Welcome to World Robot Olympiad™
This year, we’ve built on old friendships and made many new ones as World Robot Olympiad expanded into new countries. We also worked on our rules and competitions to keep them exciting, competitive - and fun.

Our goal
World Robot Olympiad aims to use robotics to get more young people excited about the STEM subjects and inspire a life of creativity. Learn more about this mission, and how we achieve it.

How we are organized
From drawing up the rules to making sure that every National Organizer has the tools it needs to build a thriving robotics culture, making World Robot Olympiad happen takes time and a lot of dedicated people.

Our categories
Each category is designed to make our teams think and create. From the themed challenges that change each year to the football and university level events, there is something here for everyone.

Pilot projects
World Robot Olympiad believes that everyone can contribute. That’s why we’ve started introducing events aimed at younger roboteers and those joining WRO for the first time.

Where we are
Across borders, across cultures and across ages, the message of World Robot Olympiad has spread around the world. See just how many countries are now involved and where we hope to make new friends in the future.

The year in review
This year has seen World Robot Olympiad grow as never before. We returned to our roots when the International Final was hosted in Thailand but got ready to reach out to more countries and young people.

The 2018 International Final
World Robot Olympiad first started in south east Asia, so it was with a happy heart that we returned to Thailand. It gave everyone chance to see how much the tournament had grown and to look to the future with renewed confidence.

See the results
Robotics is for everyone, but every tournament must have its winners. Here you can see who finished first, second and third in each category.

Welcome to Hungary - looking ahead to the 2019 International Final
Home to the inventor of the biro, the helicopter and turbine, Hungary is a country dedicated to the spirit of intellectual enquiry and the perfect venue for our first International Final in the heart of Europe.

Meet our Premium Partners
Global competition involves volunteers giving their time and expertise, but also Partners who provide funding and support that helps us stage the International Final and reach more young people.

Meet our Silver Partners
A second tier of Partners also provide us with their expertise and financial assistance that makes World Robot Olympiad possible each year. Read more about them here.

Meet the University Partners
The joy of each year’s activities is that we are constantly making new friends. And this year, we welcome some new partners into the organisation with a new set of abilities and expertise that will make it even better.

Join us
This annual report shows you about all the great things we’re doing. But don’t just take our word for it. Come and get involved and experience the benefits for you, your organisation and the thousands of young people we reach.
World Robot Olympiad is about the journey. We are about learning new skills, thinking in new ways and making sure that we have fun along the way. In the same sense that the most important part of an equation is not the answer but the process used to find it, the most important thing for all our roboteers is that they learn and laugh along the way and see how intellectual enquiry can bring them together.

Read more about the International Final in Thailand, look ahead to the International Final in Hungary and see what activities young people around the world are getting involved with. And when you reach the end, turn to the ‘Join Us’ page and think about getting involved, too.

All of our volunteers and sponsors say how much they enjoy being part of the World Robot Olympiad family. And they also say that they can see how much fun learning becomes for volunteers and young people alike when everyone works towards a common goal. To experience this, get in touch with us.

And in the meantime, enjoy an annual report… with a difference!

Annual reports are generally a place where you can read about the financial performance of an organisation and see how well it has achieved the goals it outlined in its previous report.

This report is a bit different because World Robot Olympiad is a bit different. Our aim is not to make money, or even to find the most skilled young people at robotics. Instead, our aim is to cultivate a love for what educators call the STEM subjects - science, technology, engineering and math - using robotics as a fun, exciting and challenging way to do that.

In this report, you can see just how many people around the world have joined World Robot Olympiad and are busy meeting each other, forming teams and looking at the challenges in each year’s competition. These can be the creative challenges of the Open Category, where they have to use their imaginations to come up with the solutions to a defined problem, the robotics skills needed to complete a particular task such as a Tetris-like game or building a footballing robot.

All competitions have a winner, and we find ours at the International Final each year, held in a different location which brings its own colors, sights and sounds to each event. But the Final is only a small part of the story.

This year, we’ve built on old friendships and made many new ones as World Robot Olympiad™ expanded into new countries. We also worked on our rules and competitions to keep them exciting, competitive - and fun.
The goal of World Robot Olympiad is simple.

We aim to foster an interest in science, technology, engineering and math by getting young people interested in robotics and its unique potential to help people.

To structure each year’s events, they are designed as a competition, culminating in the International Final which is hosted in a different country each year. Here, the finals of each event are held and an overall winner is selected in each category. But because it is nominally a competitive event, we recognise that there is a potential for the desire to win to get in the way of our emphasis on fun, on learning and cooperation.

With this in mind, we have three Guiding Principles that everyone is expected to abide by and a WRO Ethics Code that is similarly universal.

WRO Guiding Principles

Teams are encouraged to learn and master new skills while having fun together.

Coaches, mentors and parents are there to guide the teams, not to do the work for them.

Participating and learning are more important than winning.

WRO Ethics Code

It is not whether you win or lose, but how much you learn that counts.

We are participating in a competition. We like to win. We want to learn. And also we want to have fun.

We want to play fair. We design our own robot and we write our own software. It is not fair if someone else does that for us.

We can only learn if we try things ourselves. Our coach can teach us things and guide us. And we can also get inspired by others.

But our coach should not do the work for us. And we do not simply copy a robot or software from someone else.

We use the examples we find to design our own robot and programming.

Sometimes we fail and that is OK. Original ideas come from failing. Winning is nice but failing is part of our journey.

World Robot Olympiad™ aims to use robotics to get more young people excited about the STEM subjects and inspire a life of creativity. Learn more about this mission, and how we achieve it.
Our mission statement says that we aim to “…bring together young people all over the world to develop their creativity, design and problem solving skills through challenging and educational robot competitions and activities.” That was written when World Robot Olympiad™ was first set up in 2004. It is still true today.

While the roots of WRO are in South East Asia where the events were received with most enthusiasm, today we are a truly global family. With 100,000 young people in 60 countries taking part in events that extend from simple WeDo competitions for the younger ones through to the sophisticated business challenges of Future Innovators, there have never been so many ways to use robotics as the entry to a world of creativity and innovation.

At the heart of what we offer there are the Regular and Open categories, where competitors use their imagination and a sense of possibility to solve different, themed challenges each year. Organizing all of these, and organizing the annual International Final in which young people meet each other and enjoy finding out which solution works best, needs a whole network of staff and volunteers.

THE BOARD OF DIRECTORS

The senior people in WRO, these people make all financial decisions and decide what strategy the organisation should follow. Its members are:

- Mr Lars Vahl (Chairman)
- Ms Leefin Cham (Finance Manager)
- Mr Claus Dittev Christensen (Secretary General)
- Mr Eugene Zhang
- Mr Johnson Jan
- Mr Yasuhide Kobayashi
- Mr Clarence Sirisena

NATIONAL ORGANIZERS

Our national organizers are the ones who run WRO in their countries and who are responsible for all WRO-related robot fun and adventure. They help decide which competitions will be run in each country and are a vital source of information and feedback. Without them, WRO would not exist.

THE ADVISORY COUNCIL

Known to WRO® as ‘the AC,’ the role of the Advisory Council (pictured opposite) is to decide what robot-related activities the national organizers will be able to offer. They also decide where the International Final will be held and have separate panels that report into them about future developments.

They are experienced academics and senior people from the business world whose expertise helps keep WRO informed about new technology and that, each year, the challenges our competitors are set are interesting, fun and relate to real problems that humanity faces.

Our chairman is Mr Brent Hutcheson from South Africa. He is assisted by:

- Mr Eugene Zhang, China
- Dr Feng-Kuang Chiang, China
- Dr Kai-Tai Song, Chinese Taipei
- Mr Yasuhide Kobayashi, Japan
- Mr Clarence Sirisena, Singapore
- Mr Ole Caprani, Denmark
- Mr Najla Mohammed, UAE
- Mr Kerry Bailey, UAE
- Mr Dominic Bruneau, Canada
- Ms Alejandra Sanchez, Costa Rica

NEW AC MEMBER

Meet the newest member of the Advisory Council Alejandra Sanchez, General Director of Aprender Haciendo and Professor of Mechanical Engineering at the University of Costa Rica

I first had the idea of turning Costa Rica into a host nation for WRO way back in 2012. We had already done a National Robotics Olympiad in 2009 and then in 2011 we got the support of WRO to travel to the United Arab Emirates for our national winners to compete there, which was amazing.

And then in 2012, it was the first time we had competitors in all categories. A girl from Jesus Jimenez School in Cartago on the winning team came to Malaysia with us on tickets that her family would not have been able to afford. She had an amazing experience that changed her life. That fills my heart with pride.

When we were finally able to host the International Final in 2017, I saw the venue, crowded with children and young people from all over the world, working together. No matter what they do in their lives, they will gain new skills and be able to develop as people, all because of WRO. That is the most important thing.
Each category is designed to make our teams think and create. From the themed challenges that change each year to the football and university category events, there is something here for everyone.

There are four main categories in this year’s series of events: the Regular Category, the Open Category, WRO Football and the Advanced Robotics Challenge. As well as these, there are two more specific categories that each use the principles behind WRO® to extend the fun and the learning opportunities to younger people: they are WeDo and our starter games.

Rules for the Open Category and for the Regular Category are set in collaboration with the organizers in the country that is hosting that year’s International Final. The rules for all other events are set by WRO’s own team of expert advisors and find a balance between challenging the competitors and keeping things open, interesting and, most importantly, fun.

It is the principle of fun that is at the heart of everything we do, and of everything we believe in. All of us learn best when we are excited and engaged by what we are doing, whether that is devising a robot that can sort our rubbish or presenting an imaginative way of using robots to grow food, both challenges that WRO teams have faced in the past. No matter which category the young people of WRO enter, each of these has its own challenges, intended to encourage exciting, inventive and imaginative ways to overcome them.

**REGULAR CATEGORY**

There are four age classifications. WeDo, which is for 10 and under, Elementary, which is for age 12 and under, Junior, which is for age 13-15 and Senior, which is for age 16-19. Teams consist of two to three people under the guidance of an adult coach.

The challenge will change to suit each year’s main theme, but is always structured so that each age category faces an appropriate level of difficulty. To make the competition fair, the robot must be taken apart on the day of the competition. A surprise rule change is also announced hours before the start to test the teams’ ability and ingenuity.

**OPEN CATEGORY**

This has the same four age classifications as the Regular Category, the same team sizes and the same level of involvement of the adult coach. However, the Open Category relies on teams’ imaginations and their ability to present their ideas to an audience.

Everyone has access to a two metre booth in which they have to present their response to that year’s challenge. Marks are awarded for creative, original responses which show how robots can be used to solve the problem.

**FOOTBALL CATEGORY**

This is open to all ages between 10 and 19. Teams should have two to three members and have the guidance of an adult coach.

Each team must consist of two robots. While there are small changes to the rules each year, the overall aim is to score more goals than the other team. Robots must be broken down and then reassembled on the day of competition to keep the event fair.

**ADVANCED ROBOTICS CHALLENGE**

All the entrants to this category need to be aged between 17 and 25. It has been created to provide the ultimate test for students’ engineering and programming skills. In the past there has been a bowling competition and a TetraStack challenge which saw the robots compete to place coloured blocks into a stack. No matter what the focus is, WRO experts make sure that it provides a unique challenge to the teams’ extensive abilities.
PILOT PROJECTS

World Robot Olympiad™ believes that everyone can contribute. That’s why we’ve started introducing events aimed at beginners and an extra challenge for business minded people in the Open Category.

As well as the four main categories, we have several pilot projects that create different routes into World Robot Olympiad™ for young people at different stages of their journey. In each case, these have been created in response to judges and competitors’ feedback and show that we are continuously innovating and looking for ways to make sure what we offer is open and accessible to new audiences.

WeDo REGULAR AND WeDo OPEN

The WeDo events were developed in cooperation with LEGO Education for children aged between six and 10 who would enjoy the fun and excitement of WRO. In each case, the robotics system is less able and less complex than the one used in the full event, allowing anyone to have a go and take their first steps in robotics. At the International Final in Thailand there were special WeDo demonstration events in the Regular and Open categories featuring eight and seven teams respectively. The aim was to show organisers how WeDo can work in their countries as a tool for engaging and inspiring young people.

Both events were a huge success. It was decided that it would be in the spirit of WRO to award the prize to the three teams who made a particularly special contribution. They all showed great teamwork, could give a thorough explanation of their solution and had placed a high value on teamwork. They received large LEGO presents and everyone received their own LEGO goodybags at a special, separate award ceremony.

EXPLORER CONCEPT

In parallel with the WeDo events, several National Organizers have been successfully experimenting with starter activities. These have been given the name Explorer Concept. They do not need previous robotics knowledge. Not all schools will teach the principles of robotics and not everyone will have access to a robotics club in their spare time, so these are an ideal way for young people to get involved and not feel scared about lacking skills or expertise. This has already been trialled successfully in Spain and South Africa where we have found that they make a great introduction to the world of WRO.

FUTURE INNOVATORS

This was first run as a pilot project in Costa Rica in 2017. It saw seven teams of young entrepreneurs from around the world presenting business ideas linked to technology and robotics. Ten teams took part in the pilot in Thailand in 2018. It helped the organisers and WRO experts to understand the nature of the competition more. In the coming year we will use these experiences to create a valuable addition to our competitions.

KÄTHE ENGLER
IBM
I judged the Future Innovators in Costa Rica in 2017 and again in Thailand in 2018. The development in team performance over the two years was impressive, with convincing presentations, carefully elaborated contents and thorough research.

CARLES SOLER
National Organizer, Spain
There was feedback that elementary challenges were perhaps too hard and even teachers did not have enough experience to master them. We discovered that it made some people not want to join WRO at all. We created something called ‘Start’ that around 50% of our teams are in, targeted at the elementary age group, which has been really successful and is a great way to build confidence. Teams can join this competition the first year they join WRO, and we see that it gives them a good experience as they come back the year after.

DANIE HEYMANS
National Organizer, South Africa
The Explorer Concept we work with in the townships uses the same challenge mat and elements as in the Regular Category, which makes teams feel like they are a part of WRO. The important thing is that the Regular concept is not strictly applied, which takes away some of the pressure. The base model is pre-built and teams have to program their robot on the day the competition, in which they can make as many attempts as they want, because their best score is their highest score. Making mistakes and fixing them builds their confidence to keep participating.
In 2018, 68 countries took part in WRO. That represents more than one third of the globe.

There were 10 countries who were members of WRO in our first year of competition, but this had grown to 68 by 2018, an increase of 580%.

Russia had the most teams competing in WRO with 4183, having started with just 17 in 2004. Next highest was Malaysia with 2426 teams.

Girls made up 19% of participants at the International Final in 2018. There were around 12,000 girls in our competition in 2018, our highest total yet.

We see the number of girls in our competition rise, but would love to see more girls at that level. We do know that in national competitions the numbers are a bit higher. We also see that our Open Category challenges attract more girls than our Regular Category. When developing plans for the future we will keep thinking about ways to encourage girls to get - and stay - involved in WRO.
HECTOR MARTINEZ, National Organizer, Colombia

How did you find out about WRO?
I knew about WRO from my previous experience in Spain with robotics. When we arrived in Colombia, we applied to WRO and were fortunate enough to be named as National Organizers.

Why did your organization want to organize WRO?
This is a really challenging and exciting competition that has really thought about the cost of taking part. As it is cheaper, it means that more public schools can include it in their activities.

What have been your experiences?
It’s amazing. We had more than 50 teams and 500 people that visited us in the National Final, while in Thailand it was really exciting to see young people representing Colombia. It will really help encourage more people to get involved.

MARIA ZAUNER, National Organizer, Austria

Why did you want to organize WRO in your country?
We found out about the tournament from our neighbours in Germany and have already been able to take part in regional events. Our senior team have competed there, which made them ask us if we would like to start a new competition.

What are your experiences in this first year?
There has been a lot of support from WRO Germany. We didn’t have to organize our own competition and were allowed to compete at the German final, but were really impressed with how well their competition was organized. It makes a great example.

What was your impression of the International Final?
From planning to implementation, everything was nearly perfect. It makes us feel like Olympic athletes. But we also had time to ask the question ‘Are we crazy, we fly halfway around the world to play LEGO for three days?’ and of course, we are!

THE YEAR IN REVIEW

Previous years were about World Robot Olympiad making sure it had a solid basis for its development. This last year has been about expansion and creating exciting opportunities. New countries have been added to our family of friends, we have a new WRO Ethics Code that shows what we think is most important about and future competitions are being revised.

The nations we have been excited to welcome are Afghanistan, Albania, Austria, Bulgaria, Cambodia, Colombia, Jamaica, Myanmar, Nepal, the Netherlands and Pakistan. What they all have in common is that they want to use robotics as a way to increase interest in science, technology, engineering and math in a way that embraces creativity, imagination and the joy of learning.

Each nation that joins us agrees to believe in our values, which is why we set them down in our WRO® Code of Ethics. You can read the full Code on page six. Its role is to make it clear that although WRO events are organised in the form of competitions, which must have winners and losers, this is not the most important part of the event. In fact, thinking about the need to win can mean that WRO is not enjoyable. If your coach and parents want you to win, you can feel unhappy. Some of our adult volunteers have given teams too much help, thinking that winning was the most important thing.

Introducing our Ethics Code is a reminder that being able to make mistakes is a big part of everybody’s education. We learn best when we are allowed to fail, because we see where we did not get things right and can do them better next time. When we can come up with our own ideas, we see if those ideas were good or if they need changing so that they will work better.

If you win a WRO event, that is great. And if you take part, that is great, too. To us, that is the most important thing. See the words of our newest Advisory Council member on page nine to read about how important these ideas are to us.

Finally, we are planning some changes that are intended to make WRO more accessible. Our Advanced Robotics Competition (ARC) will be discontinued after 2020 and our focus will be on younger age groups. We hope to show them that the STEM subjects are a rewarding area for study.

An advanced game for the 15-19 age group is also being developed. The Regular Senior category will remain, but we want to add a new competition that relates to real-world problems and will encourage our teams to work on practical solutions. As always with WRO, remember to keep looking out for exciting new developments coming soon.

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Why did your organization want to organize WRO?
This is a really challenging and exciting competition that has really thought about the cost of taking part. As it is cheaper, it means that more public schools can include it in their activities.

What have been your experiences?
It’s amazing. We had more than 50 teams and 500 people that visited us in the National Final, while in Thailand it was really exciting to see young people representing Colombia. It will really help encourage more people to get involved.

Hector Martinez, National Organizer, Colombia

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We travelled to the Philippines in August 2018 for the first ever WRO Invitational Tournament. Organised by FEITA Inc, the National Organizer, with Mylene Abiva and her team, it was held in the elegant City of Lapu-Lapu in the province of Cebu and as WRO has its root in South East Asia, made the perfect venue.

The competition had fewer categories than the full International Final as it was only intended to showcase what WRO had to offer, but gave an excellent insight into the variety and excitement that comes when you have roboteers from all over the world in one place. There were 82 teams from 13 countries taking part in the event, including Chinese Taipei, Denmark, Germany, Hungary, Italy, Japan, Malaysia, Romania, Russia, Switzerland, Turkey, the USA and of course the host nation.

Everyone arrived at the Plantation Beach Resort on Thursday. This would be their base over the next few days. Lined with palms and dotted with pools of azure blue water, it made the ideal place to relax after the journey, but 80 of the young people chose to join in with the GLOBAL Beach Challenge, taking part in challenges that were held all over the resort. Each team included people from different countries and although everyone started the day as strangers, they ended as friends and could talk together at the beach-side friendship bonfire in the evening.

On Friday morning, the teams made their way to Hoops Dome for the competition and were surprised to see that school children from the surrounding area had crowded into the venue to see them take part. There were 12,200 students and teachers from 142 schools across Cebu who cheered enthusiastically for each country that was presented at the opening ceremony, which meant that there was a lively and exciting atmosphere right from the start.

After a day’s intense robot-building and competition, the teams had a celebratory dinner in the hall of a local shopping centre, giving them chance to buy gifts and souvenirs to take home. But first came Saturday and the final rounds of the official competition. The experience of seeing their robots go through their paces in such beautiful surroundings made everyone feel like they had taken part in something very special and it did not matter who won.

The closing event was held on Saturday evening with a colourful ceremony at Lapu Lapu Shrine with young musicians and dancers, all in traditional costumes. They retold the story of how the native leader Lapu Lapu had defeated Spanish soldiers led by Portuguese explorers in the Battle of Mactan in 1521 before a lavish banquet, held Philippine style, with food laid out on broad banana leaves and teams eating ‘kamayan,’ which is Filipino for ‘with the hands’.

For many, this was a new experience, but that sums up the essence of WRO. It is about learning together, meeting new people and perhaps old friends from all over the world, intent on learning something new together. The Invitational Tournament had been a success - and we look forward to the next one.
For the 2018 International Final, WRO® returned to its roots in South East Asia. Thailand was the venue for the second International Final in 2005, which travelled to the vibrant and diverse city of Bangkok to explore the theme of robots in sports and science fiction. Now 480 teams were travelling to the city of Chiang Mai to explore the vital theme of food and how it matters to the survival of the human race.

Chiang Mai is the largest city in the mountainous region of northern Thailand, situated on the Ping river. With hundreds of ornately beautiful Buddhist temples, immediately recognizable through their gold domes or ‘stupa,’ it has also been named as one of UNESCO’s Creative Cities and as one of the Thai government’s ‘smart cities,’ with an array of data being gathered to make citizens’ lives easier. With an ‘IT Valley’ for tech startups and many universities this a city that combines ancient with modern, and was clearly the perfect choice for WRO.

A friendly, open spirit is one of the trademarks of Thai culture, so the teams were greeted by Thai volunteers who were helping to stage the event and taken to their hotels. They had chance to visit the night market or the teeming streets of this authentically Thai city or, if the journey had been long and tiring, take to the hotel pool before the intense days of competition started.

THE INTERNATIONAL FINAL

World Robot Olympiad™ first started in south east Asia, so it was with a happy heart that we returned to Thailand. It gave everyone chance to see how much the tournament had grown and to look to the future with renewed confidence.

This year’s challenges went under the term FOOD MATTERS. With one in nine, or a staggering 795 million people facing the health and social problems that come with being under-nourished, teams would tackle a range of challenges grouped around the idea of growing more food, growing better food and, of course, reducing food waste.

The following day was a Friday, and teams started making their way to the Chiang Mai International Exhibition and Convention Centre, better known by the acronym CMECC. Styled after the surrounding temples with stupa-style structures and low, elegant buildings, CMECC had big convention halls able to take the hundreds of tables and booths for the Open Category. The teams were quick to settle in and start unpacking their robots.

The Open Category teams set their robots up and decorated their booths, while the Regular, Football and Advanced Robotics (ARC) teams got on with the important task of practicing for the coming competition. There is always a special rule change introduced into the Regular category on the day of the event itself, to keep teams guessing and provide a final test of their robotics skills, so there was [continues overleaf]
plenty of talk between the teams about what this might be and how it might affect their robots.

In the afternoon, it was time to step away from the booths and competition tables and enjoy the opening ceremony. Thai dancers and even the Minister of Education were on hand to provide a warm welcome, and the Chairman of the Advisory Council, was on hand to remind teams of the most important thing of all: that the teams had all reached the International Final, which was a victory in itself, and they had already learned a huge amount about robotics along the way. Compared to that, finding category winners suddenly seemed less important.

The event started bright and early underneath a cloudless Thai sky. Teams in the Regular Category were assembling their robots and quickly adjusting to the surprise rule, unveiled on the day of the tournament, while the football teams were assembling their robots and the ARC competitors were calibrating and, finally, starting to practice, with quick glances over at the other teams to see how they were getting on.

For the National Organizers, the International Final is a valuable opportunity to get together and share experiences. Many of them particularly enjoy this as it is the only time they meet people who work with WRO® in other countries, and for the staff of WRO, it is an equally important chance to listen to feedback and brief people on the changes to coming seasons. As always, a lot of information was exchanged and, as you might expect when old and new friends get together, there was a lot of laughter.

Once the rule change had been discussed, it was into the competition. While everyone takes WRO® seriously and wants to succeed, it was encouraging to see so many teams helping each other and friendships developing between people who had not known each other 24 hours before. The day had its successes and failures, but the atmosphere in CMECC meant that everyone was happy and engaged, with the Friendship Party to look forward to in the evening.

This is a fixture of WRO®, with teams being given an opportunity to sample delicious Thai food and immerse themselves in another colourful show. As always, the most important thing is that the Friendship Dinner is experienced together and is a place where stories can be exchanged and teams can give each other advice.

On the final day, the atmosphere was a little quieter and a little more serious. For the people who had progressed this far, victory was within touching distance, and they worked extra hard to have their robots in optimum condition. While the teams in the Open Category could relax a little more and not focus on mechanical or electronic problems, they still needed to make sure that they were telling the story of their answer of how they wanted to solve the problem of growing better food and reducing food waste. By lunchtime, the winners were announced and it was time for the closing ceremony, another fixture of each International Final.

While the winners received their prizes, there were short speeches thanking everyone, including the teams but also the volunteers for their time and energy. Finally, the WRO® flag was handed to the Hungarian ambassador in readiness for the International Final in 2019, when WRO® travels to Hungary. Another continent, another culture and another robotics challenge, but the same WRO family and the same desire to learn and have fun.

See you in Győr, Hungary!

Our thanks to the Thai officials whose hard work made the International Final such a success, and to the National Organizer, Gammaco (Thailand) for all their hard work. In particular, we want to express our gratitude to:

Dr. Teerakiat Jareonsettasin
Minister of Education

Asst.Prof.Dr.Rawin Raviwongse
President of the National Science Museum

Mr. Virun Phandhevee
Vice Governor of Chiang Mai

Mr. Chakarin Chantaravisoot
Chief Executive Officer of Gammaco (Thailand) Co., Ltd.

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23
REGULAR ELEMENTARY
Robots had to reduce food waste by sorting food products according to their looks and expiration date, then transporting the sorted food to places that could make use of it, instead of classing it as waste.

FIRST: HL3 – Malaysia
SECOND: Dark Horse – Thailand
THIRD: ACL Pratom 02 - Thailand

REGULAR JUNIOR
Each of the teams’ robots would have to gather data in the soil quality of fields in a range of different farms, and then use that data to plant different seedlings depending on soil quality.

FIRST: SAKTI TIGER – Malaysia
SECOND: Amoebla – Chinese Taipei
THIRD: Brick Masters - India

REGULAR SENIOR
Teams had to make a robot that would bring different kinds of food to the right destinations by ship. In addition, the robot had to equip the ships with temperature controllers to keep different kinds of food stored on board at the right temperature.

FIRST: Taiwan Golden Sun – Chinese Taipei
SECOND: TS2 – Thailand
THIRD: Chakkham S3 - Thailand

OPEN ELEMENTARY
For the Open Category, the mission was to build a robot that would support the way we grow, share and consume food. The projects should focus around the following aspects from Goal Two of the United Nations’ Sustainable Development Goals: promote sustainable agriculture, improve nutrition, achieve food security and end hunger.

FIRST: PROJECT 2 – HUNGER TERMINATOR – Malaysia
SECOND: DCY Junior Primes – Philippines
THIRD: Robot Land 1 - Russia

OPEN JUNIOR
FIRST: Robot Land 2 – Russia
SECOND: MICROBOT Inc – Romania
THIRD: SAWA JR - Syria

OPEN SENIOR
FIRST: Strawberry Fields – Russia
SECOND: Schollibotics – Germany
THIRD: Pi-Rho Technics - USA

OPEN FOOTBALL
Teams of two autonomous robots chased an infra-red transmitting ball around a WRO® approved table top field with the aim of scoring more goals than the opposition.

FIRST: TAIWAN-HSIUNG-TSAN – Chinese Taipei
SECOND: KY-GConnection – Macau
THIRD: SMK CHUN HUANG MIR ROBOT SOCCER 1 - Malaysia

ADVANCED ROBOTICS CHALLENGE
Robots competed in a version of Tetris called Tetrastack. They located, identified and stacked interlocking coloured shapes called tetracubes within a rectangular, upright box.

FIRST: Banana Milkshake – Ukraine
SECOND: Harley Warrior – Chinese Taipei
THIRD: Is the Order a Rabbit? – Chinese Taipei

THE RESULTS
Robotics is for everyone, but every tournament must have its winners. Here you can see who finished first in each category

INNOVATION, CREATIVITY & SIMPLICITY

FUTURE INNOVATORS AWARD
WINNERS: UNIFESH - Vietnam

LEGO® EDUCATION CREATIVITY AWARD
WINNERS: Steam Fun For Kids - USA

JUNIPER NETWORKS’ ENGINEERING SIMPLICITY HONORS AWARD
WINNERS: Liga Robotov-Astrakhan RST - Russia
of Győr has ambitions to be the most intelligent of all Hungarian cities by 2020, with everything from smart lighting to intelligent traffic management and even mobile parking. This ambition means that they were an excellent choice.

Much of the organisation for the International Final is still being worked on, but our teams will stay in the Olimpiai Sportpark which was built for the XIV European Youth Olympic Festival to serve as a venue for gymnastic, judo, tennis and athletic competitions. Equipped with new technology in 2017, the renovated buildings will serve as excellent accommodation for the teams and because there are a lot of dormitories, it means that everyone will be in contact to share ideas and make new friends.

The ‘WRO Village,’ as it is becoming known, will be the place to be for roboteers to be for three days at the start of November. The theme of the competition will be SMART Cities, and as Győr is known across Hungary as the headquarters of the RÁBA Automotive Group and an Audi factory where 90% of Audi engines are made and a host of vehicles, expect to see our teams working on driverless vehicles and the transport robots of the future.

WRO® will travel to Hungary for its sixteenth International Final. As well as being the biggest event so far, it takes us to a new country and a very different culture. Previous finals were often hosted by our friends in South East Asia, and although we travelled to Russia and the Olympic village of Sochi in 2014, this is our first appearance in the heart of Europe. November in Hungary will be a very different experience for many of our teams and we hope it is one that they find memorable and fun.

Hungary makes the perfect location in so many ways. Its central location means that it is easy for a lot of people to get to, there is a history of brilliant inventors and, most importantly of all, the country has maintained its strong interest in technology and science. The government is interested in the idea of ‘smart cities,’ in which data collection is used to manage their assets and their resources, and several of the country’s cities are busily looking at way they can integrate digital information with daily life.

Cities such as Miskolc, Debrecen and, of course, Budapest are looking at ways that becoming a smart city can improve urban transport and their energy usage. And WRO’s chosen host city of Győr has ambitions to be the most intelligent of all Hungarian cities by 2020, with everything from smart lighting to intelligent traffic management and even mobile parking. This ambition means that they were an excellent choice.

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Home to the inventor of the biro, the helicopter and turbine, Hungary is a country dedicated to the spirit of intellectual enquiry and the perfect venue for our first visit to the heart of Europe.

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LEGO Education is a long-time supporter and premium sponsor of WRO®, and LEGO® MINDSTORMS® has been used to grow instant STEM learning with high quality robotics solutions. The block-based programming platform of WeDo 2.0 is a natural first step towards the LEGO MINDSTORMS platform, which makes the new competition format a great entry point into WRO for young students.

For more than 38 years, LEGO Education has been working with teachers and educational specialists to deliver hands-on learning experiences that bring subjects to life in the classroom and make learning fun and impactful. With a wide range of physical and digital educational resources that encourage students to think creatively, reason systematically and release their potential. The solutions for teaching and hands-on learning inspire science, technology, engineering, and math (STEM) for preschool, elementary and middle school students. All solutions are based on the LEGO system for playful learning and combined with curriculum-relevant material and digital resources.

The annual LEGO Education Creativity Award recognizes the hard work and efforts of the team that takes the most creative and imaginative approach to the design of their robotics solution.

To learn more, please visit: www.LEGOeducation.com
Engineering Simplicity is the enduring philosophy of Juniper Networks, a leader in automated, scalable and secure networks. In the digital age, networks are the lifeblood of how the world lives, works and communicates – encompassing schools, hospitals, transportation systems, entertainment, internet connectivity, retailers, emergency services, banks and beyond, in every community, in every government and in every economy. Juniper believes that this intelligent, sophisticated, powerful technology can - must - also be simple to be effective, efficient and accessible.

Not least, automation has become a key enabler of such technology, functioning alongside humans to create and operate networks that can scale, flex and protect, dynamically adapting to conditions, developments and challenges in nanoseconds. Therefore it is imperative that the upcoming generations understand automation - Artificial Intelligence, Machine Learning, virtualization – in order to take technology forward into their future. We are proud to be the global technology partner of World Robot Olympiad in 2018 and beyond, as it is the perfect nurturing environment for tomorrow’s automation innovators.

The Juniper Networks Engineering Simplicity Honors Award is presented to a team in Regular Category that impresses with the boldness, creativity and simplicity of their robot-led solutions.

To learn more please visit: www.juniper.net
CAMILLA BOTTKE
HEAD OF AFTERSCHOOL AND COMPETITIONS

What motivated you to become a Partner of World Robot Olympiad?
At LEGO Education we strongly believe in the power of playful, hands-on learning. WRO® gives students a learning experience they will remember for the rest of their lives, and we are proud to help enable that.

What have you experienced in all the time you have worked with WRO?
Every year it becomes clear how the WRO community is growing, but the great atmosphere stays the same. Participants and visitors seem very grateful for the people who make the events happen – no matter where in the world they take place. I always enjoy seeing the influences of local culture, such as the traditional music or dances during the opening ceremony.

What have you experienced this year with the WRO WeDo challenges?
It has been great to see the Open and Regular categories using LEGO Education WeDo this year. It became clear that many students in this age group – all over the world - are excited to participate, and seeing their robots and presentations really closes. Because the bricks are white, it makes the shape and the construction stand out, and we always love seeing the wonderful creations at the end of the day. One thing we know for sure: the WRO community is full of master builders!

How do your concepts of Playful Learning, Open Mind and Open Ended Solutions fit together with WRO?
Participating in WRO really helps students develop confidence in STEM, as well as the 21st century skills that are so important for the workforce of the future: collaboration, critical thinking and problem-solving. The rules of the WRO categories encourage students to create unique approaches, and the idea that there is no one solution to a problem fits our learning philosophy. The same can be said of the international aspect, as WRO enables students to connect across borders through STEM and innovation.

How do you want to work with WRO during the season?
I lead the marketing function at Juniper Networks, and a large element of what we do is telling our story effectively to various external audiences. When we started to get to know WRO, we saw that its story is remarkable and that within it there are many other remarkable stories. We realized that helping to tell these stories more widely and in new ways could create more awareness of the competition which might bring more support, more teams, more opportunities. The documentary idea was born of that, and as soon as we started talking to some of our creative colleagues and partners, that WRO effect took hold towards an interesting career.

Why are you a Partner for World Robot Olympiad?
Firstly, that WRO is focused on young people who are setting out on their education journey. As a technology company, we have always been passionate about STEM education and have supported many initiatives around the world that promote it. Secondly, that the competition is focused on automation. The networks we build for some of the world’s largest and most mission-critical organizations rely on automation to deliver the scale, reliability and security required. So, bringing these two together is a golden opportunity to help young people on their first steps towards an interesting career.

What have you experienced in this first year working with WRO?
That our initial instinct to become involved was a good one. As we worked through the year with teams from various places on different projects, we saw first-hand how passionate, enthusiastic and smart the young people are. WRO as an organization is open to new ideas and innovation, so we have found them very willing to listen to our suggestions for additional activities and ways to tell their amazing story.

You were present at the competition in Thailand. What were your impressions?
By November 2018, we’d had a few months of working with WRO, so we thought we knew what to expect, but when we walked into the first day of the International Final, the Juniper group was just blown away by the sheer scale and buzz of it all. When we started to chat to teams, hear more about their projects and the challenges they have to overcome, we got excited about being part of the WRO family all over again.

What motivated you to become a Partner of World Robot Olympiad?
MIKE MARCELLIN
CHIEF MARKETING OFFICER

When we started looking at all the eligible teams at the International Final, I was a little daunted. Talking to the judges helped, and from there, I could better understand how a design might benefit from simplification in the context of WRO’s Regular category. Simplicity for the sake of it is not a guarantee of success, whether you’re working on a robot or a network design, but has to make the design’s function more effective and easier to use.

You made a documentary that follows some WRO teams on their journey to the International Final. Why?
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How do you want to work with WRO during the season?
We are about to embark on our second year of partnership with WRO, which is very exciting. Now we have a much better understanding of the competition and the people, our planning can be more detailed, more strategic and more creative. I also think we will be able to work much more closely with our fellow partner LEGO® Education.

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MATRIX Robotics

When a group of robotics enthusiasts get together to design their very own system, it ends up looking a lot like MATRIX Robotics. From the outset, it was designed to be an affordable, high-quality entry into 3D robotics. As a result, its various parts are accessible to our students and provide them with extra functionality and new ways of looking at their problems.

Go to www.matrixrobotics.com for more

Cogmation Robotics

Cogmation Robotics produce The Virtual Robotics Toolkit, an imaginative way of helping students learn new robotics skills. By uploading their robot to a virtual, online world first, they get to see what works and what might need further development before testing in competition with other teams. With a realistic environment and vivid graphics, students can use new elements in new ways until the problem is solved and they can modify their robot.

Find out more at: www.virtualroboticstoolkit.com

Cambridge Assessment English

Cambridge Assessment English is the producer and proud co-owner of IELTS, the world’s leading English test for migration and higher education. They help millions of people learn English and prove their skills to the world. For them, learning English is more than just exams and grades. It’s about having the confidence to communicate and access a lifetime of enriching experiences and opportunities. Cambridge Assessment English can give you the English language skills to succeed.

Visit: www.cambridgeenglish.org

Semia Global

Semia are dedicated to bringing the best STEM learning tools and experience to children. They firmly believe the best education is one which creates a rich learning environment for students to get excited and to be engaged in hands-on problem-solving activities. With offices in China, USA, Hong Kong and Taiwan, they continue their mission in STEM around the world and also provide a culture exchange platform to bring the children closer together through technology education.

More information at: www.semia.com
The joy of World Robot Olympiad™ is that we meet new people who want to become part of a global robotics family. This year, we welcome three universities whose technical expertise in robotics and the STEM subjects will be very valuable. Our University Partners also offer WRO® alumni chance to apply for special scholarships to study the technology of tomorrow.

**NEW YORK UNIVERSITY**
**TANDON SCHOOL OF ENGINEERING (USA)**
The NYU Tandon School of Engineering empowers people to use science and technology as tools to build a better society. Dedicated to creating solutions that can tackle tomorrow’s problems today, NYU Tandon focuses on invention, innovation, and entrepreneurship. As a University Partner, NYU Tandon School of Engineering supports the mission of World Robot Olympiad to engage young people from around the world by developing their creativity while solving challenges through robotic competition. NYU Tandon School of Engineering offers scholarship opportunities to WRO alumni that are admitted to one of its engineering programs.

www.engineering.nyu.edu

**MILWAUKEE SCHOOL OF ENGINEERING (USA)**
MSOE University is a community of dreamers, thinkers, makers and doers, a small university dedicated to achieving big things. We focus on small class sizes, personalized attention, hands-on practical application and lots of labs meaning that MSOE students are well prepared and sought after when it comes to launching their career. MSOE is excited to partner with WRO as WRO students have learned the value of critical thinking skills, team work, discipline and working hard to achieve one’s goals. WRO students are therefore a great fit in the MSOE community and are eligible for a STEM scholarship at MSOE that is in addition to the MSOE International Student Scholarship offering.

www.msoe.edu

**INNOPOLIS UNIVERSITY (RUSSIA)**
Innopolis University (IU) is the Russian University focused on education and research in IT and Robotics. Innopolis University is Russia’s WRO National Organizer and RRO Organizer. IU offers five Computer Science programs taught in English. There is a bachelor’s degree program of four years that offers a choice of study options in software engineering, robotics and data science, as well as four masters’ degree programs of two years. Members of WRO national teams can apply to enter the IU bachelor’s degree program with a scholarship covering 100% of the tuition fees and advanced support up to $550 a month. You are welcome to join Innopolis University and make an impact!

www.apply.innopolis.ru/en/it-degree

We welcome some partners into the organization with abilities and expertise that will make it even better!
As a nonprofit organization, WRO is proud to be supported by leading technological companies and organizations that share our mission of bringing robotics to as many young people as possible. We aim to build close relationships with a limited number of companies and organizations. We will gladly engage in a dialogue with you on how your support can get maximum effect.

Established universities worldwide acknowledge that taking part in competitions like World Robot Olympiad prepares students for higher education. They know first hand that WRO participants have valuable experience in teamwork, creativity and overcoming setbacks, which is why they offer WRO alumni the possibility to apply for special scholarships and programs. If your university or college is one of these institutions, we will gladly explore the possibility of you becoming a University Partner.

At World Robot Olympiad, our basic philosophy is to welcome all countries interested in joining our global community. The WRO program can be easily adapted to the specific situation in a country. We ask of our national organizers that they are capable of organizing the national competition independently. New national organizers get a one-year membership that can be converted into a membership for multiple years after a successful season. Apart from this, there are also numerous ways to support the WRO community at a national level. By volunteering as a coach or judge for example. Or by supporting the national organizer in your country.

Please visit our website for more information.
www.wro-association.org
World Robot Olympiad Association
C/O Science Centre Singapore
15 Science Centre Road
Singapore 609081

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