AFRICA MAKERSPACE NETWORK

FIRST EDITION

THE AFRICAN MAKER

A-MAG | FROM THE AFRICA MAKERSPACE NETWORK

HIGHLIGHTS

Makerspaces Highlight.
Industry Trends.
Women in STEM.

LAUNCH
JANUARY
2022

IN COLLABORATION WITH
Digital Times

TABLE OF CONTENTS

THE BIT MAKERSPACE

The BiT Makerspace is a business incubation and entrepreneur hub that provides human-centered design, Techno-Entrepreneurial Skills, Basic Electronics, 3D Printing Technology, Computer Programming, CNC and Laser Cutting Machines, Digital Manufacturing Tools and Designing Software Applications.

The makerspace is located in Bahir Dar, Ethiopia and was founded by Dr Seifu A Tilahun, Miss Sewenet Alemu and Mr Henok Mebratie, all from the Bahir Dar Institute of Technology together with Dr Lara Alen from the Center for Global Equity(CGE) in 2019. The makerspace is currently under the management of Dr Amare Kassaw and Miss Bezwork Tilahun.

The need to establish a Makerspace at Bahir Dar University was a case in point. Funded by the Bill & Melinda Gates Foundation, the founding of BiT Makerspace is part of an ongoing partnership between BiT and CGE to create an enabling environment in Bahir Dar for Inclusive Innovation – innovation for, with and by the rising billions. The makerspace is now a flagship initiative of BiT's Business Incubation and Techno-Entrepreneurship Centre.

Within a few months of opening, 3D printers at Bit Makerspace were used to fabricate more 3D printers, and a group developed a fingerprint scanner for the University. Other products were packaging papers and tableware from agricultural bi-product, glue from defatted soy flour, openfelex optical microscope, 3D printed masks and face shields, laser cutting face shields, oxygen concentrator, prosthetic hand, handheld soil moisture meter and RAY cosmetics which entails cosmetics produced from fish scale Turbo ventilator.

Within a few months of opening, 3D printers at Bit Makerspace were used to fabricate more 3D printers, and a group developed a fingerprint scanner for the University. Other products were packaging papers and tableware from agricultural bi-product, glue from defatted soy flour, openfelex optical microscope, 3D printed masks and face shields, laser cutting face shields, oxygen concentrator, prosthetic hand, handheld soil moisture meter and RAY cosmetics which entails cosmetics produced from fish scale Turbo ventilator.

The BiT Makerspace serves as a hub for startups, and it is one of the best MakerSpace centres with well-organized facilities, resources and staff. In 2022, the makerspace plans to conduct an Annual Hackathon/Makerthon on Artificial Intelligence, Alternative and Smart Energy technology to provide problem-solving research results by focusing on the country's priorities and responding to the development needs of their country through technology-based services.

They also look forward to preparing HCD and machine-related training, prototyping work for selected BSC / Masters / PhD Graduation Projects, and increasing women, youth, students, and graduates in the community's participation in makerspace activities.

In 2022, the makerspace plans to conduct an Annual Hackathon/Makerthon on Artificial Intelligence, Alternative and Smart Energy technology to provide problem-solving research results by focusing on the country's priorities and responding to the development needs of their country through technology-based services.

THE BIT MAKERSPACE

2 Makerspace Innovations you should know

1. Wood Drone

The term **"drone"** usually refers to any unpiloted aircraft and sometimes "Unmanned Aerial Vehicles" (UAVs). Initially developed for the military and aerospace industries, drones have found their way into the mainstream because of the enhanced levels of safety and efficiency they bring. These robotic UAVs operate without a pilot on board and with different levels of autonomy. A drone's autonomy level can range from remotely piloted (a human controls its movements) to advanced autonomy, which means that it relies on a system of sensors and Light Detection and Ranging(LIDAR) detectors to calculate its motion. Some types of drones are Single Rotor Helicopter, Fixed Wing Drones, and Multi-Rotor Drones. These drones have helped with delivery, military, emergency, and agricultural purposes. Despite these incredible abilities of drones, there are still a few hitches in their buildup.

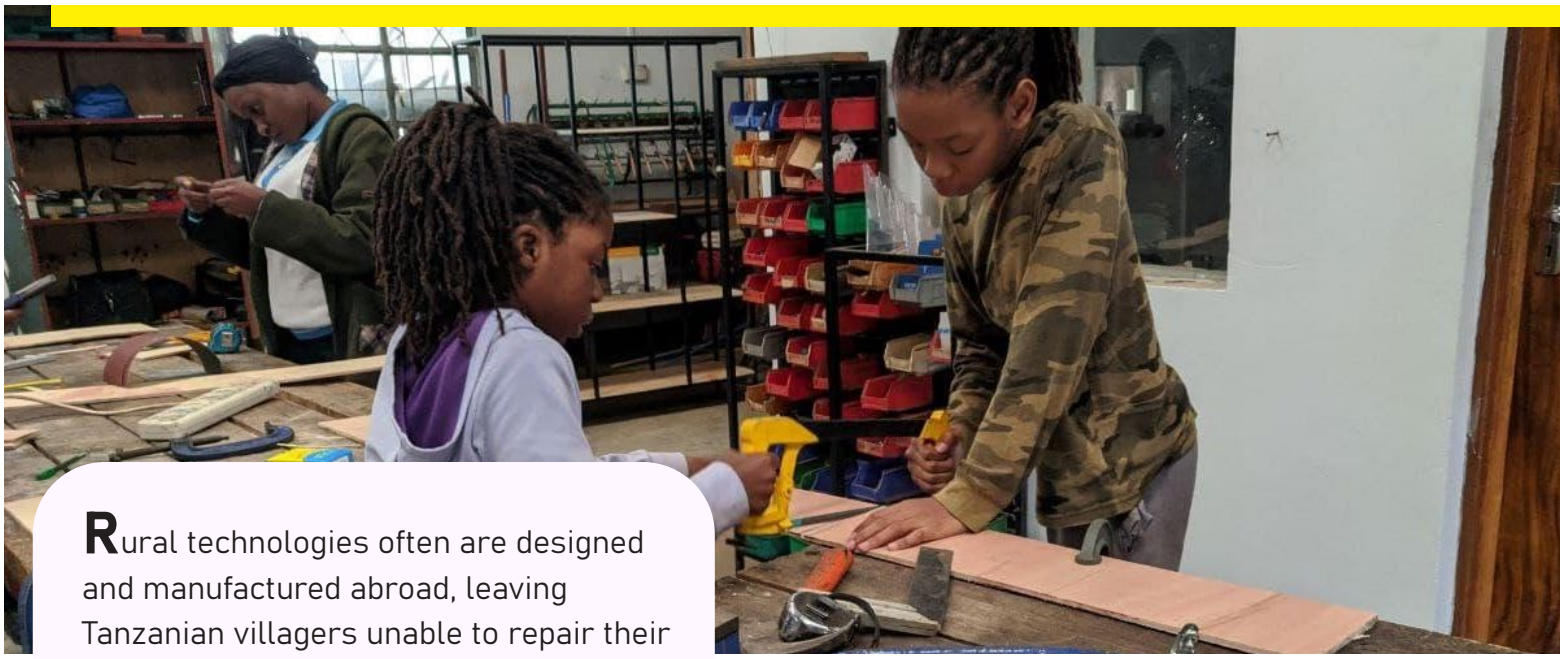
In my recent conversation with Ghana Tech Lab's makerspace team, I was opened to new possibilities. The team has designed and built new properties for their existing drones. They call it the custom drones, made purposely for training activities. The current drones were rigid, heavy, had low crash resistance, and their batteries heated up quickly.

These factors contributed to the loss of power and low flight time. Gideon Mensah, the team lead, said they used locally sourced materials to build newer drone frames to salvage the situation. The team leveraged woodwork to construct a new frame makeup. According to the team, the new properties, thus, the wooden frame, will increase flight time due to less weight, prevent batteries' heat up, and ultimately save power.

2. Spraying Chamber

Again in Ghana Tech Lab, the team are putting in efforts to put innovation and product design on the pedestal. Through vigorous brainstorming sessions, product design, experiments and whatnot, the team has successfully invented the **Spraying Chamber**. The spraying chamber is an innovative machine where paint is dispersed in fine droplets onto plaques or pieces of art in a uniform manner.

A Tanzanian Social Enterprise Is Improving Lives Through Low-Cost Technologies



Rural technologies often are designed and manufactured abroad, leaving Tanzanian villagers unable to repair their devices, especially when materials are not locally available. These technologies are not developed with a rich understanding of local needs and resources, often making them irrelevant or impractical. For example, technologies that require electricity are useless for most Tanzanian villagers who do not have access to or cannot afford electricity. Most rural technologies are too expensive for the average villager.

These problems have left an estimated 30 million villagers without access to technology to charge phones, see at night, and harvest their crops. Not only would these villagers stand to benefit from more productive technologies, but so would the Tanzanian economy as a whole.
Per this, individuals at **Twende Social Innovation Centre** are gravitating towards a world full of local solutions to local challenges. James Elseworth and Bernard Kiwia founded it in 2014.

Located in Tanzania, Twende is a social enterprise dedicated to empowering local community members to improve their quality of life through the innovation and implementation of low-cost technologies. Twende develops these technologies by engaging communities through community workshops and providing vital technical support and tools through its innovation centre platform.

Given this, the innovation centre has trained 35000 people as part of its mission to foster entrepreneurship amongst the youth and women. Over 100 have made valuable technologies used to solve technological challenges, and out of this number, over 15 have developed into companies and factories, employing more than 300 persons (75%youth and 25 women).

Notable amongst their creations are the multi-crop thresher, avocado oil processor, manure spreader, spice grinder, palm oil extractor, bar soap cutter, liquid and powder soap mixer, cereals winnower, plastic shredder, maize cob sheller and thresher, fertiliser applicator and the multipurpose wheelchair. These technologies utilise locally available materials, are designed with rather than for village communities, derived from village needs, are affordable for villagers, and can be repaired locally.

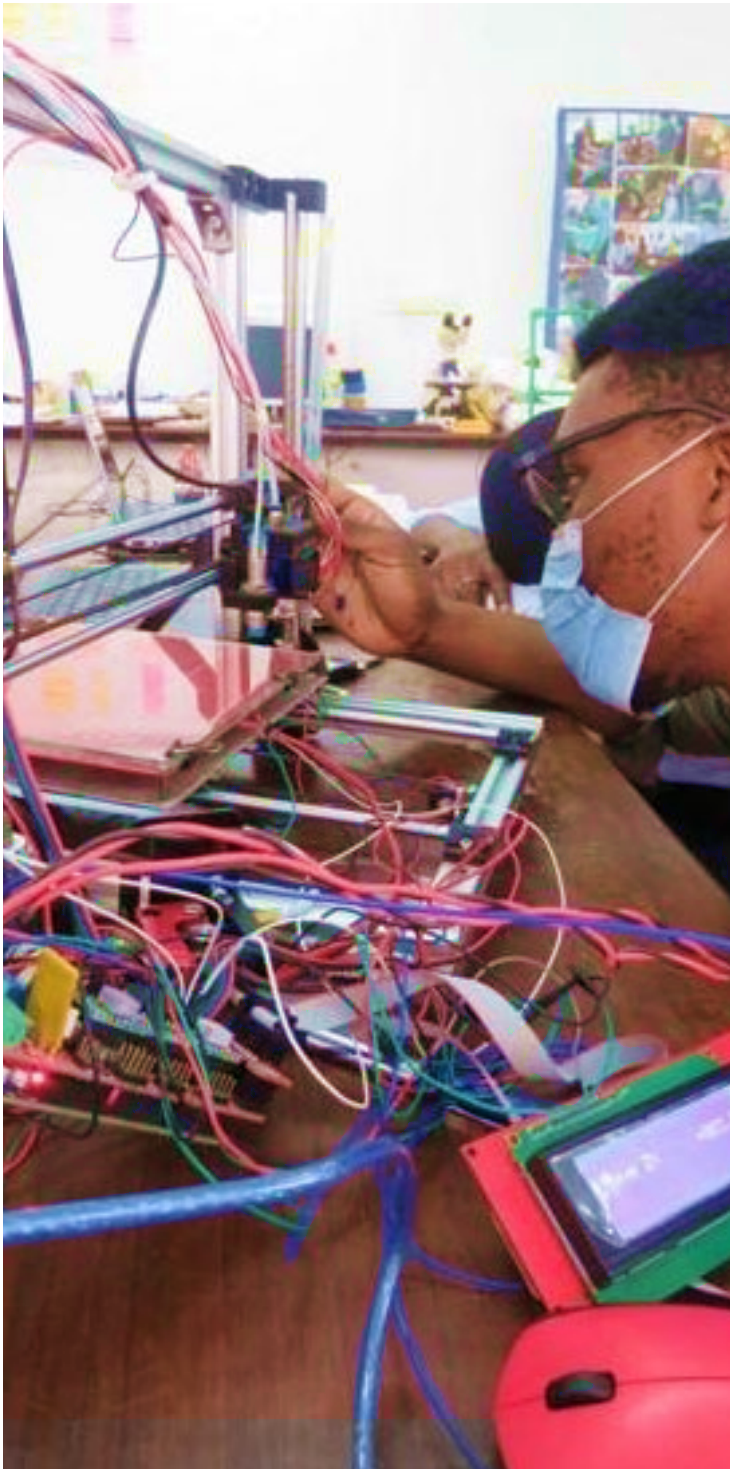
Aside from the technology building, Twende serves as a hotspot for outreach programs and workshops. They have the Build It Workshop, Jamii Tech Program, Creative Capacity Building Workshop, Tech Incubation Program and Co-working space. The Build It Workshop is usually a one-day event where participants learn to use hand tools and create a torch, floor squeezer or bottle opener. This depends on the needs of the participants and how they can use the skills in making other devices. Over five days, the Creative Capacity Building Workshop introduces participants to a build-test-iterate design cycle. Participants get to develop their practical skills through design challenges and also get the opportunity to build existing technologies with hand tools. Participants immediately utilise these skills to identify real-life problems, brainstorm solutions, and design and build a prototype with advice and mentoring from a Twende trainer. Following the teachings of Amy Smith and her colleagues at MIT's D-Lab, Twende has adopted a new model of community-based innovation called creative capacity building (CCB).

A vital component of the follow-up to the CCB training is a space where people can come together, apply what they have learned to design, and build technologies that can positively affect their lives. The Twende workshop ideally serves as this nexus of creativity, where aspiring inventors can learn about new technologies, develop their mechanics and design skills. They get to prototype their ideas, create technology products, incubate micro-enterprises and obtain guidance on how to market the technologies that they create. Workshop tools are available to all participating community members and are maintained for a small fee.

In 2022, the makerspace seeks to conduct 20 LED Outreaches, 6 Build-It Workshops, 6 Creative Capacity Building Workshops, 1 Jamii Tech Program and 1 Tech Incubation Program. They are also hoping to reach 500 students per outreach, 120 per Build-It Workshop, 120 per CCB, 20 participants per JTP and 12 per Incubation. Again, they look forward to having at least 12 Innovators to make 4 successful technologies and have at least 1 technology reaches the market testing stage by September 2022. James Elseworth is currently managing the space with support from John Nzira as the executive director.

DIT Design Studio

Is Infusing Active Learning And 21st-Century Fabrication Skills Into Technical Education



The Dar es Salaam Institute of Technology (DIT) Design Studio or DIT Design Studio is Tanzania's premier invention education design studio—a space dedicated to student innovation that later became a hub for COVID-19 preparedness and response within its communities. While DIT Design Studio has been in existence for only 2 years, it is the only makerspace within the university ecosystem that supports systemic change in engineering education across Africa. Julia Jenjezwa currently oversees the studio.

The DIT Design Studio results from a collaboration between the Rice 360° Institute of Global Health (Houston, TX) and Dar es Salaam Institute of Technology under mutual goals of infusing active learning and 21st-century fabrication skills into technical education. Students are privy to hands-on design and prototyping using 3D printers, laser cutters, other supplies and resources available in the studio. This education model aims to turn engineering students into innovators capable of turning their ideas into sustainable solutions.

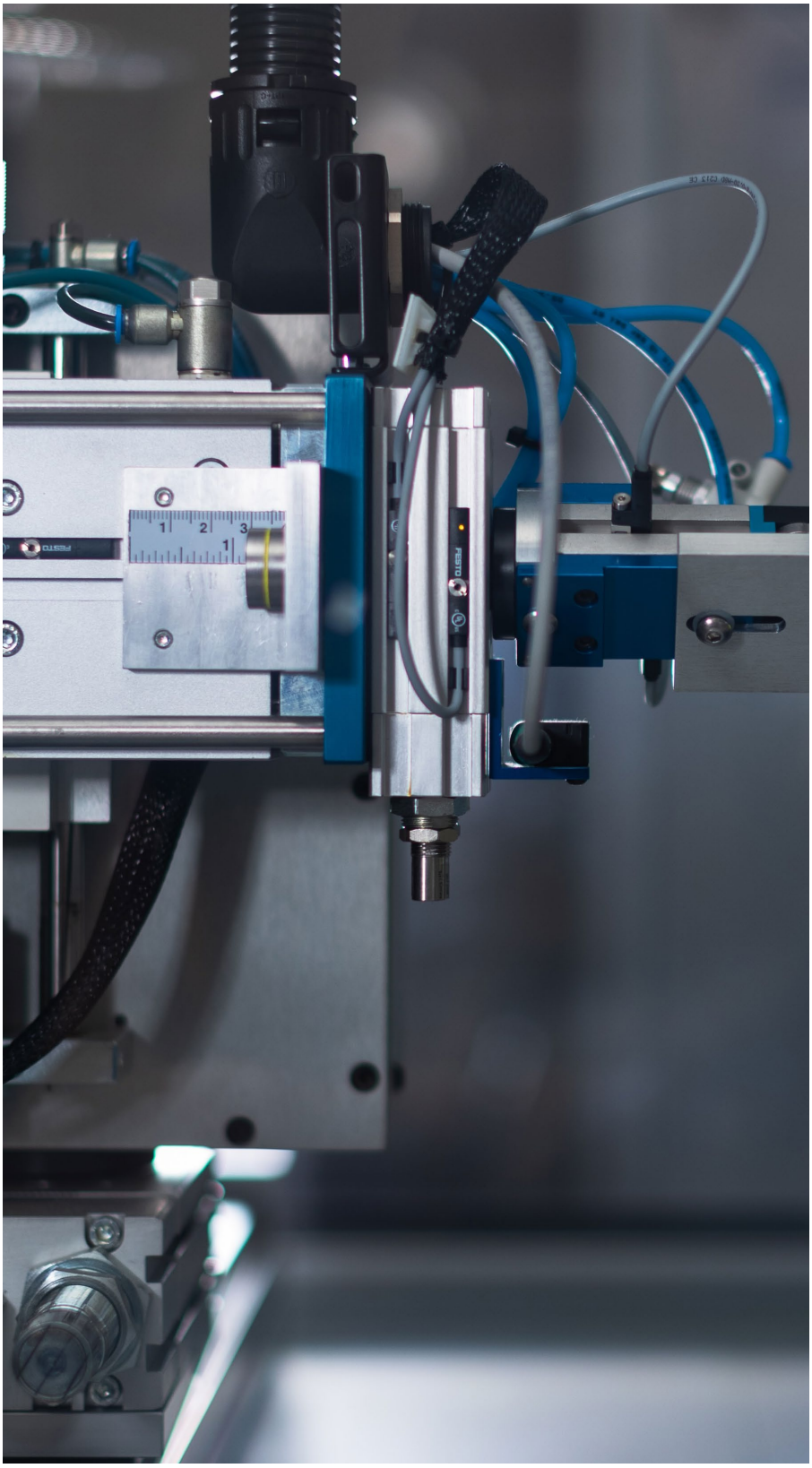
In addition to faculty development workshops and infusing hands-on skills into the existing curriculum, DIT Design Studio serves as a makerspace for all community members. The makerspace seeks to expand its reach and scale its technologies to welcome more students and train more people in key engineering technologies. They are pursuing multiple paths to move its bench prototypes towards the next step of translation and commercialisation.

Since the inception of the Design Studio, it has supported many final year projects, independent projects, and external projects where engineering students create practical solutions to problems identified within their communities. The members have undertaken many projects including hands free-crutches, a milk vending machine, upcycled dual extruder 3D printer, and a biometric voting system among others.

With an environment that allows an innovator to rapidly gain creative confidence and obtain a more precise path from an idea to a solution, the makerspace believes in student learning by actively working on problems and engaging with fellow course participants on hands-on and collaborative courses.

Most of the studio's outreach works have been focused on local hospitals, where the makerspace tries to create solutions to problems faced by Tanzanian healthcare facilities. The maker space has leveraged reverse engineering and 3D printing to design and build expensive machines and spare parts for these facilities. They also installed a functional UV N95 sterilization unit at a local hospital and distributed over 2000 pieces of PPE across Tanzania during the height of the COVID pandemic. Some of these products were face shields, ventilators, automatic hand washing machines and intubation boxes.

The Emergence Of Makerspaces In Africa



For years, there has been a growing need for creativity and an enabling environment to harness creativity and talents in Africa. The continent has watched potentials and brilliant ideas go wasted because it did not have powerhouses that could identify such prospects and hone them.

However, all hope is not lost because numerous makerspaces have emerged to change the narrative. In the mid-2000s, the global maker movement began—the campaign centred on making and nurturing creativity, innovation and entrepreneurship. Since then, makerspaces are becoming popular in Africa due to their potential for developing a thriving makerspace economy, skills and technologies needed for manufacturing and business growth in Africa.

By Dawood Haruna Adams

Going Green with SolarTaxi in Ghana

SolarTaxi is an e-mobility startup that provides modern eco-friendly mobility facilities and services. The company designs and assembles electric powered vehicles (bikes, tricycles, mini cars) locally, trains locals on vehicle operation, and offers affordable, eco-friendly transport services to the public. SolarTaxi has 4 branches stationed across Ghana to assemble and maintain clients' e-vehicles. The public is showing a great deal of interest in the vehicles, and already has clients currently with Glovo, Jumia, Letshego, University of Development Studies to name a few. Isaac Atia-Abugbilla, the Head of Engineering at SolarTaxi, and an electronics engineer skilled in IoT, machine learning/deep learning and PCB design spoke about the genesis of their battery lab and their ground-breaking "Omega Project".

This achievement led to the birth of the "Project Omega", which was the project for converting conventional fuel bikes to electric powered bikes. This project actually took a significantly shorter time than expected, due to our understanding of the systems and subsystems of e-vehicles. With that understanding, SolarTaxi was able to convert a fuel bike to an electric bike.

There have been 4 models developed so far, including one done in collaboration with the University of Energy and Natural Resources, Sunyani. The main motivation was the short lifespan of the foreign-made products, due to environmental, road, climate differences and even the riders' weight and way of riding. SolarTaxi decided to either design and build a bike from scratch, or take an existing fuel bike and make modifications. The latter was eventually decided upon. The team obtained a bike, replaced its engine, among other parts and installed parts required for an e-bike, and it worked wonders! The results after a full month of testing showed that the bike is sturdy and can withstand the environmental conditions in the country. There were no breakdowns within the test month, in contrast to the breakdowns of foreign-made products.

With the performances and successes had with these bikes, SolarTaxi plans to scale up the production of this bike. The masses are interested and a scale in production will be done to meet these demands. SolarTaxi hopes to completely change the face of transport by continuing to make great strides and ground-breaking innovations in Ghana, as well as in the West African domain.

WHAT ARE MAKERSPACES?

A Makerspace is an open-access community space for sharing resources and knowledge in a variety of disciplines. Makerspaces provide people of all ages and backgrounds with in-person collaboration and access to tools and equipment to educate and inspire creativity.

Makerspaces or Hack-labs across Africa are popping up to inspire a new generation of innovators, inventors and entrepreneurs. Their enabling environment has given creative startups a higher chance of succeeding by connecting them with experts, mentors, resources and funding.

Makerspaces foster innovation through hands-on experimentation. Participants have the opportunity to be creative and apply personalised learning strategies to make changes to existing concepts or develop their ideas, methods or products.

Makerspaces enhance learning experiences. They provide that flexibility, collaboration, adaptability and the ability to think critically and create solutions.

Through makerspaces, individuals are exposed to STEM activities, emerging technologies and 21st-century skills beyond critical thinking and problem-solving skills.

SOME MAKERSPACES IN AFRICA

iZone Hub (Zimbabwe)

Fablab Winam (Kenya)

Gearbox Hub (Kenya)

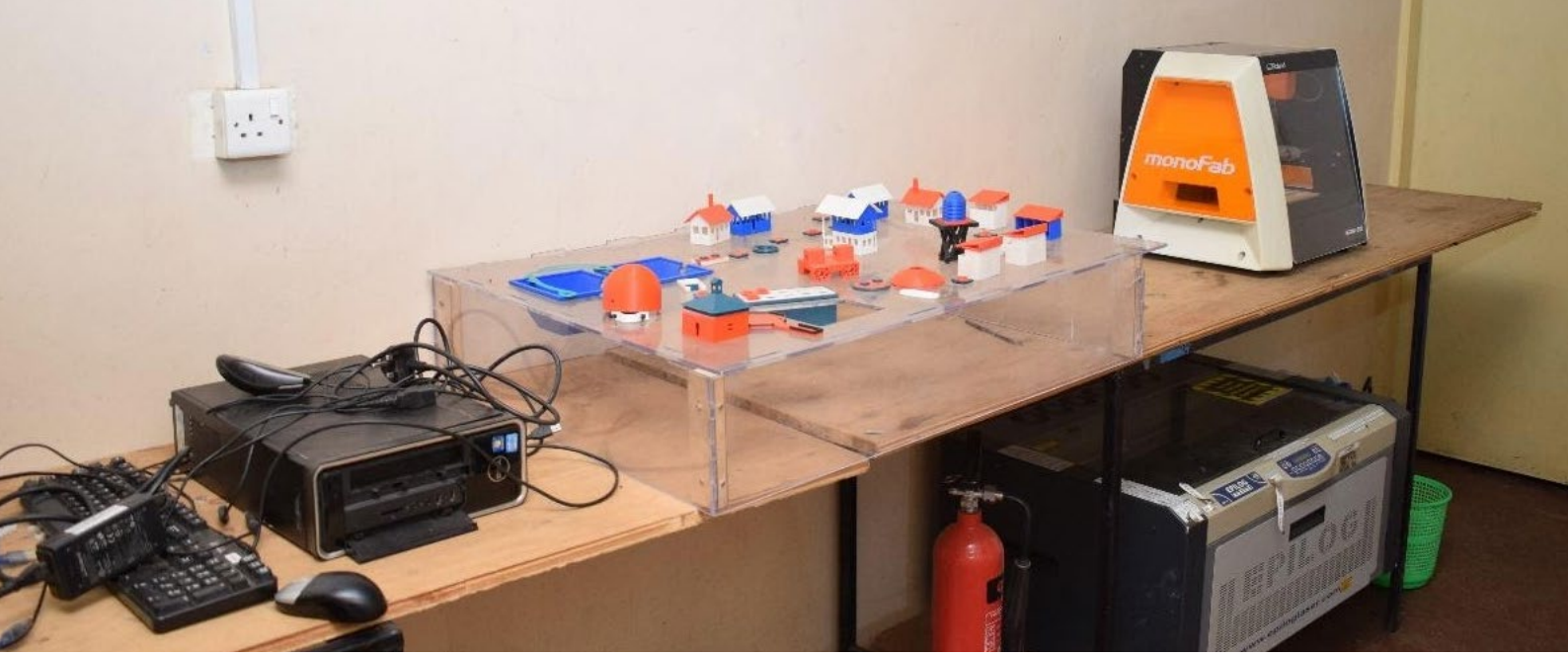
Ghana Tech Lab (Ghana)

BiT Makerspace (Ethiopia)

DIT Design Studio (Tanzania)

IOMe005 lab (Kenya)

Twende Social innovation centre (Tanzania)



FABLABWINAM

Check Out Fablab Winam, A Community For Creative Fabricators And Artisans

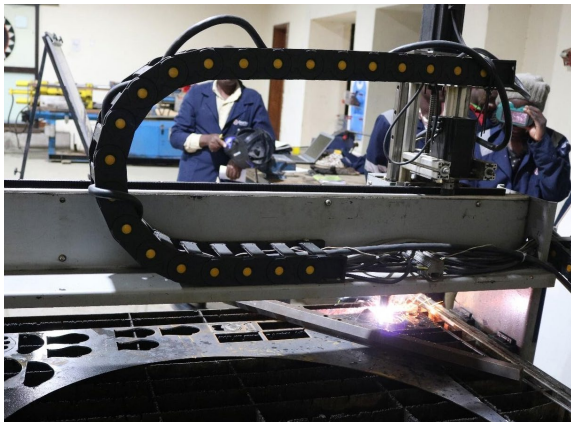
Fablab Winam is a makerspace known for running STEM programs for students, digital fabrication boot camps, coding and robotics classes for kids, and capacity building training for local manufactures in the informal sector around the Western Kenya region. Founded by Martin Oloo and currently managed by Christine Kutwa, the Fablab Winam located at Kisumu has been in existence for 3 years.

Fablab focuses on community empowerment and social innovation and is keen on introducing children and youth to innovative skills and techniques that will enable them to become skilled creatives. Fablab Winam also provides platforms to develop business ideas and take them to market.

With intentionality in helping a community thrive, Fablab's primary goal has always been to promote the maker culture in their local community by offering technical training and incubation programs for tech innovators by nurturing their ideas and introducing them to investors for scale up. The makerspace empowers women and youth in informal settlements by offering business and capacity-building training to build upon their existing companies to sustain themselves. It is the belief of the makerspace that poverty eradication, sustainable lifestyles and economic systems have to be put in place at the grassroots level for communities to begin building foundations that will propel them to flourish. Fablab Winam has built many products such as outdoor and indoor signages, awards and gift items, 3D printed face shields, foot-operated taps, handwashing stations, customised furniture, customised stationery, home accessories and interior furnishings like lamps, lampshades, wall clocks and trinket boxes. The makerspace also manufactures products using digital fabrication tools and offers training on 21c skills and software development and branding services. In addition, they offer a co-working space and are also an incubator for tech innovators.

For the year 2022, Fablab anticipates a scale-up of activities and a rollout of digital fabrication and capacity-building training programs for entrepreneurs in the informal sector; with a focus on five neighbouring counties within the Lake Basin Region. The makerspace hopes to increase youth involvement in its programs to promote self-employment and to tackle unemployment. When given to school dropouts, such hands-on skills would benefit them in starting businesses, thus providing them with a source of income and good service to their communities.

Gearbox Is Inspiring And Driving Entrepreneurship Among The Locals In Kenya



In Nairobi, there is a makerspace named Gearbox that is inspiring and driving entrepreneurship among the locals. Gearbox provides a peep into Industry 4.0 capabilities to innovators in Kenya, and it offers incubation and acceleration services. The impact-focused makerspace has also created access for makers to tools, materials, training, and expertise. It has given Kenyans the platform to build solutions such as solar-powered irrigation systems, water-saving gadgets etc.

For instance, Gearbox created the avenue for systems engineer Nicholus Kimali to develop the "speed governor" prototype. The speed governor is an engine used on Nairobi buses to keep them from going too fast. With no engineering background, Kenyan social entrepreneur Esther Mwangi developed EsVendo, an enterprise that creates sanitary pad vending machines for schools and public spaces. Kenyan innovator Roy Allela also developed Sign-IO to enable her deaf niece and other deaf children to communicate efficiently. The Sign-IO is a set of high-tech gloves that converts sign language into audio. Sensors attached to the gloves interpret hand movements into speech via an app.

All these would not have been possible without engineer Kamau Gachigi. Kamau founded Gearbox in 2014 to provide hardware entrepreneurs in Africa with the tools they need to design and build sustainable solutions to local problems.

Kamau built it with BRCK, a maker of edtech and connectivity solutions for low-infrastructure environments, along with Sanergy, a manufacturer of sustainable toilets and waste-to-energy products. He also joined forces with Ushahidi, a nonprofit software development company, and the iHub, one of the first dedicated spaces for Kenya's tech community.

The 20,000 square-foot shared makerspace offers materials and equipment including 3D printing, laser cutting and electronic circuitry and helps cut costs for inventors by providing access to assembly machines through a membership model.

ABOUT THE FOUNDER

Dr Kamau Gachigi is the founding executive director of Gearbox, Kenya's first open makerspace for rapid prototyping, based in Nairobi. Gachigi also co-founded the Africa Innovation Ecosystems Group (AIEG), which focuses on creating and managing real-estate based innovation centres of varying scales.

The engineer is also a member of the Global Council on the Future of Production under the World Economic Forum and the consultative advisory group of the World Bank's Partnership for skills in the Applied Sciences, Engineering and Technology.

Gachigi was teaching engineering at the University of Nairobi in Kenya. He noticed that talented students and faculty saw their ideas unrealized because they lacked access to equipment to build prototypes. Thus, he created a fabrication laboratory at the University of Nairobi in 2009, equipped with computer-controlled machines that anyone could use.

Meet the Nigerian STEM-driven Entrepreneur – Abiodun Odunayo Sekinat

Abiodun Odunayo Sekinat, Nigerian and founder of Tanikes Corporate World LTD, is a result-oriented person who strives to achieve the outcome in any solution she provides. She studied Geology at the university between 2007-2011, after which she worked in the Nigerian mining industry.

For the past seven years, she has increased in her experiences providing support to investors who wish to dive into the Nigerian mining business. Her work with Rural Water and Sanitation Agency, a mining company, and a mining consultancy firm have contributed considerably to everything she knows today. Her job taught her to use ArcGIS, Auto CAD, Surfer, Global Mapper, operate a resistivity meter, and so on.

Abiodun's journey has not been a straight path. She wanted to be a petroleum engineer but was not admitted into the university that offered the course. Her parents, who did not encourage idleness, applied for a course similar to petroleum engineering —Geology (Earth Science).

"To be honest, I'm not sure the exact reason, but I have always enjoyed Sciences, especially physics. I didn't want to try anything else; it is safe to say I have always been STEM-driven."

"Although I haven't been doing a lot of engineering, I value the art of creating solutions that solve mechanical problems. Engineering involves critical thinking and can produce a solution with a few tools. Such ability is priceless."

Today, Abiodun is a Mining Consultant, acting as the road map in any mining industry. She is the connecting cord that brings together different parts of the mining value chains at the grasp of the investor. She supports the investor on his journey from mineral prospecting to mineral extraction, providing solutions and recommendations at each turn.

She is analytical, a problem solver, with skills in Data Management, mine planning and financial modeling, judgment and decision making, monitoring and coordination, etc. Her firm, Tanikes Corporate World LTD, was founded in 2019 and is based in Nigeria. Abiodun leveraged Jack Welch's 4 E's of Execution to build the business.

Energy – she harnesses energy to attack whatever her mission is—the type of energy that makes her move at 95 miles-per-hour in a 55 mile-per-hour world.
Energizers - she outlines a vision and does it! Get people excited about the cause. "I give others credit when things go right and accept responsibility when things go south," she said.
Edge – she welcomes competition and lets nothing stand in the way of achieving results.
Execute – very importantly; she converts energy and edge into actions and results. Executing my goal is ultimate.

"After years of working in the mining industry, I was able to detect the importance of a mining consultant who can provide solutions that work and are cost-effective. Many investors go into mining blindly, but we are the light to guide their path; you cannot overemphasize the importance of having that capability."

"Also, hyper-growth is a sharp or rapid growth or expansion of a business. The sudden rise has made me understand the need to plan for capacity expansion as part of a contingency plan."

"Many individuals in STEM get it wrong when they think, oh, I'm a STEM person and don't necessarily need to know about business or care to know about developing a business. But if you want to give value to your invention and solutions, you need to know a thing or two about business development. When you have created an answer, you don't plan to give it away. You need to develop a strategy, keep it running, ensure it is constantly updated to suit the needs of the consumers, ensure you are making a profit and growing because every STEM needs funding, and only with growth can funds be generated."

"Part of Business planning or development is the identification of various risks associated with the business and also identifying the mitigations needed to minimize exposures. So this planning for the unexpected makes it easy for me to factor in various risks in any measure, and I also can identify the risks I can manage or tolerate. Putting this together helps keep the business focused."

"Offer pro-bono services to attract more clients. Quality and customer retention strategies like a feedback mechanism can get clients' expectations, deliver the best result in the shortest time possible, keep clients satisfied, and keep referrals coming. Sourcing and implementing strategic opportunities that can maximise the productivity and growth of your business and building lasting and mutually beneficial partnership and market research and survey etc."

Now, Tanikes Corporate World LTD provides solutions to investors such as; Mining Engineering Design and Modeling, Mining Consultancy Services, Training & Recruitment of Mines Personnel, Selection of Mines Equipment & Machinery/ Geo-Technic Design, Geophysical and Geo-Technical Services, Design of Mines and Quarries/Due Diligence of Mining Site, Mineral Exploration/ Prospecting, Reserve Estimate Calculation, Mineral Title Management, Safety and Environmental Works (HSE, EIA, EPRP, EMP, EBS, EA, etc.), Feasibility and Report Generation (EIA, Minimum Work Program and likes).

"Nigeria is a challenging place for businesses and solutions to thrive due to recession, which is causing a hike in equipment prices. Because of other deficiencies, the equipment is not manufactured in Nigeria, and these make them a lot more expensive to access."

Abiodun and her team are currently working with B & S Europe to create investment s0lutions in selected mineral value chains in Nigeria. Same as was done in Rwanda and a few other African countries.

Final words from Abiodun Odunayo Sekina

"Being a STEM Leader is as good as being a leader anywhere, although you need to understand first that STEM individuals need a lot of motivation. So as a leader, you have to be easy to talk to; be your team's friend, and be stern in giving instructions. You have to be willing to take responsibility for the team, and when there is a win, it should be a win for all, which keeps the team motivated. Lastly, you should understand innovation and have problem-solving skills yourself. You must know precisely what you are doing and understand the organization's goal you find yourself in to lead the team on the right path.You can never stop acquiring knowledge and improving on your skill, STEM is an area of development that evolves with time, and you have to stay on track. Actually, as a STEM, you always have to be one step ahead. So I would say, keep updating your skill and knowledge. Have a STEM mentor; the internet is your friend; use it to research and attend STEM programs to update on inventions and solutions.

Africa's STEM is rapidly growing, and I am excited to be a part of that, to see that the tiny drops of water in different parts of Africa contribute to the continent's overall growth. All partners must share a common goal and vision to forge more meaningful partnerships. All partners have to see, create, and realize the opportunities ahead of them, resulting in transformation. Partners should communicate information effectively to keep all partners involved to build trust and understanding. I am excited to be a part of the STEM network. STEM is the foundation of any economy. Management is built on STEM, and to know that we play such a huge role is something I am proud to be a part of. I love seeing youths think out of the box. I am excited to be part of the organization and wake up to the global speed of inventions.

Ending with the quote, "Never say something is impossible for you to do without giving it a try"– Anas Muhammad (A colleague)"

Meet the Namibian STEM GIANT

Ndeu Naukushu

Ndeu Naukushu describes himself as a "village boy" who is passionate about making Africa productive with the technologies of the 4th Industrial Revolution. The Fourth Industrial Revolution is the automation of traditional manufacturing and industrial practices using modern innovative technology. He utilizes cool gadgets to make the world a better place in much simpler terms.

Ndeu, after high school, progressed to the university where he enrolled in law school. However, he dropped out in the second year due to low funds and decided to look for a job at the bank. He enrolled again to pursue the law, but things took a downturn. Afterwards, he obtained his Master's degree in Operations Management at the University of Johannesburg.

Even after this, Ndeu did not envision himself in the Science, Technology, Engineering and Math (STEM) field but was fascinated by science and technology. His sister Liita and Prof. Tsilidzi Marwala played significant roles in his journey. Liita introduced him to the power of reading while Prof. Tsilidzi Marwala introduced him to the Fourth Industrial Revolution and Africanized AI.

Now, Ndeu Naukushu is the CEO of Africa Productivity Specialists (APS), an operations and productivity improvement company implementing the Productivity Agenda for Africa. He is also a Namibian, an agile scrum master, an artificial intelligence specialist, the author of the Productivity 4.0 Manual for Africa, a STEM Giant, and a specialist in making babies "laugh."

It is worth noting that the young CEO has played a vital role and continues to do so within the STEM community. Nonetheless, it has not been a smooth ride for the African giant. He noticed that Africa records an enormous gap in productivity due to unawareness about the 4IR and how it can improve African economies. Lack of research and development (R&D), and lack of institutions that act as responsible bodies for coordinating and regulating productivity improvement standards on the continent contributed to the gap.

"Given the experiences I had made in my life, I concluded that all that can define progress and measure productivity globally is the ability to think ahead and do so logically and realistically. STEM is the only format of knowledge that accommodates logic. LOGIC allows us to apply our minds without any influence from emotions."

"Being a global influencer, participating at making the world better means promoting productivity specifically in Africa, and ultimately enabling Africa to rid itself of poverty, hunger, corruption, and all illness associated with it currently. It means more ideas, more minds, more viewpoints, more collaboration, and more solutions."

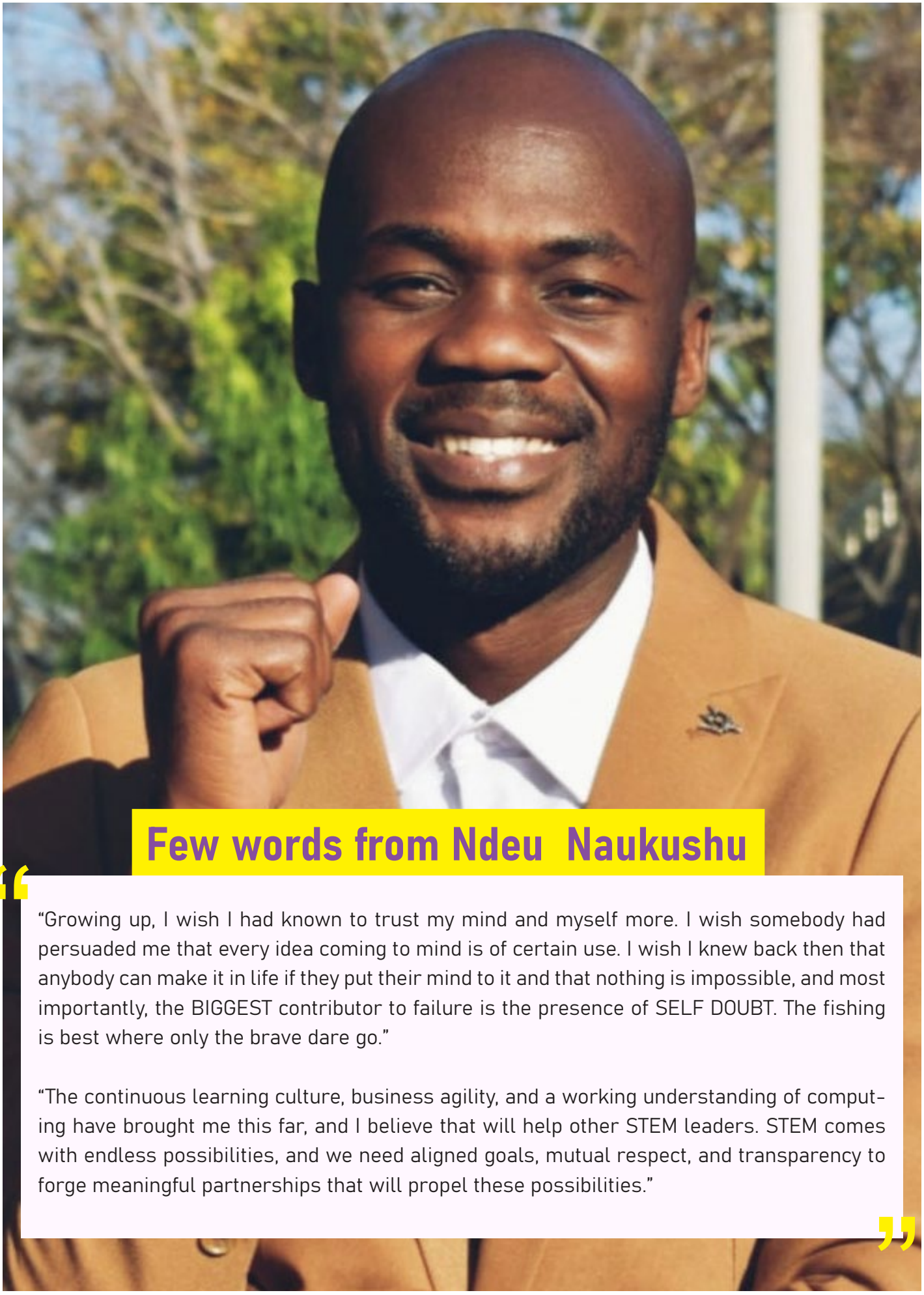
"Globalization is real, and it is time to test it. Business can take place where one wants it. Location has become secondary. Geography is no longer a barrier to success and productivity."

With this mindset and selling every valuable asset he owned, Ndeu self-funded his business. "I have not received a cent of external funding up to this very day." Ndeu developed the Productivity Manual, which illustrates how to harness "everyday" technology to solve some of the most pertinent developmental issues currently facing us as a continent and globally.

Additionally, he created a Productivity 4.0 manual for Africa. This manual has been for African governments, Small and Medium Scale Enterprises (SMEs), private and public entities, and individuals to grasp the concept of productivity and fully appreciate how to do more with less, increase efficiency, and benefit from collaboration.

His company is in its advanced stage of setting up the first cyber security training center for women in Africa.

Furthermore, Ndeu has been appointed as African Union Agenda 2063 Champion for harnessing 4IR technology. The young CEO is producing and distributing Agenda 2063 comic books to 1000 school children in South Africa and Namibia. The objective of the comic book is to provide a children's version of Agenda 2063, one which creates a visual representation of what Africa should look like by the year 2063.



Few words from Ndeu Naukushu

"Growing up, I wish I had known to trust my mind and myself more. I wish somebody had persuaded me that every idea coming to mind is of certain use. I wish I knew back then that anybody can make it in life if they put their mind to it and that nothing is impossible, and most importantly, the BIGGEST contributor to failure is the presence of SELF DOUBT. The fishing is best where only the brave dare go."

"The continuous learning culture, business agility, and a working understanding of computing have brought me this far, and I believe that will help other STEM leaders. STEM comes with endless possibilities, and we need aligned goals, mutual respect, and transparency to forge meaningful partnerships that will propel these possibilities."

MEET THE DARE TO DREAM FOUNDER:

BOTSWANA'S FEMALE PILOT CAPTAIN

KGOMOTSO PHATSIMA

In the aviation sector, it is usually white and male. Only a few women have dared to venture into such the sector, and one of such women is Captain Kgomotso Phatsima. Captain Kgomotso Phatsima is one of Botswana's first female military pilots and the founder of Dare To Dream—an organization whose aim is to get more women into all aspects of the industry. She was born in a tiny village called Ledumadumane, close to the Capital City of Botswana, Gaborone. As a little girl, Kgomotso grew up seeing aeroplanes flying over her house. From then, she knew she was born to fly. When she finished high school, she applied for piloting at 43 Air School in South Africa. Initially, her family was not in support of her dream. "My mother said it was too risky and way too out of the norm for a girl child from a very humble beginning to fly an aeroplane," Kgomotso recounted.

"We are too poor, my child, and it is unheard of that a girl would dream of flying planes. Go to the university and study to become a teacher," my mother lamented."

"So I gave up my dream to fly and went to pursue a Bachelor of Education Science degree specializing in mathematics at the University of Botswana."

"When I finished my degree, I was immediately hired at Goodhope Senior Secondary School to teach mathematics. After eight months of teaching senior secondary students mathematics, I realized that it was not challenging enough for me, that I was not fulfilled."

However, when the Botswana Defence Force started to enlist its first female military pilots in 2009, she saw an opportunity to realize her dream of flying. She enrolled and soon became one of the first female military pilots in the Botswana Defence Force. Presently, she is the founder of Dare to dream, a social entrepreneur, a leader of the Obama Foundation Africa Leaders Fellow, an Alumna of the International Visitor Leadership Program for Women Leaders Promoting Peace and Security in the USA and a coach.

Passionate about aviation and youth development, her foundation focuses on youth, women, and girls' advancement within the STEM field. The foundation supports the promotion of careers in aviation and aerospace, robotics, coding, entrepreneurial development, business leadership, and other skills essential for students to progress in the business world in Africa and globally. The Dare to Dream Foundation is at every step bridging the gap between students in the rural regions and development.

As a social entrepreneur, she uses the power of flight to ignite dreams, celebrate passion, build diversity and equip the upcoming generation with entrepreneurial business skills.

And as a coach, she conducts professional coaching, team-building exercises, motivational talks, speaker events for corporate, schools, and universities.

During her journey, she has been awarded the Botswana Youth Awards Best Female of the Year 2017, been selected for the Obama Foundation African Leaders Program, been chosen as one of the 100 Most Influential Young Africans by Africa Youth Awards 2018, been given the 80th British High Commission Commonwealth Point of Light Award, among other impressive honours. But as the saying goes, "Rome was not built in a day." For Kgomotso to be a celebrated hero today, she had endured the most painful and challenging training in the military camp. She learned martial arts and tactics, leadership skills, unarmed combat, and shooting a gun.

In the next phase of her life, the captain hopes to establish a STEM Aviation Business Leadership Centre at Sir Seretse Khama International Airport in Gaborone. The Aviation Academy will be the home of Science, Technology, Engineering, and Mathematics for Africans. It will introduce the upcoming generation to aerospace sciences, robotics, coding, and drone technology and equip them with business and entrepreneurial skills.

Developing sustainable businesses and skills empowerment in Zimbabwe – iZone Hub is creating a paradigm shift

iZone Hub is a Zimbabwean entrepreneurship and innovation hub that offers pre-incubation and linkages programs. Serving small businesses, makers, creatives and helping them develop their enterprises in the digital age is what they do best. The hub's tailored seminars give small business owners and sole traders knowledge on utilising social media as a marketing tool for their businesses. They provide business development platforms for entrepreneurs and startups in formalizing and creating security/loss control, workflow processes and financial systems. These interactions are vital for networking, collaboration, and attracting investment. Founded in 2015 and located in Hare, the hub was instituted to support the development of sustainable enterprises that solve challenging and important community problems in the digital age. Additionally, the hub seeks to equip people with the business development skills and tools to build sound, solution-oriented businesses.

Founded in 2015 and located in Hare, the hub was instituted to support the development of sustainable enterprises that solve challenging and important community problems in the digital age. Additionally, the hub seeks to equip people with the business development skills and tools to build sound, solution-oriented businesses.

As part of its mandate, iZone hub offers a platform for youth to leverage technology to solve problems in their various communities. The makerspace periodically designs workshops and training focused on various tech topics for the youth around digital fabrication such as 3D printing.

Another program the hub runs provides female founders with a platform to pitch new and existing business ideas to raise their awareness and grow their reach. These events improve their chances for networking, collaboration, and attracting investment. The comprehensive aim is to support female founders through building their capacity in the marketing/promotion of their enterprises.

Also worth noting is their Glass Room program, an initiative that informs and raises awareness on data security and data privacy in current times. The main thrust of these is to improve the participants' digital security and privacy.

Currently, the makerspace is offering an entry-level software development course in collaboration with 21C skills. The makerspace looks forward to successfully training a batch of students in software development, establishing a software development community in the makerspace and running monthly workshops on different tech topics to bring them to the attention of various tech enthusiasts in 2022. The iZonehub makerspace managed by Ronald T. Tsatsi was founded by Kudzai Mubaiwa, Bruce Kanyera and Sandra Chisepo and has been in existence for six years.

“IOMe005 lab - Providing capacity building for children, youth, local entrepreneurs and artisans”

The IOMe005 lab is an innovation and fabrication facility located in Lamu, Kenya’s UNESCO heritage coastal town. The lab was set up in September 2020 as an initiative by the Kenya Red Cross with support from the Qatar Red Crescent, and Derrick Mugasia currently manages it.

At the IOMe005 lab, several programs are conducted for training. These include Introduction to digital fabrication, Computer-Aided Design, CNC machine operation, Laser Cutting, 3D printing, waste management and Basic Computer Skills. The lab also offers Design Thinking facilitation training. In addition, the lab provides machining services to local entrepreneurs and artisans, human-centred design consultancy to organisations, and product design services. With woodwork picked up very quickly, the lab has made incense burners, rocking chairs, coasters, desk organisers, signboards, lampshades, sculptures, doors with abstract patterns and many more. Some other projects include assistive devices and teaching aids for children.

IOMe005 is community focused with a humanitarian background. The facility is inspired by alleviating human suffering through the empowerment of society, especially young people. The lab provides a platform for the youth to express themselves through various innovative activities, experiment with different ideas through prototypes and their iterations, as well as infrastructure for humanitarian organisations to conceptualise and design innovative solutions for intervention. In 2022, IOMe005 plans to be involved intensely in plastic waste recycling, assistive technology, Science, Technology, Engineering, Arts and Math (STEAM) programs for children and support of skills transfer of indigenous cultural art from the elderly to the youth within their communities. The lab is cultured around volunteerism and peer learning. This enables them to stay objective on the larger good of the community instead of individual interests.

His Four Startups Failed, Now Students Are Enjoying Science, And Technology With 5th Startup

COVID-19 impacted the world positively and negatively, forcing a new normal. Humans have always adapted to change, which heightened during the pandemic restrictions. Almost every time, there was the birth of innovation, and one such was the VoltMicroscrope.

PRODUCT DESCRIPTION

The VoltMicroscope is a product of Vilsquare, a strategy and technology consulting company that uses cloud technology and digital media to move businesses to the digital economy.

The Voltmicroscope is a portable and digital microscope designed and manufactured to support entry-level students and researchers across the globe to continue learning and exploring science at a low cost. With the device, students can easily replicate and experience a bioscience lab at home or school and keep up with observatory science that connects classroom theory to real-life evidence.

The VoltMicroscope comprises; an adjustable magnification band, a high lumen lens light, a multilayer digital objective lens, and a computer or smartphone interface. The portable device also comes with a sample cutter, volt slides, eye lens cleaner, safety gloves, and a liquid picker.

To view microscopic samples on a smartphone, Volt has an easy connection that plugs into the smartphone. Volt's chip processor has a high-speed system that transmits pictures of tiny microscopes. The images are processed to produce clear microscopic photos on small screens.

For computers, Volt's cables are hooked into the computer USB peripherals, which display tiny microscopic images. It consumes low energy and processes real-time images into clear microscopic pictures. It has a chip that cancels white noise and shows samples in their purest form.

THE BRAINS BEHIND IT

Obasegun Ayodele is a Nigerian experienced development engineer whose work combines product design, research, digital strategy development, and advocacy, to support African growth clusters and innovative use of science and technology across Africa.

He works with diverse cluster communities at an intersection of government, private sectors, and civil society across West and East Africa.

His career focuses on developing adaptive specialities for Business Intelligence and community development which includes: System Design, Forecasting, Optimization, Data Analysis, Pattern Recognition, Machine Learning, Deep Learning, Software Development, Network Level Programming, Embedded System, Adaptive and Optimal Control.

Obasegun's core competencies are in business intelligence and community development engineering. He possesses a deep understanding of African issues and focuses on building engineering infrastructure and systems to solve African challenges.

The Nigerian first got introduced to hardware in secondary school at LAUTECH International College in the South-Western part of Nigeria. His school had a relationship with the Electrical and Electronics Engineering department of the Ladoke Akintola University of Technology (LAUTECH), regarded as one of the best technical universities in Nigeria. Ayodele went on to study Electronics and Electrical Engineering at the Obafemi Awolowo University (OAU), famed for producing successful entrepreneurs.

Before Vilsquare and Voltmicroscope, Obasegun founded four startups and failed. His first venture was Alcacia Systems, a hardware consulting firm that assisted companies in building hardware solutions such as billboards and screen displays, according to Techpoint Africa. Unfortunately, the startup collapsed. Driven by purpose and his love for hardware solutions, Ayodele started Pragmatic Embedded, a machine-to-machine solution for home automation.

When the startup also failed, he founded PubCulture, which was similar to Canva. The platform allowed users to create social media graphics, presentations, posters, documents, and other visual content. It also had templates for users to use.
For his fourth startup, Ayodele ventured into the fintech space with AirMoney. The platform tried to resolve the challenge of trust in online payments. AirMoney allowed users to convert airtime to cash to make online payments. Just like his previous three startups, AirMoney failed to take off.

Ayodele built his failed startups while still studying at Obafemi Awolowo University, and when he graduated, he joined iQube, a tech company building solutions for businesses in Lagos.

"At iQube, I was not doing anything hardware. I was in sales and marketing because one of the biggest lessons from Humane was that we knew nothing about sales, marketing, or business development. They're not taught in any engineering school, even though there are entrepreneurship courses. Everybody is just focused on building without thinking of how to sell these skills."

While at iQube, he started Vilsquare as a side hustle. He subsequently met his co-founder Obialunanma Nnaobi when he led a project with another company. Initially, his co-founder did not buy into the idea of quitting her job to start Vilsquare.

"She had come from banking to public policy and governance, and I felt it was necessary to bring someone with her skillset. I had the technical skills and some experience with sales and business development. Still, none in policy or corporate governance, and I believed these were important skills to have," Ayodele said.enabled students to run simple experiments in a gamified environment."

Ayodele started the company from his savings but his co-founder, Nnaobi, would join him a year later. Without any venture funding, the two entrepreneurs relied heavily on their savings to keep the business going.

Other universities using the VoltMicroscope include Prototype Development Agency in Enugu, Afe Babalola University, Obafemi Awolowo University, University of Lagos, and Yaba College of Technology. Ayodele has reportedly shipped some 1000 pieces of VoltMicroscope and other products to the United Kingdom, Kenya, and South Africa.

Ayodele has also built the Volt School, an eLearning platform that provides learning resources for secondary/high school students. "The platform was launched towards the end of June 2020, and by September 2020, there were over 1,000 students from Ghana, Sierra Leone, Liberia, The Gambia, and Nigeria.

The platform now boasts 13,000 students in 11 African countries. Through a partnership with the Obafemi Awolowo University, Ayodele and his team integrated an online platform that

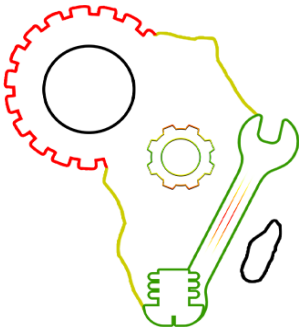
CONCLUSION

"Science will continue to surprise us with what it discovers and creates; then, it will astound us by devising new methods to surprise us. At the core of science's self-modification is technology. New tools enable new structures of knowledge and new ways of discovery. The achievement of science is to know new things; the evolution of science is to know them in new ways. What evolves is less the body of what we know and more the nature of our knowing," Kevin Kelly. The VoltMicroscopic device will not be the last we hear of the Obasegun.

MAGAZINE PARTNERS

AFRICA MAKERSPACE NETWORK

The Africa Makerspace Network comprises makers, researchers, innovators, students and makerspaces in Africa with its headquarters situated in Ghana. The network seeks to harmonize all the key mentioned groups of people under one umbrella for the purpose of growth and attaining sustainable development in Africa. This is achieved via building the business, technical and entrepreneurial capacity of makers as well as enhancing prototype-to-product development and manufacturing.



DIGITAL TIMES AFRICA (DT AFRICA)

Digital Times Africa (DT Africa) is a multimedia agency bridging the gap between the African Technology, Entrepreneurial, Innovation Ecosystems, and Traditional Industries to pave the way for exponential partnerships and strengthening the African Digital ecosystem. DT Africa is on a mission to create stellar digital content for the benefit of empowering entrepreneurs, startups, technology enthusiasts and policy pillars through education. It is the fastest growing publication covering technology, digital innovation, entrepreneurship, and the Startup ecosystem on the African continent, providing insight and analysis, influential events, and hosting conversations with major players.

Digital Times

COMMUNITY PARTNERS

KUMASI HIVE

Kumasi Hive to support entrepreneurs and innovators of all types, particularly to encourage social impact businesses to develop innovative physical products and processing methods. Also, they provide access to the local entrepreneurship and innovation ecosystem including access to government, relevant industry players, start-up/businesses, CSOs, and other stakeholders. The Hive focuses on bridging the existing Digital and tech skills gap in the African digital entrepreneurship ecosystem and seeks to address it through integrated innovation. As the world enters into the 4th Industry age, there is a shift from traditional jobs to digital and tech skills-based jobs, Kumasi Hive is therefore committed to helping build the future work with skills in emerging technologies and create jobs and solutions through accelerated adoption of these emerging technologies.

GHANA TECH LAB

Ghana Tech LAB's is an organization that inspires innovation, creativity and ideation. Their goal is to become the platform for digital innovations in Africa and beyond. Their unique programs and curriculum are designed to make an idea a product/solution that addresses a societal problem. They also are committed to equipping individuals and organizations with the necessary skills they require to increase their productivity

AFRICA OPEN SCIENCE HARDWARE

AFRICA
OPEN SCIENCE
HARDWARE

Africa Open Science Hardware (Africa OSH)'s goal is to create a conversation and set of actions on OSH, among African actors, and between them and the international community, in order to adopt OSH principles and practices appropriate to the African context. Their flagship programme is the Africa Open Science and Hardware (Africa OSH) Summit. It is a grassroot effort to bring together researchers, technologists, hacker hobbyists, educators, government officials, and start-up innovators from around the world.

GLOBAL INNOVATION GATHERING

gig GLOBAL INNOVATION GATHERING

Global Innovation Gathering (GIG) is an international network and Non Governmental Organization that aims to create meaningful connections between innovators and have a positive impact on the policies and frameworks for grassroot innovation. GIG enables cooperation and international exchange between innovators and social innovation spaces, in order to support their work and share best practices among others.

Editor's Team and Contact Details

EMAILS:

amag@africamakerspace.net

CONTACTS

+233 5965 673 73