Report

2nd National FIRST® LEGO® League Competition

Uganda

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Content

Executive Summary

Next Gen Innovators supports educators and learners to integrate robotics into education as well as inspire children from less previledged communities to be the future generation of innovators and problem solvers. This is through the FIRST® (*standing for - **F**or **I**nstpiraton and **R**ecognition of **S**cience and **T**echnology*) LEGO® League (FLL) programme. The curriculum is divided into four age groups: Discover (ages 4 to 6), Explorer (ages 6 to 10). Challenge FLL (ages 9 to 16) and FTC (ages 12 to 18). Along the process, learners develop learning habits, confidence, and teamwork abilities as they use their talents in an exciting competition and gain an understanding of the fundamentals of STEM.

Next Gen Innovators together with Coderina successfully held the Second (2nd) National FLL Competition in Uganda held at **Kabojja International School** on **Saturday 14th December 2024**. Compared to last year's event that had 10 teams, this year's competitions attracted 17 teams, that competed in the four categories of Robot Design, Robot Game, Innovation Project and Core Values with Team Rex emmerging the overall Champions in in the FLL category.

The season's theme was **Submerged** with 15 missions that were designed to help participants reflect on real-life scenarios related to ocean exploration. Teams were tasked to use creative thinking and LEGO® technology to bring their learning and ideas to the surface.

The competition was sponsored by Enabel, Kabojja International School, Victoria University and World Skills.

Introduction

Overview

In Uganda, the FIRST® LEGO® League (FLL), implemented by NextGen Innovators Uganda Ltd in collaboration with Coderina EdTech Foundation, has become a transformative platform for engaging youth in Science Technologty and Engineering (STEM) education.

This programme is designed to enhance STEM education through integration of robotics which significantly enhances learning experiences and outcomes for learners. To Broaden their training programme, the FLL Robotics Competitions that are held annually through which outstanding teams from National to International winners are identified.

This report is for the Second (2nd) National First LEGO League competition that was held on Saturday 14th 2024 at Kabojja International School.

Our Robotics Training Programme

FLL is implemented through a structured programme that includes holiday bootcamps, after school clubs, robotics competitions, innovation challenges, mentorship, and capacity-building workshops.

Our robotics programme provides a hands-on learning environment where our learners are actively engaged with using LEGO Technology and Arduino for their innovation projects from as early as four (4) years.

The programme is classified into four categories according to the age: Discover (4 – 6 years), Explorer (6 – 10 years), FIRST® LEGO League (9 – 16 years) and FIRST® Tech Challenge (12 – 18 years)

> *"Our training programme subjects learners to real life challenges in line with SDGs, emphasising problem solving while preparing them for The National and International First LEGO League robotics competitions."*

The FLL robotics competitions allows learners to design, create, build, and program robots which fosters development of their critical thinking skills as they analyze problems and devise effective solutions.

The 2nd National FLL Robotics Competition

Theme and Objectives

The 2024/25 season's competition was on the theme "**Submerged**" which focused on exploring the complexities of ocean ecosystems. Teams were tasked to use LEGO® technology to investigate various layers of the ocean, which fostered creativity and critical thinking as they developed solutions to real-world problems related to marine environments.

The overarching goal for the season's competition was to encourage participants to "bring their learnings and ideas to the surface" as they actively engaged with the challenges presented by oceanic ecosystems.

Competition Missions Challenges

In the Robot Game, Teams were faced with **15 Missions** namely: Coral Nursery, Shark, Coral Reef, Scuba Diver, Angler Fish, Raise the Mast, Kraken's Treasure, Artificial Habitat, Unexpected encounter, Send Over the Submersible, Sonar Discovery, Feed the Whale, Change Shipping Lanes, Sample Collection, Research Vessel.

Teams were also required to come up with Innovation projects aligned to the theme and career sparks.

Career Sparks: **Oceanograpers** conduct research in the deep zones of the ocean; **Marine Biologists** work in the Sunlight Zone; **Submarine Pilot** work in the Twilight Zone; **Marine Researcher**; **Photographers**; **Ecologists**

The EVENT

Participants

The event had over 17 teams from both Primary Schools and Secondary Schools from across the country take part in the competitions.

Primary School – Nakasero PS, Kampala Parents, Hearts of Gold Elementary School, Greenhill Academy Buwate, The Hungry Catepillary School, Vine International School, Mother Manjeri PS, Global Junior School, Stone Bridge PS, Bright PS, Word of Life PS, Light Academy PS.

Secondary Schools – Kasenyi SS Mubende, Bweranyangi Girls, Mengo SS, Galaxy International School, Kabojja International School, Seeta High, Kibuli SS, Nalya SS Bweyogerere, Kalinabili SS, Delhi International Public School, Rainbow International. Makerere College Mulawa Campus, Gayaza High School.

Participating Teams – Scuber Divers, Elite 8, Cyber Genesis, Roboticians, Cohort Engineers, Drasticals, Robo Ranger Kasenyi, Lamps Lego, Rex, Aqua Enginers, Nations Infinity, NPS mindstroms, Excaution Engineers, Marine Marvericks, Robotics Innovators, Pirates of the Lego Sea,

Ghetto Community children from the ghettos around kampala, under an initiative by Next Gen Innovators to support the "under privilaged children" took part part in the competition.

Venue: The event was held at Kabojja International School in Buziga, Kampala

Date: Saturday 14th December 2024.

Remarks

Opening Remarks were made by the Principal Kabojja International as

Closing Remarks were made by:

1. Uganda Industrial Research Institute
2. Enabel
3. Ayub Kalema an Educationist working with MoES
4. Ms Prossy of Victoria University (University Registrar) representing the Prof. Augustine Osamor Ifelebuegu Deputy Vice Cancellor

Welcome Remarks by Mellon Kenyangi

CEO NextGen Restyling Uganda

At NextGen Innovators, we believe that innovation is not a privilege but a necessity. It is the spark that drives progress in every field, from science and technology to education and social development. Through initiatives like the FIRST® LEGO League, we are not only fostering technical skills but also nurturing a mindset of problem-solving, teamwork, and resilience among our youth. We thank Coderina Education Technology Foundation for trusting us to implement the programs.

This day would not have been possible without the incredible support of our sponsors and partners. Allow me to extend my heartfelt gratitude to **Enabel, Victoria University, World Skills Uganda and Kabojja International School**, whose generous sponsorship has turned this vision into a reality. I also wish to acknowledge the invaluable partnership of the **Ministry of Education Uganda, NetLabs - Makerere University, Shift Enterprise Academy, Kampala City Council, Ministry of Foreign Affairs and all partnering Schools, Parents and Community**. Your unwavering commitment to STEM education and innovation is paving the way for a brighter Uganda.

To our participants, you are the heart of this event. Each robot you build, each program you create, and each challenge you tackle brings us closer to unlocking the incredible potential that lies within you. Whether you are competing for the first time or returning for another round, remember this: Every step of this journey is a victory in itself.

To the parents, teachers, judges and mentors, thank you for supporting these young innovators and investing in their dreams. Your guidance & encouragement are the cornerstones of their success.

As we witness the creativity, collaboration, and resilience displayed here today, let us remember that the impact of this competition goes far beyond the trophies and medals. It is about nurturing a generation that can think critically, solve problems, and inspire change in their communities and beyond.

I leave you with this challenge: We must continue to build bridges between education, technology, and opportunity. Let us champion innovation not just as a tool for success but as a means to uplift our nation. Remember the CHANGE YOU DESIRE BEGINS WITH YOU. Together, we can ensure that Uganda becomes a beacon of innovation in Africa and the world.

Thank you all for being part of this journey. Let the games begin, and may the best team win!

Together, we innovate. Inspire, and build a better tomorrow.

Thank you

Glance – Activities

Activities included - Judging, Robot Game, Speeches, Performances, all activities were broadcasted live on the U24 TV Channel

Local Innovations

Three innovations were showcased:

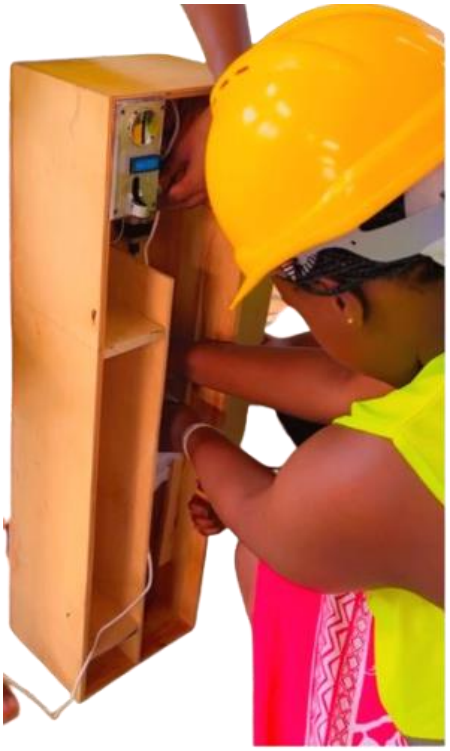
Robot Dog – an innovation by primary school children that is inspired by the love for Dogs and need for security. The Robot dog is designed with the intention to address the high maintenance costs of dogs as well as avert the possiblity of compromising dogs by humans.

Pad Dispenser – Invented by a team of secondary school students to address Menstrual Hygiene Management challenges in under served community schools. By inserting a Ush. 500 coin in the dispenser, a girl is able to get one piece of the Sanitory Towel (Pads) which is placed within the school. The Upgrade will be able to dispense a reusable and disposable pad. This will address period stigma and period poverty.

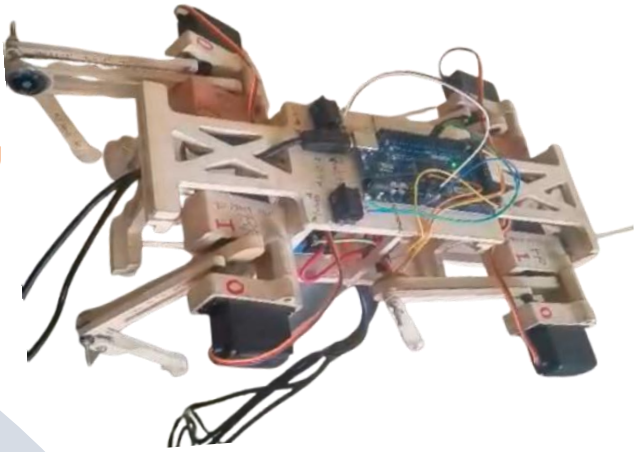
Outrigging - Boat parts that extends from the side of a boat trigered by a mobilephone app to help prevent it from capsizing. This is an invention by students from Galaxy International School Uganda borrowing from Philiphines.

Above Learners present a model of the Robot Dog during the 2nd National FLL Competitions.

Below One of the Innovators as they work on the Pad Dispenser model at UIRI in Namanve industrial park



"Rukamba" the Robot Dog



Glance – Robot Game

The Trophy Corner

Above and Right Bottom Corner: Teams programming their Robots in preparation for the Robot Game.

Below and Right: A team from the Under the Explorer programme presenting

Award Winners

The following are the winners for the 5 categories of awards

- **Champions** (Overall) – Rex (*665 Points*)
- **Robot Game** – Cyber Genesis
- **Core Values** – Marine Marvericks
- **Robot Design** – Scuber Divers
- **Innovation Project** – Aqua Innovators

Important Note – For winners in the Category awards, that is Robot Design, Robot Game, Core Values, and Innovation Project winners were those with the highest points in each category. While for the Biggest Prize winner ***(Champion),*** *was the team with highest total which required the tems to score balance and score highly in all the four (4) award categories.*

Marine Marverikcs celebrating as Victors for the Category of Core Values

Glance - Awards

Top Left Corner: Parents awarding medals to participants under the Explore category
Above U24 statation Manager awards medals to the mentors
Left: Kenya`s head Coach Merishaw School handing over the trophy to Aqua Innovators team for best Innovation Project
Below Left Corner: Dr. Diana T. Enabel handing over trophy to winners of the Robot Games.
Below: Director Steamic Clubs Ug. announcing best performing teams in the 5 Categories

Events for 2025

Key International Events – 2025

The winning teams will participate in international events next year (2025) in other countries as follows.

Country	Month	Dates	Winning Team Category
Nigeria – Lagos	January	22nd – 28th	Core Values
Japan – Tokyo	February	13th – 18th	Robot Game
South Africa – Cape town	May	05th – 11th	Robot Design
USA – Worcester	June	11th –18th	Champions (Overall)
Australia – Sydney	June - July	30th – 08th	Innovation Project

Participating in FLL international robotics competitions exposes participants to new environments, ideas, and challenges which serves as a powerfull tool for inspiring the next generation of innovators and problem solvers and choice for future careers.

Key National Events – 2025

Activity	Month	Dates	Location
STEM Community Outreach Week	August	04th – 08th	To be Determined
3rd National Robotics Competition	December	11th and 12th	To be Determined

Achievements

Talent Identification

The competition identified promising young innovators who could potentially represent Uganda on international platforms.

Three (3) innovations to address community challeges presented

1. **Pad dispenser** to deal with Menstraul Hygiene Management in rural communities
2. "*Rukamba*" the **Robot Dog** for home security.
3. **Outrigging** boat safety system trigered by mobile phone system

Increased Interest in STEM

The event sparked enthusiasm for robotics and STEM education among participants and observers alike.

An overall increase in parent support and participation in the training sessions for children and competition both on the national and international platform has been registered.

Participating Teams

2023	10 teams
2024	20 teams

Invited Guests

2023	30 Guests
2024	180 Guests

2024

17 teams in the FIRST® LEGO® LEAGUE Category

03 teams in the Explore category

Over 220 participants, and

180 invited guests and parents.

Skills Development

Students gained hands-on experience in problem-solving, coding, and teamwork, equipping them for future opportunities.

- **6 teams** represented Uganda during international competitions through **2023/2024** with outstanding performances all teams bring back medals.
- Majority of the representatives are now **Club Heads** in their respective schools and while others have become **Mentors** to their peers.

Supporting the Underserved Children

NextGen has demonstrated remarkable dedication by reaching out to underserved communities, such as the **National Infinity ghetto community**, through robotics programs and sponsorships.

We supported these communities by covering participation fees and providing mentorship for the national robotics competitions.

> *Beneficiaries of our programmes for the underserved communities include **Kasenyi SS in Mubende**, which received robotics lessons and funding, as well as **Karinabiri Senior School** and **Nakasero Primary School**.*

The results were extraordinary. Karinabiri Senior School, despite being from a largely underserved community, emerged as the champion in the National FLL Uganda competitions, proving that excellence is not determined by socio-economic status. Their success highlights that being poor is not a disability but a challenge that can be overcome with support and opportunity.

NextGen's efforts serve as an inspiring reminder that by joining hands, we can expose more children from less privileged schools to life-changing opportunities in STEM and robotics, helping them unlock their full potential.

Photo Above: Participants from underserved schools and communities

Challenges

Inadquate Logistics

Despite careful planning, some logistical delays occurred in equipment delivery due to slow team registrations, Competition materials like trophies and medals were stolen, highlighting areas for improvement in future tournaments.

Team Inclusivity

Ensuring participation from underserved regions remains a challenge as we struggle to host, transport and feed these teams which we aim to address by expanding outreach programs.

Limited Exposure

Teams from underserved community schools are limited in exposure and participation in the competitions as we are challenged by not having enough training kits as well as ability to support them with annual challenge sets.

Each competing team requires to have a LEGO® kit to make a robot, and Arduino kit for the innovation project.

We plan to increase on donor sourcing in order to increase the number of robot kits used in training. The advantage is that these kits can be re-used upto 5 years without replacement.

Next Steps

Preparation for International Events

- Winning teams will represent Uganda in USA (Worcester), Nigeria (Lagos), South Africa (cape town), Japan (Tokyo), and Australia (Sydney).
- Additional training sessions and mentorship programs to ensure team are well-prepared. Alongside our trainings for children in boarding schools and schools outside our scope.

Expanding Participation

- Launch community outreach initiatives to involve more schools from underserved regions in FLL 2025.
- Partner with NGOs and educational development partners to provide resources and training kits to underprivileged schools. Starting with West Nile & Albertine sub-regions

Strategic Partnerships

Engage more with current and new sponsors and partners to secure funding for future competitions and expand resource availability.

Capacity Building

Organize workshops for coaches, judges and mentors to enhance their ability to guide and mentor teams effectively across the regions.

Promote STEM Education

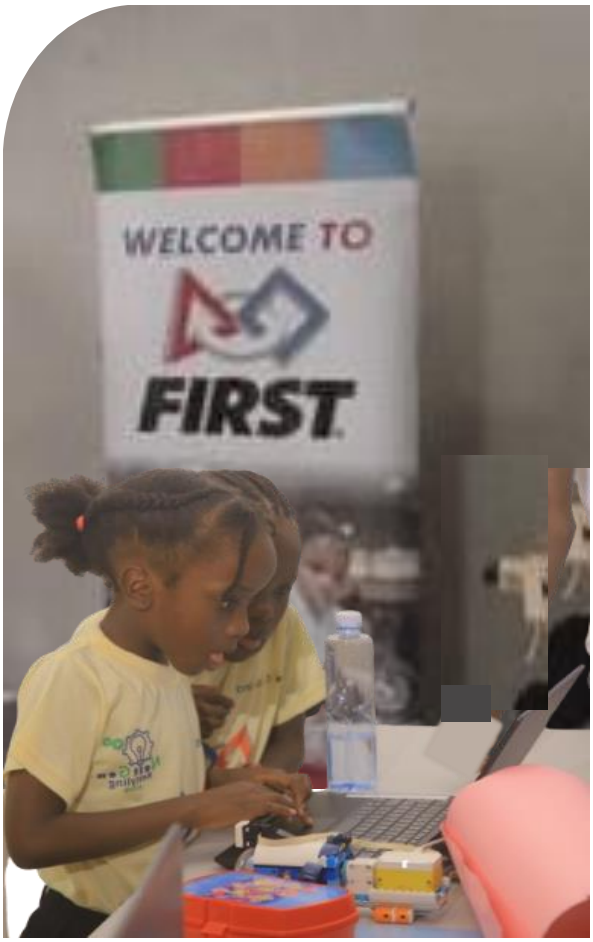
Host parent, teacher workshops, exhibitions/STEM festivals , and community events throughout 2025 to sustain momentum and interest in STEM learning.

Conclusion

The FLL Submerged robotics competition not only enhances students' understanding of STEM concepts but also instils a sense of responsibility towards environmental stewardship. By engaging in this hands-on learning experience, participants are better prepared for future challenges in science and technology while developing essential life skills such as teamwork and critical thinking.

Incorporating robotics into STEM education transforms traditional learning methods by making them more interactive, practical, and engaging. Through hands-on experiences, collaboration, and creative problem-solving, participants not only gained valuable skills that prepare them for future challenges in a technology-driven world but also helps them apply the knowledge they get from school.

It is a collective effort for all Civil Service Organisations, Development Partners to help realise the countries Transformation Education Digital Agenda and Uganda's Vision 2040 in the 4th Industrial Revolution.



Left: Participants in the Explorer category coding their Robot.
Top: A team under the FLL category explain their Strategy prior to the Robot Game
Bottom: Performance by Nation Infinity Dance Group – a Ghetto community perform after their Robot Game

Top: Guests as they during the Robot Games

Above: The Chief Guest Prof. Augustine Asamor (Middle) Deputy Vice Chancellor Victoria University and Keith from Junior Achievers Uganda Watching the Robot Game

Annex: Programme Schedule

TIME	ACTIVITY	WHO
08:00	Arrival and Registration	Secretariat **(Winnie)**
09:00 – 09:30	**Opening Ceremony** • Remarks (Kabojja, Next Gen) • Launch of Coderina EdTech	MC - Edward **(Mellon)**
09:30 – 11:00	**Competitions** • Robot Games (Team Round 1) • and Judging Sessions	Coaches, Mentors, Judges, Referees **(Ivan)**
11:00 – 11:30	**Tea Break** 	Host **(Enabel)**
11:30 – 13:00	**Competitions** • Robot Games (Team Round 2) • Judging Sessions	Coaches, Mentors, Judges, Referees **(Ivan)**
13:00 – 13:45	**Lunch Break** 	Host **(Enabel)**
13:45 – 14:10	Chief Guest Arrival Hackathon Presentations	MC – Edward **(Gilbert)**
14:10 – 15:30	**Competitions** • Robot Games (Team Round 2) • Judging Sessions	Coaches, Mentors, Judges, Referees **(Ivan)**
15:30 – 16:00	**Speeches** • Next Gen, Victoria University, MoES, Guest of Honour	MC **(Edward)**
16:00 – 17:30	Awards and Closing Ceremony	MC **(Ivan & Gilbert)**

Our Sponsors and Partners

Enabel

VU

K.I.S
We Strive to achieve
Kabojja International School

world skills
UGANDA

Hearts of Gold
Elementary School

The Hungry Caterpillar

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