ROBOTSMALI ACTIVITY REPORT

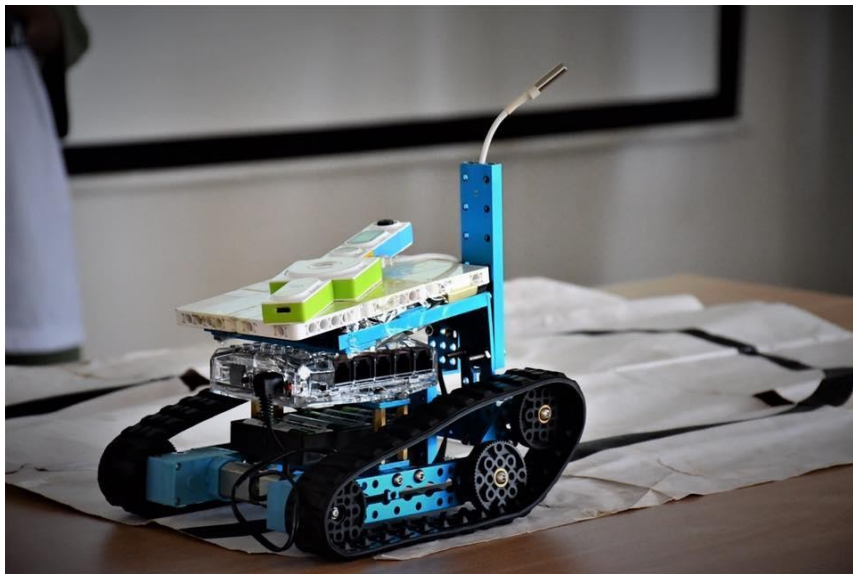# 2021

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National Collaborative Center for Education in Robotics and Artificial Intelligence
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Robots MALI

I.   Introduction

RobotsMali is the National Collaborative Center for Education in Robotics and Artificial Intelligence. From its inception to the present day, the center has been developing methods for teaching STEM and Robotics to Malian youth and expanding its offerings. With the mission to develop scientific culture, to initiate our youth in STEM and Robotics, and to showcase the talent of young Malians on international stages, RobotsMali, in 2021, has conducted many activities, despite extraordinary challenges including the continuing COVID crisis and national political and economic instability. The activities included STEM and robotics training, incubation of scientific projects, participation in international competitions, and organization and participation in public conferences and events.

II.   Education

1. Python Online

RobotsMali continued its program of initiation in Python programming begun in 2020 with new, advanced course material. In addition to online training, classes were held in person, at high school and university levels.

2. AI in Embedded Systems

RobotsMali delivered the second semester of its year-long course in Intelligent Systems to Master's students in Mechanical Engineering at ENETP, completing the first program in AI ever taught at a public university in Mali. Student's built real-world systems with an emphasis on industrial applications using Arduino processors and Tensorflow Lite convolutional neural networks models.

3. Week-long Initiation to Robotics for High School girls

On the occasion of International Women's Day, RobotsMali, in partnership with the Information and Communication Technologies

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Agency (AGETIC), organized a week-long immersion program in robotics, selecting 20 girls from high schools in different regions of the country.

While none of the girls had ever so much as seen a real robot before, the cohort performed brilliantly, with some subsequently applying for and being accepted to the national robotics team that won three medals in the Panafrican Robotics Competition this year.

4. STEM & Robotics Summer Camp 2021

RobotsMali's STEM & Robotics Camp is our signature activity. Organized every year during summer vacation, the STEM & Robotics camp is a 4-week camp during which children from the 3rd year of elementary school to the 12th year of high school discover the world of STEM, instilling a sense of discovery while having fun that has served to turn hundreds of Malian kids toward scientific and technical fields. The activities took place from Monday to Friday, from 09H to 16H in the university campus of Kabala. A bus picked up students from a central point, "Les Castors" High School, easing the burden on parents and making the program more accessible.

The various challenges confronting Mali this year forced us to reduce the size of the program from a normal enrollment of 150 to 30. The students were mentored by the graduates of our STEM Teacher Training program, working under the supervision of the Senior Trainers of RobotsMali. Activities were planned around a number of themes incorporating

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robotics, artificial intelligence and STEM in general. As always, students were guided in developing their own projects centered around building solutions to improve the lives of Malians.

Training Program
➔ STEM: Science, Technology, Engineering, Mathematics
➔ Robotics and Programming
➔ Electronics and Programming
➔ Artificial Intelligence and Python Programming
➔ Outings and company visits
➔ The projects

5. **Robotics Program at Planète Enfants**

In partnership with the school complex Planète Enfant, the RobotsMali ran a semester-long robotics program for 60 students in the first cycle and the second cycle. We present below two among many modules from extensive curriculum developed by RobotsMali that Planète Enfant students enjoyed.

Programming with Blockly Games

This introductory program in computer programming teaches basic computing operations, calculations, control, and logic through games requiring the manipulation of visual logic blocks. Once they start, kids cannot stop, making for the perfect combination of learning while having fun.

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Robot Design and Construction

Learning about robotics at RobotsMali is a "hands-on" activity, always including the design and construction of robots that model a solution to a real-world problem using educational robotics kits designed for students of each different age group. Groups are formed around each project, teaching the students about teamwork and even professional skills like project management. Presentation skills are also honed involving presentation preparation including both slide preparation in Powerpoint and video production and public speaking. Some students learn basic entrepreneurial skills such as how to do product and financial analysis of a product and pitching to investors.

III. Competitions

An important part of RobotsMali mission is, in our globally-connected world, to give Malian youth an opportunity to engage with young leaders from around the world and to show the world that Mali is a country with talented and ambitious youth. We've taken Malian girls and boys to international competitions where our national teams have performed brilliantly, and, win or lose, with great credit to their country. Thanks to them, Mali has a reputation around the world as a nation of excellence in scholastic robotics. We regularly receive invitations to competitions around the world. RobotsMali has also worked for inclusion of Africa in the scholastic robotics competitions, having worked with FIRST Global to

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include African nations in the inaugural edition of this global event, with the European Robotex robotics competition, and as a founding member of the Panafrican Robotics Competition.

In 2021, the Malian national teams under the supervision of RobotsMali, participated in 2 international events and came out with 1 gold medal, 2 silver medals, 1 bronze medal and many certificates.

1. __The Pan African Robotics Competition (PARC) 2021__

As its name indicates, the PARC competition is a robotics competition that brings together, each year, teams of middle school, high school and university students from African countries. In 2021, in a field of 30 countries, a Malian high school won gold and a second high school team and the middle school team also won medals. The university team took 4th place. This was the best result for any nation, putting Mali in the number 1 spot on the continent in African scholastic robotics.

2. __The International Festival of Engineering, Science and Technology (IFEST), Tunisia__

In addition to the competitions in which RobotsMali traditionally participates, Mali received a special invitation to participate in the festival IFEST Tunisia 2021. One of our high school teams that took part in the Panafrican PARC 2021 competition with the KAALISI project was awarded 2nd place in its category.

3. __Robotex International__

Based in Estonia, Robotex International is a grassroots consortium of national robotics organizations which holds a yearly world competition and supports national competitions in each country. It has a unique profile in the universe of international robotics organizations in that its competitions favor low cost equipment, favoring brainpower over costly or vendor-specific components and an overall cost structure that is much more accessible to developing countries, and a collaborative governing structure. It has been a great organization for Mali to develop direct contacts with robotic organizations throughout the world.

Regrettably, RobotsMali could not accept our invitation for the 2021 edition due to the challenges this year, partially related to the

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uncertainties of the COVID-19 situation but mainly due to financial difficulties and the inability to find sponsorship. While RobotsMali has made a considerable effort to develop fundraising abilities, the concept of corporate social responsibility is relatively unknown in our country, with the few international companies that do have CSR programs vastly oversubscribed. In 2021, the government greatly curtailed funding and international organizations also reduced or even suspended funding in Mali. We increased efforts to secure grants and awards from sources not directly related to Mali and revived our crowdfunding program. These efforts brought in very modest returns, perhaps partly related to the overall world situation and also related to the perception of Mali held internationally.

IV. Events for the general public

1. AI Conference at Sup-Management

CONFÉRENCE DÉBAT - INTELLIGENCE ARTIFICIELLE

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As the leader in the fields of STEM education, Robotics and Artificial Intelligence, RobotsMali center, represented by its Board President Michael Leventhal, led a conference on the theme of Artificial Intelligence: Challenges and Opportunities.

This meeting with young students was an opportunity for them to learn about technologies that are changing the world and opportunities for Malian to participate in the AI revolution.

2. Deep Learning IndabaX Mali

Indaba is the largest African AI community. Bringing together AI teachers, students and practitioners from many countries, Indaba aims to create a pan-African community of AI experts, develop local AI leadership across the continent, and recognize excellence in the research and application of AI technologies. IndabaX are local events held in each country to promote the goals of the Indaba movement.

The IndabaX are held over one to three days, organized locally with sponsorship by Indaba, to stimulate the development of a community developing knowledge and capacity in machine learning and artificial intelligence in Africa.

Thus, on July 28 and 29, 2022, Mali hosted the 1st edition of IndabaX-Mali, with RobotsMali as the hosting technology center.

The objective of this program was to :

- Promote artificial intelligence in Mali.
- Mobilize and develop the scientific community in Mali for knowledge exchange around AI.
- Encourage the use of artificial intelligence in the key areas of the Malian economy.
- Initiate actions oriented towards the teaching and development of artificial intelligence in Mali.

The program included 3 conferences, 2 training workshops on artificial intelligence and a debate on the creation of an artificial intelligence community.

The partners were numerous and the event succeeded in mobilizing students, teachers, researchers and many actors in the field, including participation from regions of Mali and Malians abroad.

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3. The Children's Fair of Bamako (S.E.B.A)

On the occasion of the 5th edition of the Bamako Children's Fair, RobotsMali joined the celebration by offering a program for children in robotics and STEM.

Organized under the sponsorship of the Minister for the Promotion of Women, Children and the Family, SEBA is an annual event held in honor

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of the children of Mali. Along with RobotsMali, all organizations active in the fields of child welfare and education participated with thousands of Malian children coming from all the regions of the country.

V. Projects

1. Bayelemabaga

During the year 2021, the Bambara language machine translation project using deep learning became operational thanks to a funding grant from the Lacuna Fund. The Lacuna Fund is an international foundation created by Google, the Rockefellar Foundation, and Canadian, German, and Swedish development organizations to address the need for dataset development for AI projects on the African continent. RobotsMali shared the grant with the American university Rochester Institute of Technology and INALCO, the French institute for the study of languages.

A project team has been set up to manage the entire operation. To date, RobotsMali and its partners have mobilized translators, programmers, and others in the field to collect massive amounts of data in the Bambara language, which will then be processed and added to an elaborate computer system that will serve as a translator into multiple languages.

2. Yelenkoura

First start-up hosted in the center and aiming to develop technological solutions for the disabled, Yelenkoura technology is now a registered company in the form of a SARL. With the accompaniment of the center and the support of its various partners such as UMAV, the Malian Union for the Blind, the start-up has become an independent company. Yelenkoura was selected as a leading company using AI technology on the African continent by AI4D and has received grant assistance and entrepreneurial training.

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3. <u>Innovation of the year - KAALISI</u>

KAALISI is a very promising entrepreneurial initiative with the surprising fact that it is the creation of high school students who launched the project as an entry in the Panafrican Competition 2021.

KAALISI aims to develop a platform for connecting investors and projects or companies seeking funding. The start-up works on the basis of identifying the most important criteria to analyze the viability of a project on all levels of development and financing using statistics and machine learning. The platform will allow funders to better choose the projects to be financed and startups to benefit from better support and greater visibility with funders.

KAALSI has been double awarded, by PARC 2021 and the "IFEST Tunisia" festival. The project is in the development phase with its team of future engineers working to develop a solution adapted to the Malian market.

VI.   Conclusion

In pursuit of its mission RobotsMali has risen to meet numerous challenges during the year, thanks to the continuous effort of its team and the unfailing support of its various partners. RobotsMali has not only been able to reach a new circle of Malian youth benefiting from an awareness and initiation in robotics and STEM, but also continued in the accompaniment of many of its former students as they advanced in their studies and even, in some cases, launched careers or created their own ventures.

The prospects for 2022 are numerous and rely on the active participation and contribution of all actors in the education of children in Mali.

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VII. PARTNERS

They accompanied us this year

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