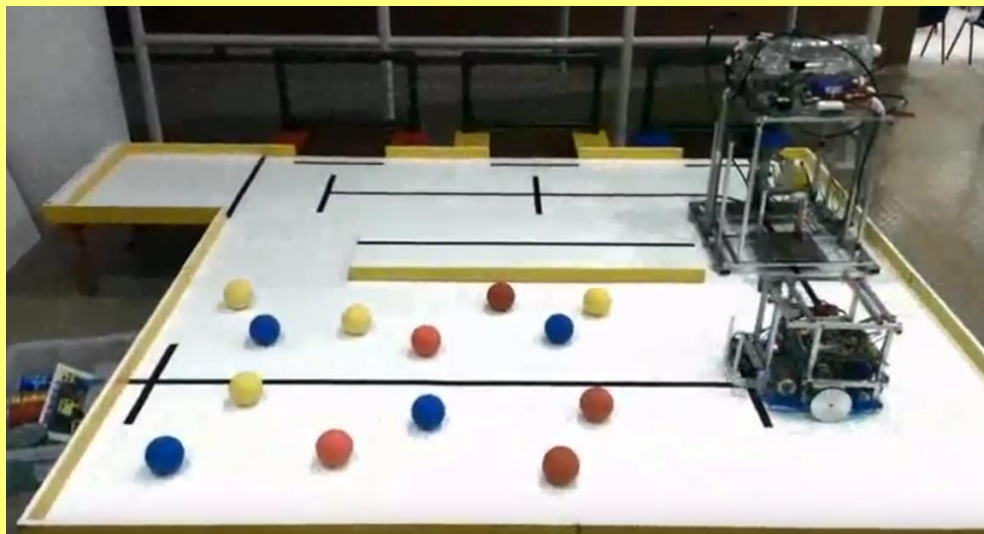
InRoF stands for **I**ntelligent **R**obot Contest **F**estival

InRoF is one of the robot competitions which uses
“Intelligent” robot



One of the robots of InRoF

Only things that human can do is to push the start button



Challenger's Course

- Collect 3 color balls and put them in same color boxes
- Playing time is 10[min.]
- Scored by 50[%] competition result and 50[%] artistic point.

Master's Course

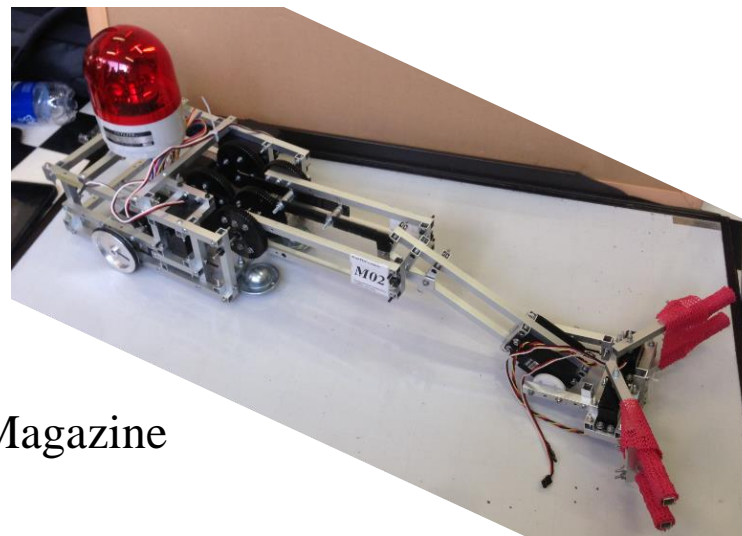
- Collect many types of objects including filled bottle, can, and ball pyramid.
- Playing time is 10[min.]
- Scored by 70[%] competition result and 30[%] artistic point.



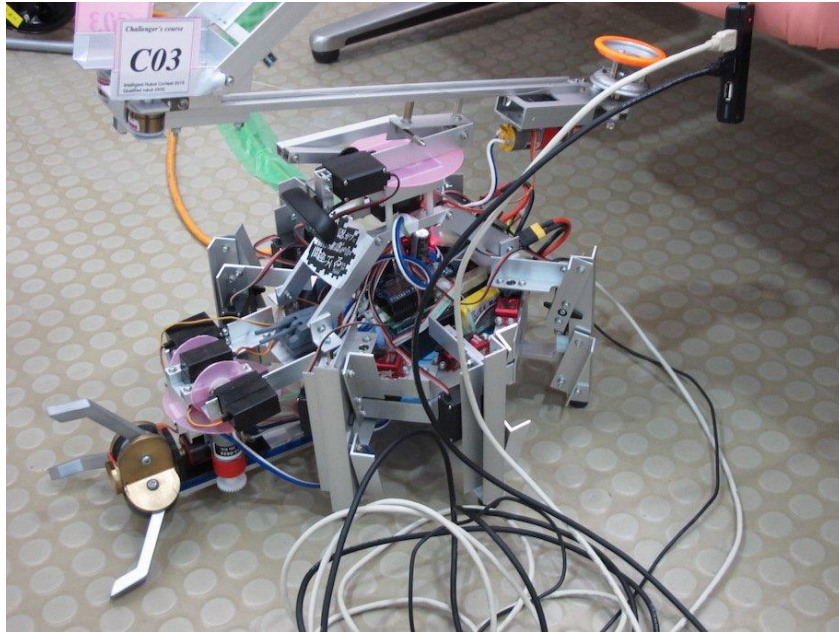
Previous Achievements

- 2014 (About 90 teams participated)
 - Challenging Technology Award →
 - Idea Award
 - Best Video Award
 - Invited to Demonstration (3 teams)
 - 2 teams are published by ROBOCON Magazine

- 2015 (About 100 teams participated)
 - Champion of Master's Course →
 - Idea Award
 - Best Video Award (2 teams)
 - Invited to Demonstration (2 teams)
 - 3 teams are published by ROBOCON Magazine



Previous T-Semi's Robots



Multi Legged Robot

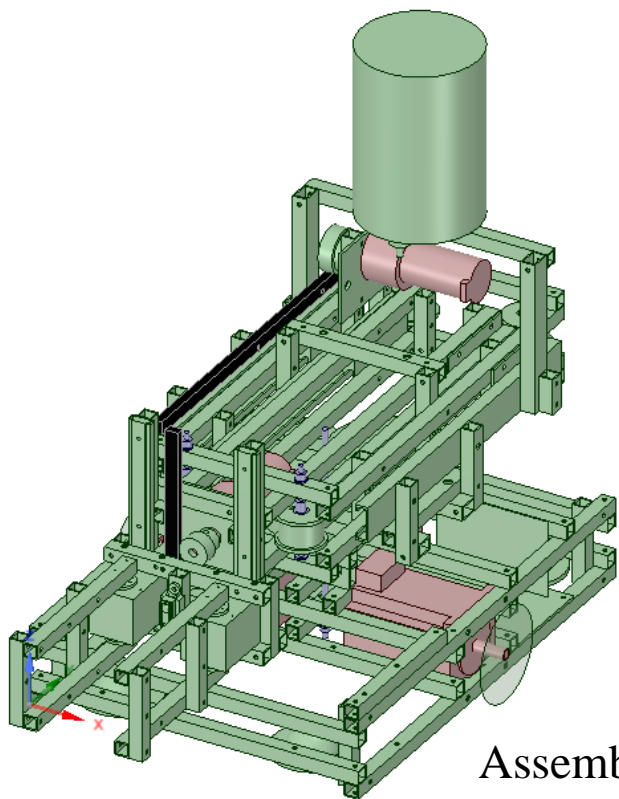
- Detect position using visual odometry
- Grab a ball using 3-fingered hand and shoot by catapult

Parallel Link Manipulator Robot

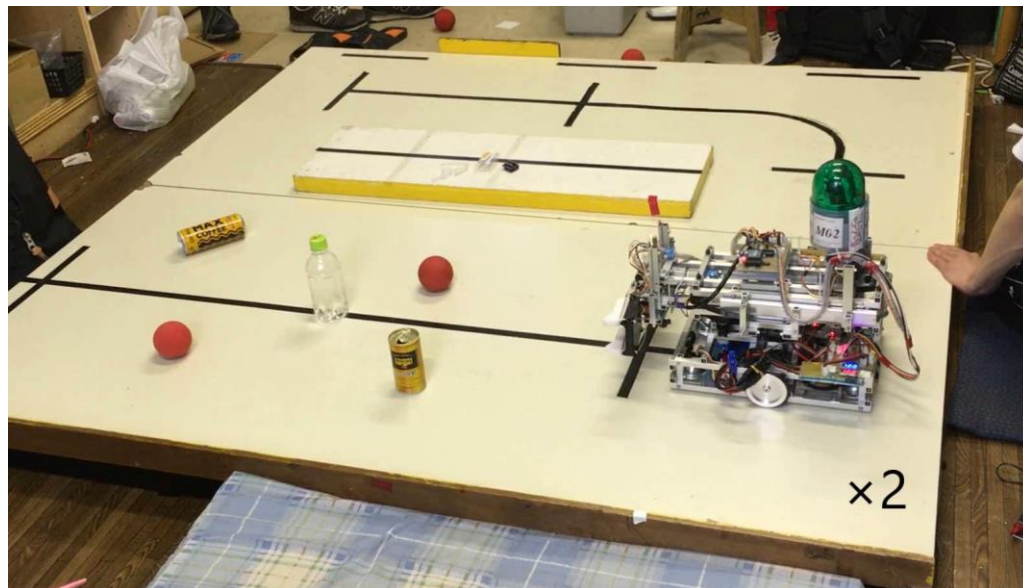
- This robot uses Parallel Link Mechanism to correct balls
- Manipulator can follow desired path by solving forward and inverse kinematics



Uses Direct-acting telescopic mechanism and realized expansion and contraction by only one motor



Assembly of blueprints



This robot can rotate upper part like a tank so it does not need to go out of the line

More than 100 teams participated and
our team could achieve

“Invited to Demonstration (2 teams)”

Most of our teams could not correspond the
difference between the practice field and the actual field
so we could not get many achievements like last year.

Next year, we will ...

- Acquire new technology and apply to InRoF Robots
- Create interesting robots and aim for the championship
- Inherit the technology to younger students

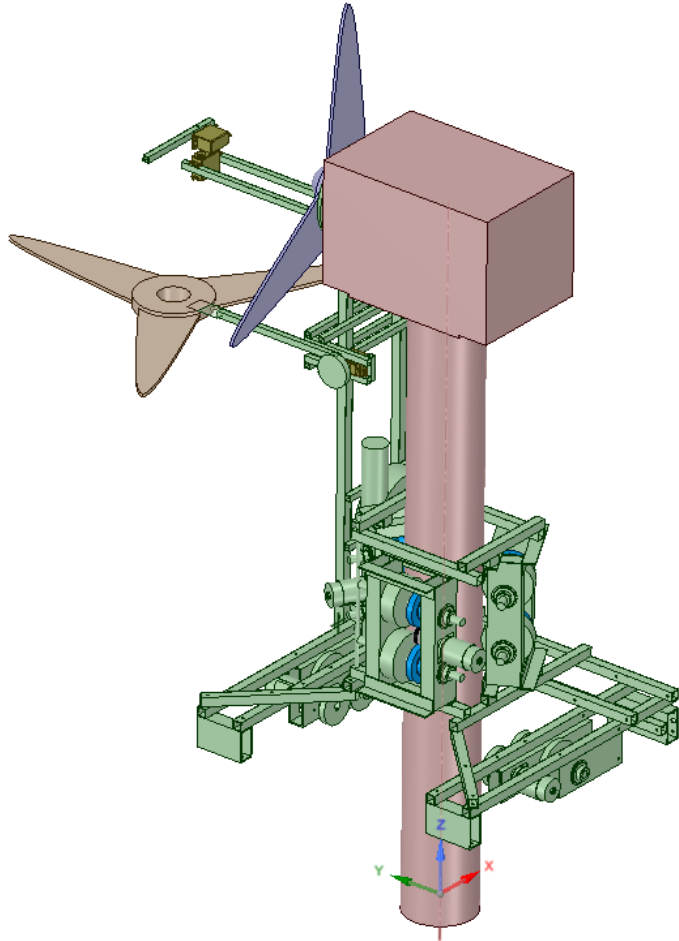
NHK Robot Contest (NHK Robocon) is competition which robots compete to complete a task within a set period of time.

Each year the competition has different topics and rules

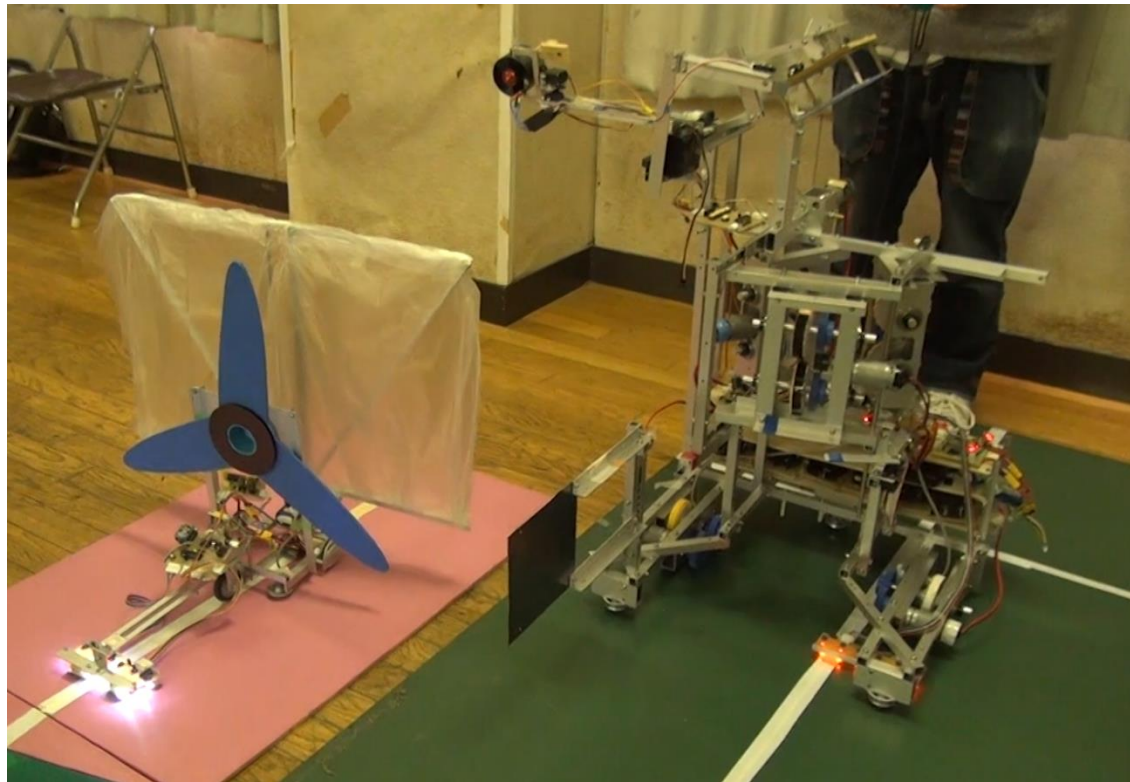


This year's tasks

To complete all of the tasks, we made two robots

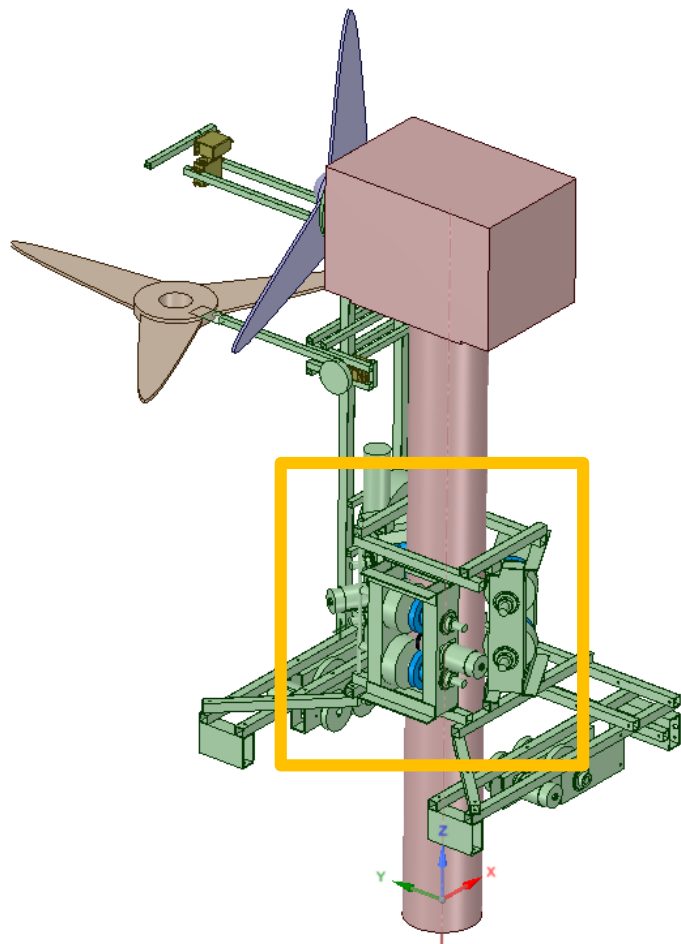


Blueprints of Hybrid Robot

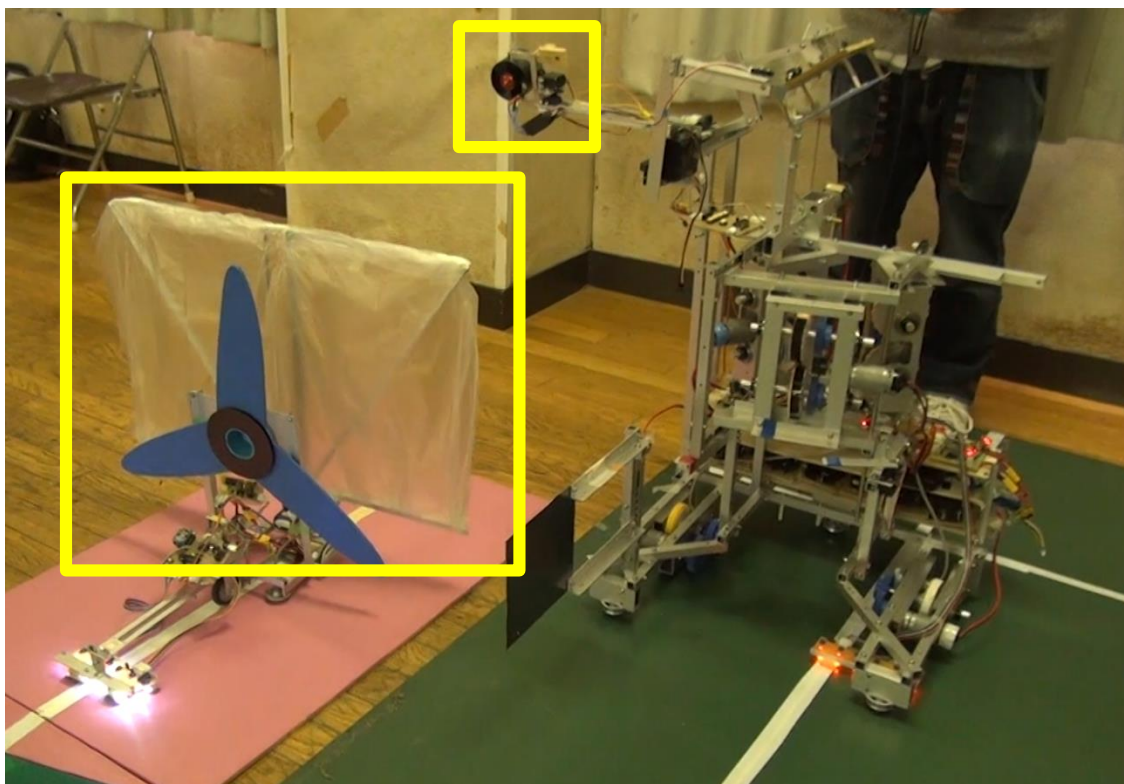


Created Hybrid Robot and Eco Robot

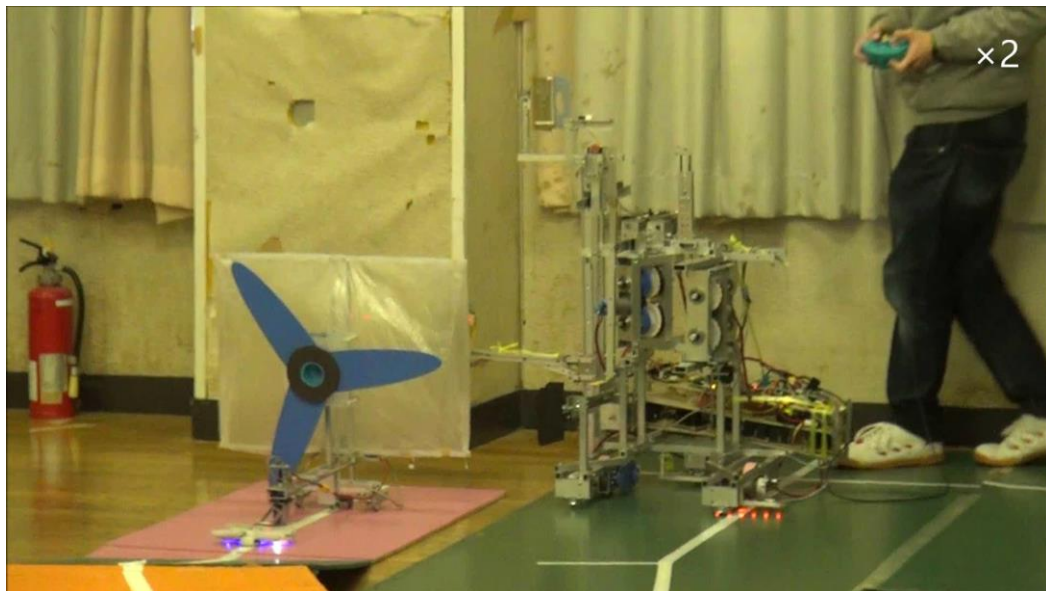
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Blueprints of Hybrid Robot

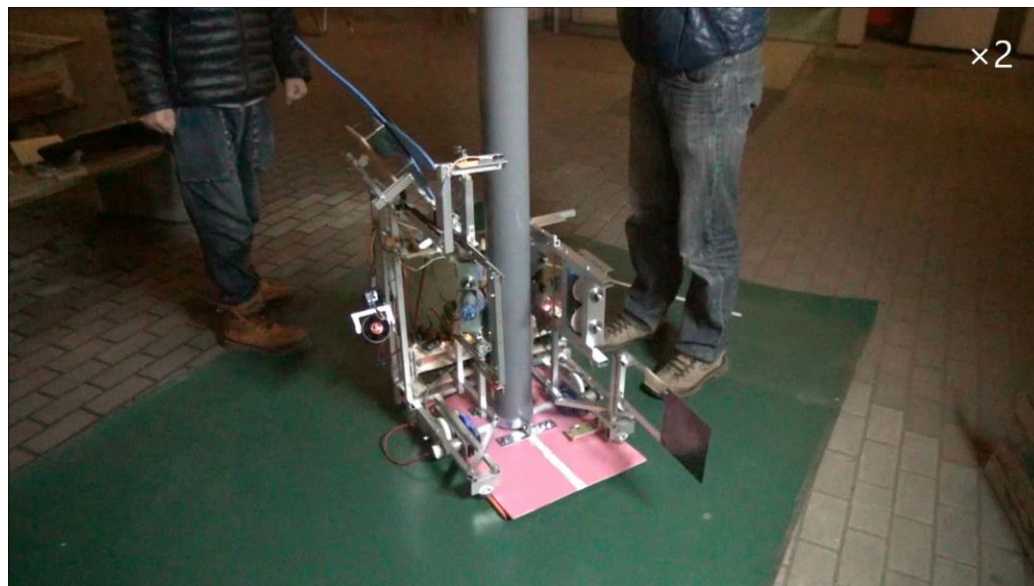


Created Hybrid Robot and Eco Robot



Up the hill

Climb the pole



This year's result

Over 100 teams applied, and about 50 teams passed the first qualification. Finally, 24 teams passed the second qualification and go to the final round.

We passed the first qualification,
but we were eliminated from the second qualification.

Next year, we will ...

- Acquire and understand advanced technology, and go to the final tournament

Paper Application

Some of the T-Semi members try to participate in next year's RoboCup Rescue World Competition



We proposed a new mechanical system of manipulator for Rescue Robot

We submitted a paper to System Integration Division Annual Conference

Title: Proposal and prototype of robot arm with adjustable load compensation mechanism

- InRoF
 - Create interesting robots and aim for the championship
- NHK Robot Contest
 - Acquire and understand advanced technology, and go to the final tournament
- RoboCup Rescue World Competition
 - Install our proposed mechanism to the Rescue Robot and participate in RoboCup Rescue World Competition

Thank you for your attention