Makerere University

College of Engineering, Design, Art and Technology

Annual Report for 2019

To: **The Directorate of Planning and Development**

Submitted by: *Principal's Office*
CEDAT

February 2020

Contents

Introduction

Background information

On 13th December 2010, Makerere University Council approved the merger of the former Faculty of Technology (FOT) and the Margaret Trowell School of Industrial and Fine Arts (MTSIFA) into the College of Engineering, Design, Art and Technology (CEDAT).

The college started operating on 1st February 2011. That was during the period the outgoing Strategic Plan 2008/2009-2018/19 was being operated in the various strategic initiatives in the domains of teaching and learning, research and Knowledge Transfer Partnership. That period saw a number of achievements made, including the Kiira EV innovation, Makapads, the Solar powered irrigation pump, strengthening of a research culture, enhancement of international linkages and collaboration among others. The College structures were formed and operationalized.

During 2016/17, the World Bank funded Africa Centre of Excellence on Materials Product Development and Nano-technology was launched. Similarly, CEDAT was designated an East Africa Centre of Excellence on Renewable Energy and Energy Efficiency. Most of these achievements were made possible by enormous support from the Government of Uganda, the World Bank and the development partners. Constraints still remain, particularly inadequacy of space, poor state of laboratories, high staff turn-over and others.

The College developed a Strategic Plan for 2011/12 – 2018/2019. Soon after the approval of the plan, incentives were introduced by the University which in a way distorted the plans at the unit level. The strategic plan at the College level continued to guide the annual plans and activities though with many challenges.

CEDAT Mandate

The mandate of CEDAT falls within the overall mandate of Makerere University, i.e.

a) the provision of higher education , promotion of research and advancement of learning in Engineering, Design, Art and Technology; and
b) dissemination of knowledge and giving opportunity of acquiring higher education to all persons including persons with disabilities wishing to do so regardless of race, political opinion, colour, creed, or sex;
c) the provision of accessible physical facilities to the users of the Public University

CEDAT Mission Statement

To provide transformative innovative teaching, learning, research and services responsive to dynamic national, regional and global needs in Engineering, Design, Art and Technology.

CEDAT structure and administration in 2019

The college is headed by a Principal who is deputized by a Deputy Principal. Currently, Professor Henry Alinaitwe is the Principal while Dr. Venny Kakazibwe is the Deputy Principal.

Schools, Departments and administrative offices

CEDAT is made up of three (3) Schools and each School is headed by a Dean as follows:

i. School of Engineering- Assoc. Prof. Umaru Bagampadde served until 3st July 2019. Dr. Dorothy Okello was appointed on a four year term effective 1st August 2019.
ii. School of the Built Environment- Assoc. Prof. Moses Musinguzi
iii. Margaret Trowell School of Industrial and Fine Arts- Assoc. Prof. Kizito Maria Kasule

Each of the Schools has 3 departments. Each department is headed by a Head of Department, as follows:

School of Engineering

a) Department of Civil and Environmental Engineering – Dr Robinah Kulabako
b) Department of Electrical and Computer Engineering- Dr. Roseline Akol.
c) Department of Mechanical Engineering- Assoc. Prof. J B Kirabira

School of the Built Environment

a) Department of Architecture and Physical Planning- Dr. Amin Tamale Kiggundu
b) Department of Construction Economics and Management- Assoc. Prof. Anthony Kerali served until 30th June 2019. Dr. Nathan Kibwami was appointed Acting Head of Department for one year with effect from 1st July 2019.
c) Department of Geomatics and Land Management- Assoc. Prof. Anthony Gidudu served until 31st July 2019. Dr. Lydia Mazzi Kayodo was appointed Head of Department for a term of four years with effect from 1st August 2019.

Margaret Trowell School of Industrial and Fine Arts

a) Department of Visual Communication Design & Multimedia- Prof. Phillip Kwesiga
b) Department of Industrial Art and Applied Design- Dr. Angelo Kakande
c) Department of Fine Art- Assoc. Prof. Francis Xavier Ifee was Head of Department until 31st May 2019. Dr. Ritah Edopu was appointed Acting Head of Department with effect from 1st June 2019.

Institute and Centres

CEDAT has one (1) Institute and six (6) Centres headed by Directors. Centres are the base for service to the community and knowledge-transfer partnerships.

- Institute of Heritage Conservation and Restoration- Assoc. Prof. George Kyeyune
- Centre for Research in Energy and Energy Conservation- Ms. Susan Abbo
- Centre for Research in Transportation Technologies- Dr. Hilary Kasedde
- Centre for Technology Development and Design - Dr. Michael Lubwama
- Centre for Geographical Information Systems (GIS) - Dr. Lydia Mazzi Kayondo (Acting)

- The East African Centre of Excellence in Renewable Energy and Energy Efficiency (EACREEE) - Assoc. Prof. Mackay Okure is the Interim Executive Director.
- The Africa Centre of Excellence for Materials, Product Development and Nano Technology (MAPRONANO). - Assoc. Prof. John Baptist Kirabira is the Center Leader.

Some of the other key administrative and support offices

The College has the following:

Registry –	Dr. Alfred Tingo; Ms Esther Kyomugisha, Ms Anne Auma and Mr Moses Kasujja
Bursar –	Mr. Steven Kayima, Jerome Tugumisirize and Ms Joan Ninsiima
Human Resources Office –	Mr. Mujuni Tayari was transferred and was replaced by Ms Racheal Ikiriza effective 16th September 2019.
Procurement Office –	Mr. Tadeo Ibanda
Communications Office -	Ms Betty Kyakuwa
Web Administrator -	Mr. Mark Rujumba
System Administrator -	Mr. Hadadi Kigozi
Senior Administrative Assistant-	Ms Madinah Namakula
Custodians -	Mr. Elias Nuwagaba, Mr. Yorokamu Muhangi and Ms Juliet Oundo
Secretaries in Principal's Office-	Ms Ruth Namusisi, Ms Noeline Nansubuga

Staffing levels and enrolment

Support facilities and administrative changes

Promotions in 2019

No.	Name	Post promoted to	Department	Effective date
1	Lubwama Micheal	Senior Lecturer	Department of Mechanical Engineering	2.1.2019
2	Lydia Mazzi Kayondo	Senior Lecturer	Department of Geomatics and Land Management	2.1.2019
3	Charles Basalirwa	Senior Technician	Department of Mechanical	2.1.2019

Newly Appointed in the University Service

No.	Name	Position	Unit	Effective date
1	Mufumu Wilson	Technician	Principal's Office	1.4.2019
2	Onda Juliet	Custodian	Principal Office	1.4.2019
3	Kasujja Moses	Administrative Assistant	Registry	1.4.2019
4	Angura Stephen	Messenger	Principal Office	1.4.2019

Stop gap contracts

No.	Name	Position	Department
1	Kigozi Hadadi	Systems Administrator	Principal's office
2	Davis Harrison Watsala	Assistant Gallery Administrator	Dean's office, MTSIFA
3	Peter Kiyaga	Driver	Principal's Office

4	David Livingstone Mutamba	Computer Laboratory Technician	Principals Office
5	Julius Ssemukasa	Computer Laboratory technician	Dean's office, MTSIFA
6	Hishamunda Patrick	Security Guard	Principals Office
7	Adowa Robert	Security Guard	Principals Office
8	Titus Bikara	Security Guard	Principals Office
9	Deus Byomuhangi	Security Guard	Principals Office
10	Andrew Otim	Security Guard	Principals Office
11	Hannington Mbazira	Model	Dean's office, MTSIFA
12	Prossy Najjingo	Model	Dean's office, MTSIFA
13	Akudo Beatrice	Model	Dean's office, MTSIFA
14	Oliver Nagayi	Model	Dean's office, MTSIFA
15	Janet Nambogga	Model	Dean's office, MTSIFA
16	Badru Makumbi	Model	Dean's office, MTSIFA
17	Ziyada Kalekwa	Model	Dean's office, MTSIFA
18	Susan Namata	Model	Dean's office, MTSIFA
19	Hadijah Nankya	Model	Dean's office, MTSIFA
20	Ssekibala Andrew	Model	Dean's office, MTSIFA

Confirmations into University Service 2019

.No	Name	Post Considered	Department
1	Nakyanzi Margaret	Cleaner	School of Industrial and Fine art
2	Tumusiime Amanda Evassy	Senior lecturer	Department of Visual Communication
3	Nanyonjo Dorothy	Cleaner	MTSIFA
4	Mary Apio	Sanitary Cleaner	MTSIFA
5	Namala Lillian	Cleaner	MTSIFA
6	Kakiza Charles	Cleaner	MTSIFA
7	Geofrey Mark Kagarura	Assistant Lecturer	Dept. of Electrical and Computer Engineering
8	Kigonya Richard	Studio Assistant	MTSIFA
9	Tusiime Mathias	Cleaner	MTSIFA
10	Nulu Nalubula	Cleaner	MTSIFA
11	Kyalisiima Hope	Sanitary Cleaner	MTSIFA
12	Nankumba Judith	Cleaner	MTSIFA

Transfer of Service (In & Out)

No.	Name	Position	Unit From	Unit To
	Transfers in			
1	Ikiriza Racheal	Human Resource Officer	CHS	CEDAT
2	Komugisha Esther	Assistant Registrar	CEES	CEDAT wef 1.4.2019
3	Ntambi Jimmy	Security Guard	CAES	CEDAT
4	Ninsiima Christine	Accountant	COBAMS	CEDAT
5	Kasujja moses	Administrative Assistant	Academic registrar	CEDAT wef 1.4.2019

6	Nuwagaba Elias	Chief Custodian		CEDAT w.e.f 10.09.2019
	Transfers Out			
	Name	**Position**	**Unit From**	**Unit To**
1	Mujuni Deus	Principal Human Resource Officer	CEDAT	Directorate of Human Resources
2	Hasifa mukyala	Administrative assistant	CEDAT	Academic registrar
3	Nakasi Grace	Administrative Secretary 1	CEDAT	University Bursar
4	Teddy Mbabazi Byaruhanga	Copy typist	CEDAT	Physiology

Staff Dismissals in 2019

No.	Name	Designation	Department	Efectie
1	Ssegwaya Vincent	Cleaner	Principal's office	29.12.2019
2	Namono Catherine	Lecturer	Department of Fine art	21.12.2010
3	Semuwemba James	Assistant lecturer	Dept of Civil and Environmental Engineering	1.10.2012
4	Niwagaba Charles	Associate Professor	Dept of Civil and Environmental Engineering	27.11.2018
5	Mwesigye Aggrey	Assistant Lecturer	Dept of Mechanical Engineering	18.4.2018
6	Okou Richard	Associate Professor.	Dept of Civil and Environmental Engineering	30.7.2017
7	Eiman Elwidaa	Assistant Lecturer	Department of Architecture	7.2.2017

Staff resignations accepted in 2019

No.	**Name**	**Former position**	**Effective date**

1	Mugisha F M	Assistant Lecturer	19th September 2019
2	Kibirige Sylvia	Cleaner	31st July 2018

Retired

No.	Name	Position	Effective Date
1	Nankumba J	Cleaner	23.6.2019
2	Nankabirwa D	Sanitary Cleaner	2.4.2019
3	Namembwa R	Sanitary Cleaner	1.1.2020
4	Ssegwaya V	Grounds man	24.7.2019

Summary of academic staff at CEDAT

Department	Prof.	A/Prof.	S/Lecturer	Lecturer	Assistant Lecturer	Part time staff
Civil and Environmental	0	1	1	12	10	5
Mechanical	0	2	2	6	7	4
Electrical and Computer Engineering	0	1	1	6	18	12
Architecture and Physical Planning	1	1	2 and 1 visiting	7	8	7
Geomatics and Land Management	0	2	2	3	4	3
Construction Economics and Management	0	1	0	5	8	16
Industrial Art and Applied Design	0	1	2	4	6	2
Visual Communication and Multi Media Design	1	0	1	4	4	
Fine Art	0	2	2	2	5	
Totals	**2**	**11**	**13**	**49**	**70**	**49**

Summary of administrative and support staff engaged on permanent terms

Staff category	Number filled	Requirements	Remarks
College Bursar	1	1	Okay
Assistant Accountants	2	3	1 required
College Librarian	1	1	okay
Assistant Librarian	2	6	4 required
College Registrar	1	1	Okay
Assistant Registrars	3	4	1 required
Human Resources Officer	1	1	okay. But shared with CHUSS.
Procurement Officer	1	1	Okay. But shared with CONAS and requires an assistant
Principal Communications Officer	1	1	okay
Web Administrator	1	1	okay
Senior Administrative Assistant	1	1	okay
Senior Administrative Secretary	1	1	okay
Administrative Secretary	3	3	okay
Copy typists	3	9	6 more are urgently required.
Chief Technician	1	7	6 more required
Principal Technician	4	9	5 more are urgently required.
Senior Technician	3	9	6 more required
Technician II	5	9	4 more required
Technician I	3	9	6 more required
Technical Assistant	3	9	6 more required

Lab/studio Assistant	3	9	6 more required
Laboratory Attendant	6	9	6 more required
Driver	1	4	3 more required
Chief Custodian	1	1	okay
Custodian	2	4	2 more required
Security guards	3	12	9 more required
Head Cleaner	1	2	1 more required
Sanitary Cleaners	1	6	5 more required
Cleaners/messengers	12	20	8 more required

Challenges with staffing

- Understaffing in some departments and sections more especially
    - In the Department of Construction Economics and Management; and the Department of Electrical and Computer Engineering.
    - All departments are understaffed on the part of technicians
    - The College does not have Computer Laboratory technicians.
    - The section of cleaners is seriously affected.
    - The college has only three security guards on permanent terms. The rest of the guards are employed as stop gap measures.
- Huge number of part time staff whose payment is not well taken care of in the budget.
- Lack of replacement after retirement or death.
- Uncertainty in the contracts for stop gap staff.

Infrastructure conditions

CEDAT has fifteen blocks of buildings; six at the Former Faculty of Technology; and nine at the Margaret Trowell School of Industrial and Fine Arts. Most of the buildings seriously require rehabilitation. The blocks of buildings at MTSIFA, which are some of the oldest at campus, need rather urgent attention especially on the roofs, services and decoration.

All buildings at CEDAT require decoration and furniture to make them conducive for teaching and learning.

The College had installed overhead projectors but a good number of them were either vancalised or stolen. the College installed CCTV cameras in the main building block but still requires close monitoring.

A few laboratories were provided under the Presidential Initiative but there is need to upgrade and to provide more state of the art laboratories.

Progress in meeting the Annual Work Plans

Financial Report 2019

Budget Performance/Activities done

Total Budget is UGX 3,222,272,198 for the whole financial year. The College was able to utilize 96% at the end of the Financial year.

Improved the environment for teaching and learning by utilizing all our vote for allowances to pay part-time teaching staff/Extra load, though this leaves us with a challenge of NOT considering other staff who would benefit from Allowances code.

We have 49 part-time staff. This takes about 600m. We have also integrated ICTs and gender in teaching by providing relevant materials.

We request the centre to take up this budget for part time teaching.

The following payments/service deliveries have been made to our departments;-

- Teaching materials were supplied amounting to UGX. 323,620,100 per semester.
- We have facilitated Industrial Training Supervision including placement of students amounting to shs 376m
- We have catered for Recess term activities amounting to 218m.
- We have facilitated End of Semester Exams including centralized marking, Invigilation and materials amounted to 250m.
- We have ensured that students/staff with Disabilities facilities are well maintained.
- We have catered for cleaning materials stationery, Repairs and maintenance of vehicles, equipment and furniture.
- We started paying on our External Examiners to reduce on the debt burden. This amounted to shs. 8.2m.
- We have catered for staff welfare, by providing daily break tea to all staff, eats and drinks during meetings and students presentations.
- Supported students' activities including Open Day, Sports Gala, Elections, CEDAT Week for cleaning and others amounting to 30m.
- We have also facilitated third year students going for internship under the Presidential Initiative fund amount to shs. 179m.
- We have enhanced knowledge transfer partnerships.
- We have improved on research and innovation culture.
- There is also retention of College contract staff to cater for the gap in staffing needs and this is supported by the centre.
- We intend to set up a Resource Mobilisation office.

Challenges

- Budget underfunding on most of the activities, in the budget.
- Payment of part-time teaching/Extra load to staff is not enough hence paid in instalments leading to poor motivation of staff. Hence high staff tur over due to poor remuneration and working conditions.
- There were unfunded priorities as per the list below.

Particulars	**Quantity**	**Unit Price (UGX)**	**Amount (UGX)**
Part-time teaching	8000 HRS	50,000	400,000,000
Stop gap staff	25 staff	1,000,000	25,000,000
Lab Materials for Teaching	10 Departs	20,000,000	200,000,000
Lab maintenance	10Depts	10,000,00	100,000,000
Practicals	10Depts	5,000,000	50,000,000
External Examiners (TICKETS ETC)	51 Examiners	2,000,000	102,000,000
Teaching Materials (NOT ENOUGH)	10Dept.	5,000,000	50,000,000
Recess Materials, (NOT ENOUGH)	10Dept.	5,000,000	50,000,000
Office Imprest (NOT ENOUGH)	20 offices	500,000	10,000,000
Furniture(STAFF, STUDENTS)	20 Offices + students	5,000,000	50,000,000
Computers	20 Computers	5,000,000	100,000,000
Projectors	20 Projectors	5,000,000	100,000,000
Photocopiers	5	12,000,000	60,000,000
College Bus	1	800,000,000	800,000,000
Printers	5	4,000,000	20,000,000

Summary of values of procurements at CEDAT during 2019

Month	**Services**	**Supplies**	**Works**	**Total (UGX)**
January	0	188,919,760	0	188,919,760
February	0	107,270,478	0	107,270,478
March	0	54,301,910	4,999,800	59,301,710
April	3,327,600	775,917,715	0	779,245,315
May	29,250,000	201,169,050	0	230,419,050
June	0	19,933,740	0	19,933,740
July	1,416,000	0	0	1,416,000
August	0	61,617,412	0	61,617,412
September	0	0	0	0
October	4,978,000	126,733,212	0	131,711,212
November	0	0	0	0
December	0	9,998,784	0	9,998,784
Totals	**38,971,600**	**1,545,862,060**	**4,999,800**	**1,589,833,460**

Progress in Implementing the 2018/19 Strategic Plan

Teaching and learning

Curriculum Review

All programmes at CEDAT are being reviewed and they have reached various stages that are geared at fresh accreditation by National Council for Higher Education.

Student numbers

The teaching and learning process went on well. As an indicator of the number of students at the college, the number of candidates who sat for examinations for Semester II, 2018/2019 during November - December 2018 examinations was 3202. This is the same number that was expected at the beginning on Calender Year 2019 minus some who were retaking one course. The numbers are summarized as follows:

Program	**No. of Candidates at end of Semester one 2018/2019.**					
Year	I	II	III	IV	V	
UNDERGRADUATE						
School of Engineering						
Civil Eng	32	90	76	86		
Electrical	163	74	67	140		
Computer Eng.	35	75	67	82		
Mechanical Eng.	71	60	57	59		
School of the Built Environment						
Architecture	31	30	51	97	29	
Urban Planning	18	33	30	51		
Geomatics & Land Mgt	32	80	68	49		
Quantity Surveying	41	24	48	50		
Construction Mgt.	36	48	28	55		
Land Economics	36	24	27	42		
Telecommunication Engineering		47	36	42		
Margaret School of Industrial and Fine Arts						

BIFA	177	166	161			
GRADUATE PROGRAMMES						
School of Engineering						
MSc Civil Eng.	29					
MSc Telecommunications	2					
MSc Power Systems	19					
MSc Mech. Eng.	9					
MSc TIID	32					
MSc. Architecture	5					
MSc Renewable Energy	11					
School of the Built Environment						
M Urban Planning and Design	13					
MSc. Geospatial information	22					
PGD UPD	14					
MSc GIST	32	18				
MSc Construction Mg't./ PGD Construction Project Mgt	34	41				
M**argaret School of Industrial and Fine Arts**						
MAFA	7					
Totals	**894**	**810**	**716**	**753**	**29**	**3202**

Summary of Graduates who completed in 2019 and Graduated in January 2020

The College had 794 successfully completing their programmes in 2019. Below are the numbers of candidates that graduated in January 2020.

Programme	Female	Male	TOTAL
Undergraduate			
B. Architecture	7	17	24
BSc. Urban and Regional Planning	25	39	64

BSc Land Surveying and Geomatics	06	27	33
BSc Surveying	0	0	00
BSc Construction Management	11	21	32
BSc Quantity Surveying	25	31	56
BSc Land Economics	10	34	44
BSc Civil Engineering	17	75	92
Bsc Mechanical	04	50	54
BSc Electrical	13	61	74
BSc Computer Engineering	09	19	28
BSc Telecommunications Engineering	15	30	45
B. Industrial and Fine Arts	73	87	160
Graduate			
MSc Construction Management	6	25	31
Master of Architecture	0	1	2
PGD Construction Project Management	0	21	21
Master of Science in Geo-information Science and Technology	4	3	7
MSc Urban Planning and Design	0	1	1
MSc Civil Engineering	0	5	5
MSC Electrical Engineering	0	1	1
MSc (Mechanical Engineering)	0	5	5
Master of Science in Technology innovation and industrial Development	1	4	5
PGD in Urban Planning and Design	1	0	1
MSc Power Systems Engineering	2	4	6
Doctor of philosophy (in Fine Arts)	1	0	1
Doctor of Philosophy (Engineering)	1	2	3
TOTAL	231	563	795

At the 70th graduation ceremony of Makerere University, on Friday 17th January 2020, the Chancellor, Prof. Ezra Suruma conferred degrees and awarded diplomas to 795 graduands from the College of Engineering, Design, Art and Technology (CEDAT).

(L-R) Dr. Emmanuel Menya , Dr. Joan Kekimuli & Dr. Grace Bakyayita after receiving their PhD degrees

The Vice Chancellor in his remarks noted that the College has continued to partner with other Science-based universities across Africa in order to address key challenges affecting society. He also stated that through the Problem Based Learning Approach, CEDAT students participated in different competitions and won international awards aimed at spurring innovation within a circular economy that upholds sustainable use of the world resources. These included the team of five students code named Team Wet Technik, that participated in the Wege Prize and presented their innovation, a system to address Uganda's water shortage and wastewater treatment issues by way of upcycling grey water using a mix of constructed wetlands and another team of five code named VEPOX, who participated in the Climate Launchpad Global Competition held in the Netherlands in November 2019 and presented their innovation that addresses water quality in rural areas.

The Chancellor, Prof. Ezra Suruma on the other hand gave the graduands words of wisdom to ponder upon as they leave the University. He cautioned them about the challenges they will face in the future. "These challenges will require character, courage and sacrifice."… "I hope you will find something to believe in, to stand for, to sacrifice for." He then made an appeal to the graduands and to all Ugandans to take a stand for what is right and to be a candle in the darkness.

By the close of the graduation ceremony, a total of 793 students received degrees and diplomas from various programmes at the College. Of these were 3 PhDs, 62 Masters degrees and 22 Post graduate diplomas. The 3 PhD graduands were Dr. Bakyayita Grace Kizito (PhD

in Environmental Engineering), Dr. Kekimuli Joan (PhD in Art History) and Dr. Menya Emmanuel (PhD in Mechanical Engineering).

Some of the CEDAT graduands at the 70th Graduation Ceremony

CEDAT Running Research projects /Grants 2019

S/N	PROJECT	PRINCIPAL NVESTIGATOR	BUDGET	FUNDER	Start date	End date
	B	C	E	D		
1	VOLKSWAGEN GRANT project 90014	Peter Olupot	Euro 166,000	VOLKSWAGEN Foundation Germany	2019	2021
2	AFRIWATSAN project	Robinah Kulabako	UKPounds 314,040	The Royal Society, UK	2019	2022
3	Higher Education rtnerships for Sub Sahara Africa	Henry Alinaitwe	UKPounds 200,000	Royal Engineering Academy, UK	2019	2021
4	RUFORUM Project	Roselyn Akol	USD 14,000	RUFORUM	2019	2019
5	PBL East Africa	Venny Nakazibwe	Euro 902,500 project	Finnish Government	2017	2020

6	T- GROUP PROJECT	Robinah Kulabako	Euro 299,706	University of New Castle	2017	2021
7	Networking New Opportunities for rtist in East Africa	Lilian Nabulime	Euro 2,670	Arts & Humanities Research Council	2018	2019
8	CAWESDEA project	Jotham Sempewo and Martin Tumutungire	USD 5,946	Tanzania Water Partnerships	2018	2019
9	RCMED project	Anthony Gidudu	USD 42,808	RCMRD- NAIROBI KENYA	2019	2020
10	Africa Center of Excellence on Materials Product Development and Nano Technology	John Baptist Kirabira	USD 6 m	World Bank/GoU	2017	2022
11	Women in Housing in Uganda	Assumpta Nagenda	UGX 100 million	Makerere University Research Fund/RIF	Nov 2019	June 2020
12	An Assessment of Bus Transit Operations in the Greater Kampala, Uganda	Kiggundu Amin Tamale	UGX 81 million	Makerere University Research Fund/RIF	Nov. 2019	June 2020
13	Capacity Building & Greening the Urban Planning and Architecture Curriculum at	Department of Architecture and Physical Planning, CEDAT	US$ 300,000	European Union/Global Green Growth Institute	June 2020	June 2023

	Makerere University					
14	Global Monitoring for Environment and Security and Africa (GMES and Africa)	Anthony Gidudu	Euro 150,000	Regional Centre for Mapping for Resource Development (RCMRD)/African Union	2019	2020
15	Upgrading the University Wide GIS centre	Lydia Mazzi Kayondo	SEK 5,130,946	sida	2015	2020
16	Secure Access to Land and resources (SALaR) Improving Tenure Security of Smallholder Farmers in Select District in south western and west Nile, Uganda	Moses Musinguzi	USD 315,000	UNHabitat	2019	2020
17	Improvement of Land Governance in Uganda	Moses Musinguzi	EURO 523,604	GIZ	2019	2020
18	Presidential Initiative fund towards Science & Technology	Various PIs for components headed by Henry Alinaitwe	UGX 22.5 Billion	Government of Uganda	July 2015	June 2020

Research and Innovations

Presidential Initiative

The College has continued to deliver on the Presidential Initiate project. However, the disbursement of funds from Government has been dwindling.

Center for Technology Design and Development (CTDD) summary for 2019

Introduction

CTDD has a vision "to become a leading center for innovation, technology development and Transfer in Uganda". We are involved in (i) Technology Development; (ii) Community Outreach (iii) Technology Transfer; and (iv) Technology Business Incubation. CTDD's main areas of focus are:

i. Agro-processing machines
ii. New Engineering Materials
iii. ICT applications for real world problems
iv. Public Health innovations

CTDD is located in Room 2002 at the College of Engineering, Design, Art and Technology (CEDAT), Makerere University Kampala. We can be contacted at: tdtc@cedat.mak.ac.ug. In the financial year 2019, particular emphasis was placed on agro-processing solutions, mainly hybrid dryers for fruits and fish and maize shellers.

Hybrid dryers

CTDD developed and innovated in-house its own hybrid dryers for fruit and fish farmers. Fishermen and fruit farmers deal in products that have an extremely short shelf life. Farmers were often left with the option of selling these products at very low prices due to their quick spoilage. CTDD developed hybrid dryers to solve this problem that: (i) ensure proper air in-flow (ii) allow for uniform heat distribution in the chamber using a low-cost 3A heat source; (iii) prevent contaminations of fish and fruits; (iv) dry over 250 kg of produce in one drying session. Some of the hybrid dryers developed by CTDD are shown in Figures 1-3.

CTDD officer measuring temperature on heating source chamber

Hybrid dryer with heating source utilizing biomass

Hybrid fish dryer drying silver fish

Maize shellers

The existing sheller designs on the market today require subsequent separating and cleaning processes done independently after shelling. This affects overall grain quality. Also shellers on the market have very many parts for maintenance, which the farmers are unable to do. Grain damage and cob break up are commonly observed with maize shellers on the market. CTDD have innovated and developed two (2) modified maize shellers. Each of the maize shellers design has been custom tailored to allow the grain release, cob release and husk release at separate outlets. There is no mixing of grain with husks or cob with the improved sheller designs because the two exit the sheller at opposite sides (See Figure 4).

Improved maize sheller made at CTDD

Commercialization

CTDD has been invited and will participate in Harvest Money Expo 2020 at Mandela National Stadium from 14th – 16th February 2020. This expo brings together all stakeholders in Uganda's agricultural sector. The expo also brings farmers and farming organizations from the Netherlands. CTDD has also participated in the IUCEA exposition on the Academia Public Private Partnership forum and exhibition held at Speke Resort Munyonyo on 23rd – 25th October, 2019.

Final year Student Project sponsorships

CTDD sponsored 26 students from CEDAT with funding to carry out their final year students projects in 2019. Students from all departments in CEDAT were beneficiaries.

Centre for Research in Energy and Energy Conservation (CREEC) in 2019

The centre focuses on the thematic areas of rural electrification, energy for productive use, household energy and energy entrepreneurship with energy management as a cross-cutting theme. At the end of 2013, CREEC strategically reorganized its four departments (Bioenergy, Solar Photovoltaic, Pico-hydro and Energy Management) into two: Project Engineering and Testing Services. The latter does independent testing of improved cookstoves and solar PV equipment in accordance with internationally accepted testing methods and supports clients in product development and improvement. The Project Engineering department undertakes project implementation, supervision and consultancies on projects in the thematic areas.

The centre aims at application and adaptation of technologies to the specific Ugandan and local environment with an emphasis on systems with components that can be locally manufactured. For capacity building and knowledge transfer purposes, CREEC endeavors to include students in the centre's projects whenever possible.

Areas of focus

The centre focuses on thematic areas of: rural electrification, energy for productive use, energy efficiency, energy for household use, energy testing services and energy entrepreneurship under the two departments: Project engineering and Testing Services. CREEC also carries out activities in different renewable energy technologies including Bioenergy, Biogas, Briquette making, Gasification, Improved Cookstoves, Solar PV, Pico Hydro and Energy management.

Achievements for the year 2019

- Installation of the CEDAT solar PV system. This has resulted in a Reduction in power bills as well as a reliable backup power supply during blackouts.
- Designing and implementing a phone charging system / Printed Circuit Board. This has resulted in reduced down-times for phone charging services at the solar kiosk. The circuit board design via a Software program has been concluded with the next phase involving physical printing of the board.
- Installation of a solar water pumping station in Nakasengere, Kiboga district. This will result in supply of Reliable and clean water supply for residents in Nakasengere, Kiboga. Demand and supply surveys have been concluded with two potential sites identified. Determination of depth of water table and its sustainability over time through different seasons
- Designing of monitoring chips for solar lanterns used in the energy kiosks.

  Usage tracker for solar lanterns. This is to assist CREEC in monitoring financial activities of the Kiosk operators after renting out of lanterns. The kiosk operators have a habit of under declaring funds.

The Centre for Research in Transportation Technologies [CRTT]

Research innovations

The following research innovations areas were developed at CRTT during the year 2019.

- Development of unmanned aerial vehicle (UAV) for agricultural applications
- Development of unmanned aerial vehicle (UAV) for urban air quality monitoring
- Development of a zero emission e-bike (electric bike) for urban transportation
- Green synthesis of graphene from agro wastes for automobile battery applications

Research Dissemination

The center participated in the first expert group meeting on harnessing emerging technologies for improved transportation in Africa organized by the United Nations Economic Commission for Africa (UNECA) in Addis Ababa from 9-10th December 2019. A paper on harnessing materials science and nanotechnology for transport was presented by the center. During this meeting the team was able to share with other experts in the transportation industry about the idea of green synthesis of graphene from agro wastes for automobile applications which is a promising technology especially with zero emission vehicles (electric vehicles).

Repairs to the Old Technology Building

Repairs to the roof to the Old Technology Building with a contract sum of UGX 518,000,000 and a 6 months Defects Liability Period started in June 2018. Todate, the contractor has not completed and some defects are to be addressed.

East African Centre of Excellence for Renewable Energy and Efficiency (EACREEE)

The East African Centre of Excellence for Renewable Energy and Efficiency (EACREEE) is a regional organization mandated by the Council of Ministers of the East African Community (EAC) to promote renewable energy and energy efficiency. EACREEE is registered as a non-for-profit organization under CEDAT to develop and implement programmes/projects in all the EAC Partner States. EACREEE was established with support from the United Nations Industrial Development Organization (UNIDO) and the Austrian Development Agency (ADA).
During the reporting period, EACREEE implemented a number of activities as described below:

a) EACREEE's Institutional Development
EACREEE has a duly constituted Board of Directors, which comprise representatives of the energy ministry of each of the EAC Partner States, EAC Secretariat and Makerere University. The Board of Directors of EACREEE held its first meeting on 28th February 2019 at CEDAT. At their inaugural meeting, the Board approved internal rules and procedures, which include 5-year Strategic Plan, rules of procedures, financial instruments (financial Regulations & Rules, Finance & Accounting Manual, Procurement Manual) and staff regulation.
With support from UNIDO, EACREEE also engaged a consultancy firm its Business Plan. The Business Plan and its Action Plan for Implementation shall also define a feasible and sustainable scenario of budget and resource requirements. The consultant has already advanced in the work and the draft has been submitted and reviewed.

b) Harmonization of Policies, Strategies and Legislation on Renewable Energy and Energy Efficiency
One of the key mandates of EACREEE is to champion harmonization of policies, strategies and legislation on renewable energy and energy efficiency in the EAC region. In the course of 2019, EACREEE implemented a number of activities in this regards. These include:

i. A Public-Private Sector Dialogue on Renewable Energy Policy was held in Kigali, Rwanda 22-24 May 2019 which came up with several recommendations on RE & EE policy measures that were submitted to the EAC organs for consideration.

ii. EACREEE hosted the Inception Workshop for development Bioenergy Development Strategy and Investment Plan for the Eastern African Region with support from the UN Economic Commission for Africa (UNECA) and New Partnership for Africa's Development (NEPAD) Planning and Coordinating Agency (NPCA) in Kampala, Uganda, 5 – 7 November 2018. Review workshop with EAC Stakeholders was held 18-20 September 2019 in Nairobi. The draft strategy will be further reviewed and submitted to EAC for approval by the Sectoral Council on Energy.

iii. The Common Market for Eastern and Southern Africa (COMESA) through the Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA) has engaged EACREEE and other centers to implement an EU funded project Establishment of a Sustainable Regional Energy Market (ESREM) that includes the development of Renewable Energy and Energy Efficiency Strategy for the Eastern Africa-Southern Africa and Indian Ocean (EA-SA-IO) Region. The strategy was drafted and validated in 2019. EACREEE is working to have this domesticated and approved by the EAC organs for approval.

c) Energy Efficiency Programme

EACREEE is currently implementing the project 'Energy Efficient Lighting and Appliances for Eastern and Southern Africa (EELA)'. EELA is a €5.9m joint project with the SADC Centre for Renewable Energy and Energy Efficiency (SACREEE), sponsored by the Swedish International Development Cooperation Agency (Sida) through UNIDO. The EELA project aims to create market and institutional conditions to enable a transformation of the sector to stimulate increased diffusion of energy efficient lighting products and appliances across all sectors. The implementation phase commenced in June 2019. The first EELA Project Steering Committee (PSC) Meeting was held in Dar es Salam, Tanzania on 7 August 2019. The Technical Committee for Standards held their first meeting in Lusaka Zambia (for SADC region) and Nairobi Kenya (for EAC region) 27th November 2019 and 29th November 2019, respectively. Under the project, draft Minimum Energy Performance Standards (MEPS) for different types of lighting applications have been developed and are currently under technical review.

EACREEE collaborated with the African Union Commission (AUC) in the development of Guidelines for Minimum Energy Performances Standards (MEPS) Energy Labelling and Eco-Design at the Continental Level. The overall objective of the project is to reduce the final energy demand in Africa by introducing MEPS and energy efficiency labeling systems for retail market products in the region, with an initial focus on four electrical appliances - lighting, refrigerators, air conditioners and fans. A consultant engaged by the AUC developed the draft guidelines. A Final Technical Meeting to review the draft was held in Addis Ababa, 6-8 March 2019. The Guidelines for Minimum Energy Performances Standards (MEPS) Energy Labelling were adopted during the Second Ordinary Session of the African Union specialized Technical Committee on Transport, Transcontinental and Interregional Infrastructure, Energy and Tourism (STC-TTIIET) held on 14 – 18 April 2019 in Cairo, Egypt.

EACREEE has worked with the UN Environment's under the United for Efficiency (U4E) Initiative to implement the project 'Rwanda Cooling Initiatives. The project is funded by the Kigali Cooling Efficiency Program (K-CEP), a fund set up to support the implementation of the Kigali Amendment to the Montreal Protocol. Under the project model regulations for refrigerators and air conditioners as well as Rwanda Cooling Strategy has been developed. EACREEE will help to promote widespread adoption with an aim toward enhancing policy harmonization and market oversight and enforcement in East Africa. In addition, as part of the R-COOL project, EACREEE will convene EAC stakeholders for a regional discussion of lessons learned from experience in Rwanda on policies and financial mechanisms, and to learn from others and facilitate adoption of the model regulations and cooling strategy at EAC regional level.

d) Capacity Building Programme

EACREEE has been implementing a number of capacity building initiatives. These include:

(i) Micro-Grid Academy: EACREEE has plaid a key role in establishing a Micro-Grid Academy (MGA) for East Africa in collaboration with Renewable Energy Solutions for Africa (RES4Africa), AVSI Kenya, Institute of Energy Studies & Research of Kenya Power and Lighting Company, Strathmore University and St. Kizito Vocational Training Institute (Nairobi). MGA is a Capacity Building Platform – a series of modular training courses- based on distributed renewable energy systems. The objective is to conduct capacity building activities upon energy access and decentralized renewable energy solutions directed towards East-African young technicians, managers and engineers. Since its launch in January 2018, 8 sessions of MGA training courses have been implemented so far, with a total of over 300 participants, about 100 of them being females. In 2019, 2 sessions of MGA were held – in January and in May with a total of over 90 participants.

(ii) Capacity Building on Small Hydropower: EACREEE in collaboration with the International Centre for Hydropower (ICH) of Norway conducted an East African Regional Training Course on Operation and Maintenance of Small-scale Hydro Power Plants (SHPP), at the University of Dar es Salam, 26-30 November 2018. The course was attended by 29 participants (3 of them females) from Burundi, Kenya, Rwanda, Uganda and Tanzania.

SHPP Training at CREEE

The second session was held 30th September - 4th October 2019 at the Centre for Research in Energy and Energy Conservation, which is located at CEDAT. The course was attended by 27 participants (3 of them female). The course was organized by , EACREEE in in collaboration with Uganda National Renewable Energy and Energy Efficiency Alliance (UNREEEA) and the Centre for Research in Energy and Energy Conservation (CREEC), supported by bfz, the United Nations Industrial Development Organization (UNIDO), the Austrian Development Agency (ADA).

(iii) Capacity Building on Solar PV: EACREEE conducted a survey in partnership with International Solar Alliance (ISA), French National Institute for Solar Energy (INES) and Kenyatta University (KU) on assessing Solar Photovoltaic training needs for the EAC region in Nairobi Kenya March 2019. Following that assessment, a joint regional project

'Accelerating the Deployment of Solar Photovoltaic Systems in the East African Region' is currently being developed – with strong component on capacity building. A pilot EAC Regional Training Course on Standalone Solar PV Systems Design and Installation is being organized in Nairobi 16-26 September 2019. The purpose of the training course is to provide comprehensive and up-to-date, theoretical and practical knowledge on Standalone Solar Power Systems Design and Installation.

e) Energy Access Explorer for East Africa:

EACREEE engaged with the World Resources Institute (WRI), the Uganda's Energy Sector GIS Working Group and other partners to establish an open, unified, regional energy and economic development space in East Africa by setting up an energy geo-visualization observatory platform. The platform aim at boosting knowledge management, networking, advocacy and strengthening capacities on renewable energy and energy efficiency, acting as a catalyst for policy development and energy planning. The online GIS platform called the Energy Access Explorer (https://www.energyaccessexplorer.org/) has been developed and was launched on 4th September 2019 and is now being improved. The Energy Access Explorer will provide decision makers, project developers, investors and other stakeholders with tailored information to establish an initial critical assessment of the energy situation.

Launch of Energy Access Explorer

f) Partnership Building and Networking:

During 2018/2019 EACREEE signed Memorandum of Understanding with (i) the International Solar Alliance (ISA), (ii) the International Centre for Hydropower (ICH) of Norway (iii) the Association of Energy Professionals - Eastern Africa Chapter (AEPEA) and the International Renewable Energy Agency (IRENA),

In addition, EACREEE was represented in a number meetings, conferences and workshops, which provided networking and partnership building opportunities.

The Africa Center of Excellence in Materials, Product Development and Nanotechnology (MAPRONANO ACE)

Background

The Africa Center of Excellence in Materials, Product Development and Nanotechnology (MAPRONANO ACE) is part of the Eastern and Southern Africa Higher Education Centers of Excellence Project (ACE II) supported by World Bank and coordinated by the Inter-University Council for East Africa (IUCEA), which serves as a regional Facilitation Unit. This Center was developed out of the need to strengthen research and training in the multi-disciplinary areas of materials science and engineering, product development, nanotechnology and Nano medicine with the prime purpose of develop human resource capacity and advance high impact research in applied science; engineering and medicine disciplines in the great lakes region. The overall goal is to train highly skilled human resource capacity and foster advanced research capacity in Materials science and Nanotechnology innovations through offering MSc & PhD training in Materials, Product Development & Nanotechnology in Uganda and Africa as a whole. Subsequently, the project envisaged to deliver six outputs to support the realization of the goal and they include i) training of over 12 PhDs and 68 Master's students; train 120 students on short courses; ii) publish over 78 peer reviewed research publications in high impact journal; iii) increase joint submission for research funding; iv) attract over 250,000 USD research funding every year; v) develop new collaboration networks regionally and internationally; and vi) develop state-of-the-art materials, product development and nanotechnology facilities.

Main Achievements and Highlights 2019

Masters and PhD Training:

a) Enrolment

- 21 PhD students have been enrolled of which 6 are female & 99 MSc students enrolled of which 40 are female students in the academic year 2018/19
- 59 students attended short course training in Bioinformatics & Genomics and welding technology of which 17 were female students

b) Completion:

Of the 99 MSc students enrolled in 2018/19, 30 graduated in January 2020, which indicates 30% completion rate, and of these 14 are females representing 14% female students' completion rate in Science, technology, engineering and mathematics (STEM) subjects.

Partnerships/Collaborations: MAPRONANO ACE has fostered regional and international partnerships that contribute to the research portfolio of the institution. More than 9 MoUs with higher institutions of Learning (HEIs) and industries have been signed i.e. University of Illinois at Chicago (UIC, USA), University of Petroleum & Energy Studies (UPES, India), University of Nairobi, University of Rwanda, Jimma University and Mekelle university in Ethiopia. MAPRONANO ACE has promoted joint research and training linkages with industries, 2 MoUs have been signed with industries i.e. Luwero Industries, Kevoton Motions Engineering Ltd and CODEK Engineering and these are aimed at joint research in product development and commercialization.

Staff and Student Exchange: Over 23 staff and PhD students participated in university exchange program activities in MAPRONANO regional partners in University of Cape

Town, Queen Mary University (UK), University of Rwanda, University of Nairobi, and University of Dares Salaam in Tanzania.

Conference Paper Presentations: MAPRONANO ACE and affiliated researchers and students have presented over 8 research papers at peer reviewed international conferences.
Peer reviewed Journal papers: MAPRONANO ACE and affiliated researchers have co-authored 34 Internationally recognized research publications with regional co-authors.
Revenue generation through research funding: MAPRONANO ACE has attracted over USD $ $316,116 of research funding, this is funding attracted by MAPRONANO staff from external funders namely, Volkswagen foundation and internally through Makerere research and innovation (Makerere Research & innovation fund, MakRif) respectively.

Research and Innovation:

a. MAPRONANO ACE in partnership with Kevoton Motions Engineering have developed a single piston diesel engine using locally available materials and artisans

b. MAPRONANO ACE in partnership with CODEK Engineering Ltd have developed a solar powered multi-purpose, weed cutter, sprayer and planter. The team is also developing a Micro/Robotic Tractor for slashing bush, mulching, ploughing all types of soil, planting seeds into the ground

Equipment: There were NO Equipment purchased in 2019
Implementation challenges

- Delays in disbursements after verification of results affects funds flow
- Discrepancies in verification protocols of the results on externally generated revenue
- Slow process of approval of verified results by the line ministries and World Bank.
- World Bank had initiated India collaboration to support some of the ACE students but there has been non- responsiveness from the Department of Science & Technology (DST), India to support the students.
- Accreditation of programs at regional and international level is difficult to achieve yet this indicator has a high disbursement amount, this is partly due to lack of regional accreditation body also the timeframe to have programs accredited is long and not favorable for a results based project.

Strengthening PBL in East African Universities

The project, aimed at strengthening PBL, is funded by the Finnish Government through their Ministry of Foreign Affairs. It involves three universities in East Africa: viz, Makerere University, University of Nairobi and University of Dar es Salaam. The managing university in Finland in Aalto University.

Some selected new Innovations 2019

Kati Ndaba

Team Leader	Mubiru Simeon, Electrical Engineering Year 2, mubzsimeon@gmail.com, 0787799198
Team Members	Ddembe Oscar, Biomedical Engineering Year 2; Nalubega Priscilla, Geology Year 1; Kigonya Hussam, Biomedical Engineering Year 2; Kigenyi Douglas, Biomedical Engineering Year 2; Mwebaze Jordan Oswald, Architecture Year 2; and Nakimuli Mona Lisa.
Faculty Advisor	Dr. Andrew Katumba, andrewkatumba@cedat.mak.ac.u

Problem Statement

Blindness and Deafness are some of the most common forms of physical disability plaguing mankind today. Many people over the years have been born devoid of the ability to see and this disability has greatly inconvenienced their daily lives in a myriad of ways. Those living with auditory impairment face difficulties in communication because most of today's communication (personal peer to peer communication) is done by speech/sound. However, the most pressing problem that impaired people face is difficulty in locomotion and navigation. Unaided locomotion is a tantalizing dream for a visually impaired person, as it is near impossible to achieve. This is attributed to the constant collision with stuff like walls, other people, and a myriad other common obstacles which makes it impossible for a sightless man to move on his own.

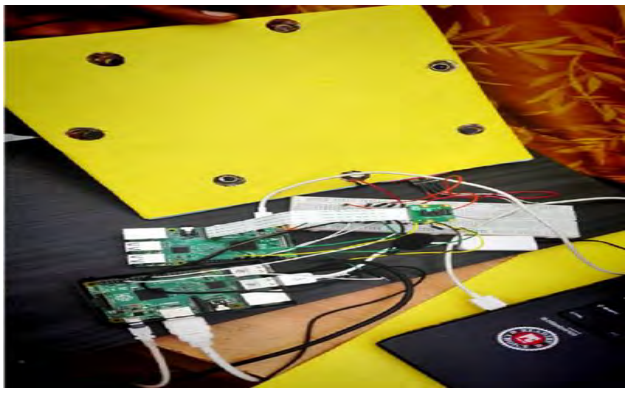
Quite obviously, various different fixes have been invented over time to attempt to alleviate the problem for visually impaired people, and for auditory impaired people alike. However, these fixes are either too expensive or ineffective. It costs about $32000-$35000 to train a guide dog partnership, and an additional approximately $12,800 to maintain the dog. This and several other discrepancies with currently existing solutions warrants a more effective and cost friendly solution that is going to revolutionalise lives worldwide.

Proposed Solution

We have created a device that effects Sensory Substitution for the human being to assist blind people in easy locomotion, and also employs sensory substitution to enable deaf people to hear.

The KatiNdaba, as we have chosen to name our project, is a device that can detect an obstacle in front of the blind person in a full 180^0 and give him feedback via a complex system of vibrations on his skin. Our device does this using a camera coupled with sophisticated machine learning and big data algorithms to interpret visual data and then, the information about the proximity and the direction of the obstacle relative to the user is communicated via

vibrations delivered on the person's skin. The proximity and directional feedback shall be communicated via a pair of vibrating bracelets whose intensity of vibration is inversely proportional to the distance from the detected obstacle. Additionally, the bracelets shall help the wearer know the direction of the detected obstacle, by majoring vibration on the left bracelet for a left oriented obstacle and the right bracelet for a right side oriented obstacle relative to where the wearer is facing.



The KatiNdaba Prototype Version 3

Shipping Container Housing

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Team Members	Nyakaisiki Zoe, Industrial Art Year 2; Isma Jumba, Civil Engineering Year 2; Segirina Gerald, Civil Engineering Year 1; Ssekamatte Daniel, Civil Engineering Year 2; Majjojje Rogers, Architecture Year 4; and Twesigye Chuckgayton, Civil Engineering Year 2
Faculty Advisor	Dr. Moses Matovu, mmatovujr@gmail.com, 0772 507

Problem statement

According to a report from Ministry of Lands, Housing and Urban development, 49% to 64% of the total urban population live in an informal settlement as per New Vision Oct 31, 2012 and the urban population in Uganda living in slums was reported at 53.6% in 2014 according to World Bank; this problem is very critical and needs to be resolved urgently since it has different impacts in a country, some of them are: Poor road and drainage network; Improperly planned housings; and low hygiene, high rate of contamination and easy

transmission of diseases. During our research about informal settlements we took a case study of Kasubi.

As you can see in the figure above; the urban plan is poorly designed and there is a lot of congestion with no vertical movement of housings which leads to excessive land fragmentation. The project basically looks at how to solve this problem in the shortest time possible. On that note it is evident that during the rainy season this area become very swampy since there is no proper drainage of storm water in these types of areas. Therefore, our project is working towards improving the housing and water system in this type of areas.

Proposed Solution

Our project uses shipping Containers as a gateway to abolishing informal settlement areas in Uganda, and Africa as whole in the shortest time possible by using them as housings since a prefabricated mechanism is being used for construction. Our idea of building a *Circular community* aims at improving the welfare of people in conjunction with conserving the environment. The idea of our Circular Community comprises of shipping containers as housings and apart from just using container housings, our design is incorporated with using green roofings. Planting the rooftops of urbanized areas brings many benefits. Here are some of the benefits of green roofings: reduce storm waste runoff; they are energy efficient since they reduce heat flux through the roof which can lead to cooling of roofs; Green roofs; improve air quality and sustain the environment and improve biodiversity.

So we are trying to come up with a mechanism that uses detectors to sense the amount of rain water in this roofings and properly harvest them so that they can be used.

Planned development at Kasubi

SONATA (Smart Soil Analytics for Cost Effective Agriculture)

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Team Members	Isaac Mubiru, Computer Engineering Year
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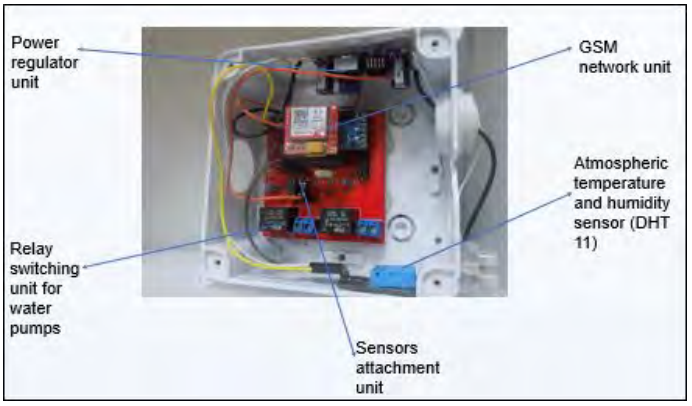
Problem Statement

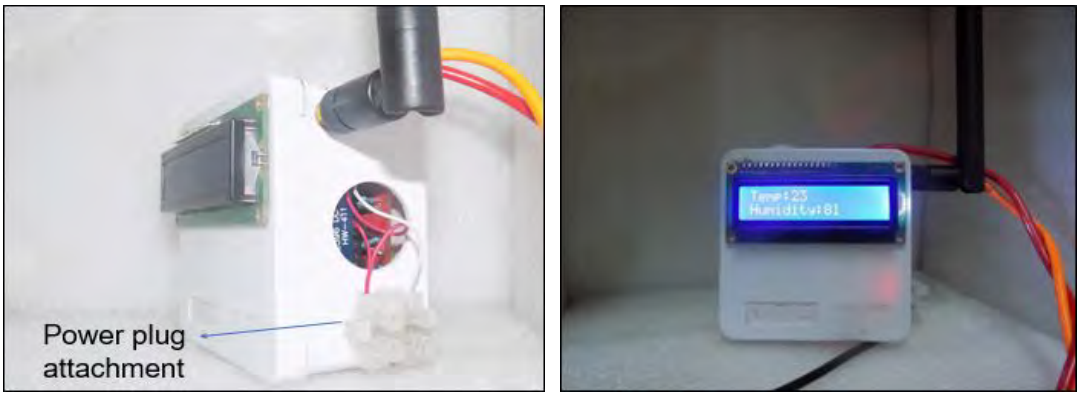
While farming in African environments has a major advantage of abundant sunshine, both in intensity and duration, a sufficient amount of rainfall and rich nutrients in the soil to support various crops, the rate at which such information is used for advance of the agricultural decision making in determining farming practices has been low. This has been due to the shortage of smart tools to carry out real time soil and farm field weather analysis, and limited man power to manually do testing of the soil and weather parameters to establish these

records which is also a time-consuming process. In turn, it has hampered the adaptation of modern farming methods in certain areas like smart irrigation schemes. This inefficiency has led to a slow increase in revenue from the agricultural sector which is the main backbone sector of the Ugandan economy. This led to the development of a technology-based equipment to be able to address this challenge i.e. the SONATA device.

Proposed Solution

The SONATA (Smart Soil Analytics for Cost Effective Agriculture) device addresses the issue of inefficiency of data collection in the agricultural sector in the Ugandan economy to support decision making by the famers. We have implemented a hybrid on and off grid device with several autonomous sensors to capture this data. We have kept track of soil moisture levels, soil nutrient levels, surface temperature and humidity. This information is collected on a centralized cloud server with a machine learning API to train on this data and determine which crops grow best in which environments and also automate farming processes like smart irrigation. With this continuous logging of information, it gives provision for generating an e-soilmap to enable better land usage based on soil statistics captured by the SONATA device. This also ensures proper policy making in terms of land usage hence increasing productivity in the agricultural sector.





SONATA devices

VepoX Filter

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Team Members	Muyita Samuel, Civil Engineering Year 4; Aturinda Marvin Daniel, Mechanical Engineering Year 4; and Atwijukire Reagan, Civil Engineering Year 4
Faculty Advisor	Dr. Herbert Mpagi Kalibbala, hkalibbala@cedat.mak.ac.ug, 0772 496451 Dr. Robinah Kulabako, rkulaba@cedat.mak.ac.ug, 0772 426621

Problem statement

Adequate water, sanitation, and hygiene (WASH) is essential to ensure good health and wellbeing. It is estimated that by 2050, more than half of the world's population will live in water stressed regions. In fact, 85% of the disease burden in Africa could be prevented through improved safe water supply (Rosen, 2002). Many countries including Uganda are still grappling with challenges related to water access. More than 30% of Ugandans lack access to secure water sources (WHO, 2015). The situation is not much better for the remainder of the population, with 60% of people reliant on boiling water to drink and 10% on purchased bottled water. As a result, water-borne illnesses remain the top cause of death among children under the age of five. Approximately 23,000 Ugandans, including 19,700 children under 5, die each year from diarrhea nearly 90% of which is directly attributed to

poor water, sanitation and hygiene (WHO, 2010). According to Sustainable Development Goal 6, there is a target to achieve universal and equitable access to safe and affordable drinking water for all by 2030 (UNDP, 2015).

Proposed solution

The solution is the VepoX filter; a water purification device with an intricate filter media, which combines the anti-microbial capabilities of the moringa oleifera cationic protein seed extract, the filtration and adsorption capabilities of bare sand and bamboo activated carbon respectively to eliminate pathogens, dissolved ions (especially nitrates), and reduce the turbidity of raw water to world health organization's standards for safe drinking water. The use of Moringa has an added advantage over the chemical treatment of water because it is biological and has been reported as edible. The cost of this natural coagulant would be less expensive compared to the conventional coagulant (alum) for water purification since it is available in most rural communities where treated water is a scarce resource.

A study by Lin et al., 2015 reported that the activated carbon with multiple micro/mesopores can be used as functional water purifying material. As activated carbon has a developed pore structure, it can adsorb the trace amounts of organic contaminants in water and significantly reduce dissolved nitrates, the chemical oxygen demand and total organic carbon in water (Omri et al., 2013). It is also effective on the turbidity and chromaticity of the physical standards for drinking water.

Prototype of the VepoX filter

Wet Technik

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Team Members Ssekimpi Dennis, Civil Engineering Year 4; Kwizera Pike, Mechanical Engineering Year 4; Buzabo Mellissa, Industrial and Fine Art Year 3; Mwebesa Nina Shatsi, Quantitative Surveying Year 4; and Musumba Emmanuel, Mechanical Engineering Year 4.

Faculty Advisors Dr. Herbert Mpagi Kalibbala, hkalibbala@cedat.mak.ac.ug, 0772 496451

Dr. Robinah Kulabako,

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Problem statement

Wastewater is mainly in two categories namely; black and greywater. Greywater comprises of a large proportion of wastewater generated in households and institutions. The reuse of greywater serves two fundamental purposes namely reduction in the fresh water requirements and reduction in sewerage generation.

Wet Technik is targeting recycling wastewater from schools and factories as these have knock-on effects on the surrounding communities, as well as the respective schools and factories.

The amount spent on water is a significant proportion of the total monthly expenditure in schools and households that practice backyard agriculture.

Per Capital Water Consumption	Non Potable	Potable
Most of the activities consuming the water were non-potable uses	· Washing · Flushing toilets 27 litres (per person)	· Cooking · Drinking 10 litres (per person)

There is great potential for the use of water, from our solution, to satisfy these purposes hence reducing the effective water bill.

A study by LVEMP on the management of industrial and municipal effluents in the Lake Victoria basin in Uganda indicated that most factories do not have effluent treatment plants and even where they existed most of them were poorly designed and constructed. Therefore, of those that have effluent treatment plants, only a few were achieving effluent discharge standards. This is a major threat to both the bio-diversity of the lake and the continued sustainable use of the lake resources which are a backbone to most of the population living in their vicinity. An environmentally friendly, cheap but circular alternative is needed to effectively filter out the toxic substances before release into the natural streams.

Proposed solution

Wet Technik is a student start-up founded at Makerere University by a multidisciplinary group of students looking at reducing the costs of water usage and environmental pollution by hazardous wastewater through the use of constructed wetlands. We are a group of six students from a multi-disciplinary background passionate about solving the ever-present problem around wastewater handling and bring to light the potential of its recycling. Through using a mixture of modified waste bottle caps and pumice in our constructed wetland, we have proven that it will reduce the area requirements, making this system accessible to the factories, schools and eventually households.

Constructed wetlands have been adopted as a solution to treating and recycling wastewater. A constructed wetland is a shallow basin filled with some sort of filter material (substrate), usually sand or gravel and planted with vegetation tolerant of saturated conditions. They are cheap and easy to maintain solutions as compared to other wastewater treatment systems. The major barrier to their implementation in various settings i.e. households, institutions, communities and factories is the large area requirements.

The innovation looks at the use of pumice and modified waste bottle caps as a filter material to reduce the area requirements while maintaining the quality of water effluent from the system. Wet Technik wants to use beautiful wetland flowers and other plants and creative landscape designs that coupled with the less area requirements can have the system placed within a household’s interactive space. Therefore, there will be more value for maintenance of the system due to its increased visibility, making our solution more sustainable. Our solution will be more applicable in places with limited land like households in urban settings and factories that have limited land but require a wastewater treatment facility. The product we are presenting gives an opportunity for households and institutions to recycle their greywater generated hence optimum water usage and factories a treatment option for their wastewater to meet the discharge standards of the National Environment Management Authority (NEMA).

Art Exhibitions 2019

The year 2019 has been a reasonably an active year for IHCR in spite of the loss of its two staff members who were critical to its day to day running. The Gallery Curator Katrin Peters Klaphake resigned in 2016 while Hasifa Mukyala was absorbed in the University service under the Academic Registrar's Office at the beginning of 2019. Currently, it is Watsala Davis, the Gallery Assistant and myself the Director sustaining the Institution. Secondly, it had also been extremely difficult to operate without an assured budget. As we look for external funding ourselves, we hope that the University will honour its financial commitment as budgeted for 2020.

Different But One 23 art Exhibition
It has been a tradition for IHCR to start the year by hosting Different But One (DBO) exhibition. DBO is a MTSIFA staff exhibition which has been running uninterrupted for the last 23 years. Apart from showcasing recent research by MTSIFA staff DBO is also an opportunity and a site to publish visual and literary material. Rebecca and Prof. Philip Kwesiga are the principal curators of DBO.

The Reflection
The reflection was a solo art exhibition Assoc. Prof. Kizito Kasule Maria. Assoc. Prof. Kizito is the Den of MTSIFA. The Reflection, a one month exhibition, was officially opened by the Principal CEDAT on 14th March and closed on 18th April 2019.

The Journey to VENUS
The Journey to VENUS was another very interesting and powerful art exhibition by Hasan Muhammad Morshed, a Bangladesh water-colour visual artist. His work was uniquely relevant to MTSIFA students because of its freshness and finesse. Assoc. Prof George Kyeyune wrote a revealing critical essay for The Journey to VENUS Catalogue.

The Mzungu Art Exhibition
EIRIK JARL TRONDSEN the author of the exhibition is a Norwegian who combines image and text in his painting. The Mzungu Art Exhibition which opened from 18th July and run till 8th August 2019 was accompanied with a critical academic essay written by Assoc. Pro. George Kyeyune. EIRIK is an affirmative artist with an appeal for every one of us to dream and take the next step of implementing our dreams.

Future Africa Visions In Times (FAVT)
FAVT was travelling Art exhibition featuring a selection of African Artists organised and funded by the Uganda German Cultural Society (UGCS). It was officially launched by the Germany Ambassador to Uganda on 15th August 2019. FAVT: Future Africa Visions In Times was accompanied by a one day symposium on the 16th August 2019 and guided tours of the exhibition in the weeks that followed.

The INVICTUS Artnauts Exhibition
This was an exhibition which was organised by the global Livingstone Institute in Collaboration with MTSIFA. Prof Philip Kwesiga co-ordinated the MTSIFA contribution. The INVICTUS Artnauts was opened September 26th and continued up to October 24th 2019.

The Refugee Law Project under the School of Law collaborated with School of Law and MTSIFA students and constructed a story that highlighted the plight of refugees in Uganda. It opened on November 14TH 2019.

On November 22nd, The Uganda German Cultural Society (UGCS) celebrated 30 years since its inception in the Gallery and around the Gallery space. Issues of cultural exchange and collaboration were highlighted.

Besides art exhibitions, IHCR has continued to support research in visual culture as well hosting primary, secondary and tertiary institutions from near and far. These have been given tailor made short and sometimes informal lectures about art and design in Uganda.

UCASDR Art Exhibition and Auction: From Grass to Grace: The exhibition that raised an interesting debate

Mathias Tusiime, the man who used to fix our white canvases onto frames, assisted female Art students to suspend their murals on high studio walls in the late nineties is now a soaring Ugandan Artist. The popular story about Tusiime receiving no formal educational training in art, or cleaning the studios at the school of Industrial and Fine Arts is slowly but surely becoming insignificant. That story may soon find a good place in books of contemporary African artists and museum archives.

His Auction and Exhibition of about forty or more paintings which opened on the 3rd of May 2019 was a well-attended function. Most of the social media invitations indicated 5:00 p.m as the opening time , but for the love of Tusiimes art and cause, most of the art lovers waited patiently until the arrival of the guest of honor.

During the first half of the waiting period Tusiime looked a little bit nervous but was constantly comforted by his number one client, the former cultural attaché of the Italian Embassy, Pietro Auverono. The diplomat seemed to have a clue as to when the guest of honor would arrive. Finally the guest of honor arrived and Tusiime was now standing between Pietro and The Deputy head of Mission of The Italian Embassy, Lorenza Gambacorta. Tusiime was now balancing in between like the bald headed Jedi master Mace Windoo, confident and not confident but sure of victory due to an invisible force locked within his soul.

After the speeches, Tusiime gained momentum. He was seen confidently making gestures in the air as he explained his works to the two Diplomats before an army of photographers. He was accompanied by the president of the Uganda Visual Artists and Designers Association Eddy Waddimba. Tusiime runs an organization, The Uganda Community Art and Skill Development Recycling (UCASDR) Project which seeks to improve the livelihood of communities through art.

I first wrote about Tusiime in 2013, the year in which he was invited by the University of Florida Center for Arts in medicine. He flew to the US to conduct a workshop about his work in the University of Columbia, USA Mbali Institute, Merryland University and New Orleans University. My main task was to write a piece about Tusiime in the context of why he had won the hearts of Western Art collectors. Could it be that the Western Art Collectors found something unique in "Tusiimerism" Or "Katarikawerism" which is lacking among formally trained Artists? In General I analyzed the work of Tusiime and that of our departed Art Maharaja Jack Katarikawe. Like most scholars about contemporary African Art such as Kasfir, Kyeyune, Ifee, Sanyal, Kakande Kwesiga, Tumusiime, Ssempangi, Nnagenda Kizito, I was converted to their philosophy. This philosophy advocated for practicing and adopting a form of Art that is skewed towards African consciousness in terms so subject matter style and finish.

Deputy Ambassador Lorenza Gambacorta (Centre) together with Mathias (on behalf of UCADSR), present a painting and certificate of appreciation to Mr Averono Pietro for his support to UCADSR

It is surprising that both Tusiime and Katarikawe benefit greatly from this school of thought yet most formally trained African Artists continue to stick to western principles and elements when making paintings, sculptures ceramics, Fashion. Jewelers, etcetera.

However, much as we categorize Artists like Tusiime, Katarikawe and a large number of other excellent African Artists as "self-taught" This notion about "self-taught" is challenged by some Artists. Their preamble is that since such artists like Tusiime and Katarikawe have been made and lived among Faculty members and the general Art students alumni in Makerere and other art institutions, they have received some form of formal education training in Arts either consciously or unconsciously. When I tried to bring up this debate during Katarikawe's vigil, I was advised by the president of Ugandan Artists Association and his Kenyan counterpart, Lady Annabelle (an extremely gifted "self-taught" artist from

Kenya) to give credit to self-taught artists and not to mix them in the same bag with formally trained artists.

Conferences and Workshops hosted at CEDAT in 2019

No.	Workshop/Conference Theme	Date	Participants
1	Science, Technology, Engineering and Mathematics (STEM) Advancement symposium	19th June 2019	Makerere staff, students, industry representatives, private sector.
2	Advanced Geomatics Research Conference 2019	August 2019	International participants in the Geomatics field
3	Workshop on Urban Governance and Youth Participation in Uganda	9th August 2019	Lecturers, Students and other stakeholders

Science, Technology, Engineering and Mathematics (STEM) Advancement symposium

The Ministry of Science, Technology and Innovation in collaboration with the College of Engineering, Design, Art and Technology on 19th June 2019 organized a Science, Technology, Engineering and Mathematics (STEM) Advancement symposium at Makerere University. It aimed at addressing the challenges in the innovation sector by calling upon new ways of scientific training to achieve a scientifically proficient and technologically advanced society in the next twenty years (2040). The theme was **'strengthening national STI system: innovative solutions for scaling up scientific training, research and technology diffusion for national transformation.'**

The Science, Technology, Engineering and Mathematics (STEM) Advancement symposium was organized to strengthen the STI system as a necessary catalyst for accelerated economic growth. To create and share innovative solutions towards strengthening public scientific literacy, scientific and technical training, technology adoption, coordination and collaboration among STI system stakeholders. The stakeholders include experts in scientific and technical education, science, technology and innovation enterprise, incubation, academia, researchers, private sector, policy makers and development partners.

With an emphasis on the impact of the STI to national development processes, the symposium objectives were to promote innovative approaches to scientific and technical training: Scientific research and product development, discuss and provide a call to action for new approaches to reorient Uganda's young population towards STEM and how to improve public scientific curiosity and innovativeness among others. In his welcome remarks, Mr.

David O Obong, The Permanent Secretary, Ministry of Science, Technology and Innovation stressed that CEDAT is an impeccable player in the field of innovation and the symposium is meant to provide a way forward to the different challenges.

Prof. Charles Kwesiga delivering a speech on behalf of Hon. Dr. Elioda Tumwesigye, the Minister for Science, Innovation and Technology at the ST&I Symposium.

Professor Charles Kwesiga who represented the Minister of Science, Technology and Innovation Hon. Dr .Elioda Tumwesigye applauded Makerere university for the conducive environment in which the dialogue was held as a way of bringing more stakeholders on board which is in tandem with the symposium theme. In his speech, he pointed out the significance of women and the youth in promoting science and innovation. "This symposium is meant to address the challenges in the innovation field. We need more ladies who are scientists. Science innovative events are going to be organized to inspire more youth who are scientists." The professor explained. He also pointed out the areas which need support such as National Research and Innovation, indigenous knowledge, space science program, and material science institutes and also support to upgrade and improve science technologies in Uganda.

The challenges that are limiting the development of science and innovation include inadequate funds, inadequate space, gender stereotypes, lack of holistic engagement, high tax rates on scientific equipment, licensing intellectual property which affects; the knowledge and skills gap between industry and academia, intellectual property protection issues and weak implementation of Public Private Partnership (PPP) policy, science education and the complexity of science communication.

In his closing remarks, Mr. Maxwell Otim Onapo, the Director Science Innovation and Research, Ministry of Science, Technology and Innovation stressed the need to show cause beyond academic excellence and getting grants as the reasons for research. "There is need to put things into context, the Ministry is well positioned to put into account all that has been crystallized today," he emphasized.

Group photo with participants at the Symposium

CEDAT hosts Advances in Geomatics Research Conference (AGRC) 2019

The College of Engineering, Design, Art and Technology on August 1st -2nd, 2019 hosted the fifth Advances in Geomatics Research Conference a two- day event that attracted a number of attendants from Africa and the rest of the world.

The conference, held under the theme "**Geomatics for Development**." Was the Fifth Advances in Geomatics Research Conference (AGRC) 2019 building on the previous four conferences held in 2011, 2013, 2015 and 2017.

In his welcome remarks, the College Principal, Prof. Henry Alinaitwe applauded the conference organisers, saying the conference had come at a time when the College is celebrating 50 years of the existence of the Faculty of Technology and the Art gallery, a show of the strides the college has made towards research uptake.

Prof. Alinaitwe congratulated the leaders for nurturing and sustaining the conference for all these years. "The theme ' Geomatics for Development' has come at a time when the country is facing a number of challenges such as land grabbing, encroachment on wetlands and reserves, environmental degradation and landslides," he pointed out, emphasizing that these challenges must be addressed by researchers through influencing policy on these matters. He thanked all the stakeholders; Sponsors, International Society for Photogrammetry and Remote Sensing (ISPRS), Red Cross Society, Global Monitoring for Environment and Security and Africa (GEMS Africa) among others for the support and partnership.

Some of the issues addressed in the conference include Data use and protection, embracing the use of Artificial Intelligence, Remote sensing, spatial data, Fit- For -Purpose approaches among others. Prof. Tony Ayono, the Principal College of Computing and Information Sciences at Makerere University stressed the need for emerging economies to embrace

artificial intelligence. He, however, noted that artificial intelligence has a number of ethical challenges which are common mistakes such as privacy, security, ethical, legal data protection and open versus closed data; data protocols must ensure data protection and privacy.

While discussing the status of the Global Navigation Satellite System (GNSS) technology infrastructure and applications in Africa, Ms. Agnes Kobusingye said that most African states have plans of using GNSS in the implementation of Performance Based Navigation (PBN) in the aviation sector. Africa is a follower in terms of Postlethwaite&Netterville (P&N) technologies. There is need to build capacity as a prerequisite and key success factor.

Ms. Milly Mbuliro from Nile Basin Initiative (NBI) addressed the issue of remote sensing as used in covering the water levels, however, remote sensing is only used on the larger water basins. “What remains as a challenge in human capacity is to process data to generate information for policy makers,” Ms. Mbuliro explained.

There is also need to understand land and how it concerns people by for example defining national land policy, land use planning among others. This can easily be done through the use of ‘Fit-For-Purpose’ approach. The idea behind the Fit- for- Purpose approach is that land administration should be designed to meet the needs of the people and the environment. Dr Emmanuel Nkurunziza the Director General RCRMD explained the influence modernizing land administration system would have for instance through digital cadaster and land registry, simplified land transaction procedures and reduced land transaction costs such as through mobile phone query among others. Dr. Nkurunziza said that this approach has had a profound impact in Rwanda; where they would take 371 days to register land, today it only takes one day.

Professor Moses Musinguzi, The Dean School of the Built Environment CEDAT, showed the role of legal and regulatory framework in the use of spatial data. Some of the roles include providing direction and guidance, dispute over data ownership and mandates, and dispute over coordinating agencies. He, however, noted that there is limited use of spatial data in planning, implementation, monitoring and evaluation of development program.

The fifth Advances in Geomatics Research Conference AGRC 2019 came after a number of pre-conferences for example ISPRS summer school, Humanitarian Mapping among others. These acted as curtain raisers for the conference. The range of subjects covered include Geomatics Information Systems, Remote Sensing Applications, Global Navigation Satellite Systems, Drone technology and Land Management.

Universities are supported through a program called Youth Mappers. The program supports university efforts to offer meaningful global learning experiences, build a socially engaged citizenry and enhance long-term scientific capacity. Currently Youth Mappers is in 42 countries, 154 campus chapters and 5,000 Universities in the whole world.

Participants at the AGRC, 1 = 2 August 2019

Participants at the AGRC, 1 = 2 August 2019

Publications in 2019

Journal Publications:

1. V. A. Yiga, M. Lubwama, and P. W. Olupot. Effect of Alkaline Surface Modification and Carbonization on Biochemical Properties of Rice and Coffee Husks for Use in Briquettes and Fiber-Reinforced Plastics. Journal of Natural Fibres (2019). 1-10. DOI: 10.1080/15440478.2019.1642824
2. E. Menya, P. W. Olupot, H. Storz, M. Lubwama, Y. Kiros & M. J. John. Effect of alkaline pretreatment on the thermal behavior and chemical properties of rice husk varieties in relation to activated carbon production. Journal of Thermal Analysis and Calorimetry (2019). 1-11. DOI: 10.1007/s10973-019-08553-6
3. E. Menya, P. W. Olupot, H. Storz, M. Lubwama, Y. Kiros & M. J. John (2019). Optimization of pyrolysis conditions for char production from rice husks and its characterization as a precursor for production of activated carbon. Biomass Conversion and Biorefinery. 1-16. https://doi.org/10.1007/s13399-019-00399-0
4. V. A. Yiga, S. Pagel, M. Lubwama, S. Epple, P. W. Olupot and C. Bonten (2019), Development of fiber reinforced polypropylene with NaOH pretreated rice and coffee husks as fillers: Mechanical and thermal properties. Journal of Thermoplastic Composite Materials. 1–23. DOI: 10.1177/0892705718823255
5. M. Lubwama, V.A. Yiga, F. Muhairwe, J. Kihedu, physical and combustion properties of agricultural residue bio-char bio-composite briquettes as sustainable domestic energy sources. Renewable Energy 148 (2020) 1002-1016
6. V.A. Yiga, M. Lubwama, Thermogravimetric analysis of agricultural residue carbonized briquettes for domestic and industrial applications. MRS Advances (2020) https://doi.org/10.1557/adv.2019.485
7. V.A. Yiga, M. Lubwama, P.W. Olupot. Effect of alkaline surface modification and carbonization on biochemical properties of rice and coffee husks for use in briquettes and fiber-reinforced plastics. Journal of Natural Fibers (2019) 1-10 https://doi.org/10.1080/15440478.2019.1642824
8. E. Menya, P.W. Olupot, H. Storz, M. Lubwama, Y. Kiros. Effect of alkaline pretreatment on the thermal behavior and chemical properties of rice husk varieties in relation to activated carbon production. Journal of Thermal Analysis and Calorimetry (2019) 1-11 https://doi.org/10.1007/s10973-019-08553-6
9. V.A. Yiga, S. Pagel, M. Lubwama, S. Epple, P.W. Olupot, C. Bonten, Development of fiber-reinforced polypropylene with NaOH pretreated rice and coffee husks as fillers: Mechanical and thermal properties. Journal of Thermoplastic Composite Materials (2019) https://doi.org/10.1177%2F0892705718823255
10. E. Menya, P.W. Olupot, H. Storz, M. Lubwama, Y. Kiros. Optimization of pyrolysis conditions for char production from rice husks and its characterization as a precursoe for production of activated carbon. Biomass conversion and Bio-refinery (2019) 1-16 https://doi.org/10.1007/s13399-019-00399-0
11. J. G. Nayebare, M. M. Owor, R. Kulabako, L. C. Campos, E. Fottrell, R. G. Taylor (2019). WASH conditions in a small town in Uganda: how safe are on-site facilities? Journal of Water, Sanitation and Hygiene for Development.https://doi.org/10.2166/washdev.2019.070
12. George Otaka, Aldo Okullo, Charles B. Niwagaba, Robinah N. Kulabako, Alex Y. Katukiza (2019). Evaluation of the efficiency and benefits of a Pilot Scaled

Decentralized Faecal Sludge Treatment System in Kampala. International Journal of Scientific & Engineering 10(3)March 2019: 621-630, ISSN 2229-5518.
13. Bakyayita, G.K., Norrström, A.C., & Kulabako, R.N. (2019). Assessment of Levels, Speciation, and Toxicity of Trace Metal Contaminants in Selected Shallow Groundwater Sources, Surface Runoff, Wastewater, and Surface Water from Designated Streams in Lake Victoria Basin, Uganda. Journal of Environmental and Public Health Volume 2019 (2): 1-18, https://doi.org/10.1155/2019/6734017
14. Maryam Nastar, Jennifer Isoke, Robinah Kulabako & Giorgia Silvestri (2019):A case for urban liveability from below: exploring the politics of water and land access for greater liveability in Kampala, Uganda, Local Environment, 24(4): 358-373. https://doi.org/10.1080/13549839.2019.1572728.
15. Ouga, A., Alinaitwe, H. and Mwesige, G. (2019) Modelling Block Laying Productivity on Building Sites in Kampala. Journal of Construction in Developing Countries, 24(1), 1- 30
16. Vipul Sharma, Vipul Sharma, M.S. Goyat, Amrita Hooda, Jitendra K. Pandey, Adesh Kumar, Rajeev Gupta, Avani Kumar Upadhyay, Rajiv Prakash, John Baptist Kirabira, P. Mandal, Prashant Kumar Bhargav, 2019, Recent progress in nano-oxides and CNTs based corrosion resistant superhydrophobic coatings: A critical review. Progress in Organic Coatings 140 (2020) 105512, https://doi.org/10.1016/j.porgcoat.2019.105512
17. Edmund Tumusiime, John Baptist Kirabira, and Wilson B. Musinguzi. Long-life performance of biogas systems for productive applications: The role of R&D and policy. Energy Reports 5 (2019) 579–583, Elsevier, https://doi.org/10.1016/j.egyr.2019.05.002
18. Edmund Tumusiime, John Baptist Kirabira, and Wilson B. Musinguzi. Long-life performance of biogas systems for productive applications: The role of R&D and policy. Energy Reports 5 (2019) 579–583, Elsevier, https://doi.org/10.1016/j.egyr.2019.05.002
19. Lwanyaga, J.D., Kasedde, H., Kirabira, J.B., 2019. Effect of Temperature on Mineral Precipitation Sequence of Lake Katwe Brine during Evaporation. Current Journal of Applied Science and Technology 33(6): 1-12, 2019; Article no. CJAST.47890. ISSN: 2457-1024 (Past name: British Journal of Applied Science & Technology)
20. Vipul Sharma, Vipul Sharma, M.S. Goyat, Amrita Hooda, Jitendra K. Pandey, Adesh Kumar, Rajeev Gupta, Avani Kumar Upadhyay, Rajiv Prakash, John Baptist Kirabira, P. Mandal, Prashant Kumar Bhargav, 2019, Recent progress in nano-oxides and CNTs based corrosion resistant superhydrophobic coatings: A critical review. Progress in Organic Coatings 140 (2020) 105512, https://doi.org/10.1016/j.porgcoat.2019.105512
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22. Edmund Tumusiime, John Baptist Kirabira, and Wilson B. Musinguzi. Long-life performance of biogas systems for productive applications: The role of R&D and policy. Energy Reports 5 (2019) 579–583, Elsevier, https://doi.org/10.1016/j.egyr.2019.05.002
23. Lwanyaga, J.D., Kasedde, H., Kirabira, J.B., 2019. Mineral Precipitation Sequence During Evaporation of Lake Katwe Brine. – In: Wolkersdorfer, Ch., Khayrulina, E.;

Polyakova, S.; and Bogush, A. (Editors) Ch.: Extracting of Value Elements of Mine Water and Tailings; Perm, Russia, July 15 – 19, 2019, International Mine Water Association Conference. (Perm Federal Research Center of the Ural Branch of RAS) ISBN 978-5-91252-145-4.

24. Lwanyaga, J.D., Kasedde, H., Kirabira, J.B., 2019. Effect of Temperature on Mineral Precipitation Sequence of Lake Katwe Brine during Evaporation. Current Journal of Applied Science and Technology 33(6): 1-12, 2019; Article no. CJAST.47890. ISSN: 2457-1024 (Past name: British Journal of Applied Science & Technology)
25. Okello, D., and Mugume, E. (2019) Energy Efficient Techniques for Next-Generation Wireless Networks, International Journal of Technoscience and Development (IJTD), Vol. 4, Issue 1, 2019, pp. 41 - 50, ISSN 2001-2837.
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1. Okwel, M., Alinaitwe, H. and Kalumba, D. (2019) Health And Safety Performance in The Uganda Construction Industry in Patrick Manu, Fidelis Emuze, Tarcisio Abreu Saurin, Bonaventura H. W. Hadikusumo (eds) Construction Health and Safety in Developing Countries, pp. 97 – 110. Taylor and Francis, London
2. Nturanabo, F., Masu, L., & Kirabira, J.B. (2019). Novel Applications of Aluminium Metal Matrix Composites. Materials Science, Aluminum Alloys and Composites, DOI:10.5772/intechopen.86225

Peer – Reviewed International Conference Papers

1. Menya, E., Olupot, P. W., Storz, H., Lubwama, M., & Kiros, Y. (2019). Performance of chemically activated carbons from rice husks in Uganda towards humic acid removal from water. Presented at the 1st Great Lakes and Catchment Management Conference on Protecting Water and Land Resources in Africa for Climate Change Adaptation and Improved Livelihoods, 5-7 June, 2019, Water Resources Institute, Entebbe
2. Menya, E., Olupot, P. W., Storz, H., Lubwama, M., & Kiros, Y. (2019). Development of physically activated carbons from rice husks for adsorption of humic acid from water. Presented at the 13th Multi-Disciplinary International Conference on Transformational Leadership, Innovation and Technology Transfer for Sustainable Development in Developing Countries, 19-21 June, 2019, Masinde Muliro University of Science and Technology, Kakamega, Kenya
3. V.A. Yiga., and M. Lubwama. Thermal stability of compression molded rice and coffee husk fiber reinforced polypropylene composites. 14th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics (HEFAT), July 22-24, 2019, Wicklow, Ireland
4. Lwanyaga, Joseph Ddumba; Kasedde, Hillary; Kirabira, John Baptist (2019): Mineral Precipitation Sequence During Evaporation of Lake Katwe Brine. – In: Khayrulina, E.; Wolkersdorfer, Ch.; Polyakova, S.; Bogush, A.: Mine Water – Technological and Ecological Challenges. – p. 515 – 522; Perm, Russia

5. Mwikirize, C., Nosher, J.L, Hacihaliloglu, I. (2019). Single shot needle localization in 2D ultrasound. MICCAI LNCS,11768, 637-645. https://doi.org/10.1007/978-3-030-32254-0_71. (Presented at MICCAI 2019, October 13-17, Shenzhen, China).
6. Mwikirize, C., Nosher, J.L, Hacihaliloglu, I. (2019). Learning needle tip localization from digital subtraction in 2D ultrasound. Int J CARS, 14(6), 1017-1026.https://doi.org/10.1007/s11548-019-01951-z (Presented at IPCAI 2019, June 18-19, Rennes, France)
7. Mwikirize, C., Hacihaliloglu, H., Chen, A. Learning-based Device Localization in 2D/3D Ultrasound-guided Interventions. Keynote at the 2nd Uganda National Biomedical Engineering Conference 2019, November 7-8, Kampala, Uganda.
8. Towards a Resilient Power Sector. Summer School on Modelling Tools for Sustainable Development – OpTIMUS, International center for Theoretical Physics, Trieste, Italy, 10 – 28 June, 2019

Collaboration

MoUs signed in 2019

No.	Name party in MOU	Effective date	Duration
1	University of Notre Dame energy and sustainable Development with Design (ESDD) Lab	18th March 2019	3years
2.	Durban University of Technology Department of Construction Management and quantity surveying, Faculty of Engineering and The Built Environment, South Africa	5th December 2018	5years
3	China University of Petroleum (East China) Purpose: Co-establishment of the institute of Geoscience and Petroleum at Makerere University	7th January 2019	5 years
4	Central University of Technology	26th November 2019	5years

Student support services (Library and teaching aids)

CEDAT Library Report for 2019

Responsible Person: Mukama Proscovia as the College Librarian

Background and Mission

There are two libraries at CEDAT, the one at the main college building and that at the Margaret school of Industrial and Fine Arts. The mission is to meet the study, teaching, research and outreach information needs for sustainable development for CEDAT as a college.

Staffing Levels/Enrollment

There were four members of staff. One College Librarian and three Library Assistants: Madia, Begire; Mundua, Janet and Kyokyo, Edith.

Progress in meeting the annual work plan for the CEDAT library for 2019.

The work plan set for CEDAT library for 2019 was met. We were able to carry out our annual stock taking exercise in June and July 2019. This helped us to determine the total number and titles of books we had in stock for year 2019. The exercise also helped us to identify how many books needed repair and binding. We established how many books were borrowed for the year 2019. We were also able to identify how many staff and students had defaulted in returning the *books* that is those who went beyond the due date they were given to return the books. (See attached copies)

We were able to compile a list of new books received. These books were processed and entered in the Virtua Database library system for Makerere University library. The list of new books was displayed on the CEDAT Library notice board.

We conducted training were students obtained knowledge on how to use the library and retrieve relevant information. Students were also trained in how to use e-resources in the library. The venue was in CEDAT library on 7th August and 20th August 2019 respectively.

Book orders were made for the college library with the help of the lecturers from the department of Civil Engineering , Architecture and physical planning and Fine Art. The work plan budget for 2020 was prepared and given to the management, CEDAT.

Library clearance was given to the final year students who had not defaulted with the college library and had submitted their dissertations/theses in MAKIR – the Institutional repository for Makerere University. CEDAT library staff have contributed towards the growth of the institutional repository, MAKIR. Student have been given submission rights to submit their dissertations and theses online.

Progress in implementing the 2018/2019 Strategic Plan for 2019.

Objective 1: To increase and sustain library information resources by the end of 2019

The library received 1674 new books. These include 2 PhD thesis, 67 masters dissertations, 102 postgraduate diploma dissertations, 977 undergraduate project reports and 526 text books. Most of the books received were a result of a transfer from Prof. Kerali's office to the CEDAT library. The library stock consists of : Reserve section 1357 books, book titles, 815. Open shelves 7889 books, book titles 3778. 60 books were identified which need repair and binding but there was shortage of funds to accomplish the job.

806 undergraduate projects have been identified for weeding. These are project reports of years 2000 and below. This is being done to create space for current undergraduate project reports as there is a shortage of space in the CEDAT library. Identified for weeding also are 46 torn books which are beyond repair. We need approval from the Principal CEDAT and the Procurement Office, Makerere University, to carry out this exercise.

CEDAT library was given 1.9 Million Uganda shilling by the college to purchase text books which are on demand. This was done, 9 titles of books one copy each were purchased using Mallory publishers. These were worth 1,875,000 Uganda shilling. A balance of 25,000 remained and was used for airtime expenses to liase with the publishers. A total of 25 titles were ordered under the book bank system.

Objective 2: To ensure optimal utilization of library resources by the end of 2019 The new books received in the CEDAT were processed and most of them were entered into the virtua library database system of the main library. About 100 books were entered in the virtua database and 150 books were bar coded. This is done to help improve on access to the information materials.

61 new students were trained on how to use the library and obtain necessary information. 64 students were trained in using e-resources.

13 Library interns were supervised and trained in handling, processing and managing information

A total of 334 students from CEDAT have been given submission rights to submit their dissertations/theses from CEDAT library.

A total of 404 final year students were offered library clearance.

Please find attached copies of work plan, annual report for 2019 and new books received for 2019

Challenges Faced in managing the college library:

- Shortage of staff: Originally, the staff were 7 who were managing the two libraries in CEDAT. But now there only 4 full time staff. The few staff available are quite overworked.
- As the information materials increase and the library users increase the library space is getting smaller. There is need for expansion of the library with time.
- There are hardly any computers available for use by students and the staff of the library.
- The 5 computers for library users all broke down. Non is working. Students can't access the online library databases and catalogue anymore. The desktop given by the IT department in the main library is also non functional.
- The 4 computers for staff members have very slow internet connectivity and very frequently they breakdown. It makes virtua library system not to be readily available for use. Therefore processes like data entry into the virtual library database, online circulation of books and clearance of students are carried out with difficulty or are carried out at a much slower rate

- The chairs for the students and the staff of CEDAT library are in very bad shape.

Recommendations

1. There is a need to increase the library staff in CEDAT.

2. The library is growing and there is need for a bigger place.

3. The library needs to be given more computers both the students and the staff of CEDAT library.

4. Both the students and staff of CEDAT library need better chairs.

ICT Annual Report 2019

Activity	Status	Activity output	Activity Outcome	Comments
Procurement of 2 (two) desktop Computers I (one) office printer.	Delivered and Installed now Operational in the Offices of the Principal and Col. Registrar	Installed new Computers to replace absolute machine in the offices	Efficiency in productivity from the offices	
Installation of 20 tower stations and 10 UPS from the Head of GIS to Comp-Lab-3034 (New building)	Equipment installed and now operational in Lab-3034, Newbuilding.	Replacing long serving Computer in the Lab with new Computers	Supports students access to internet and hands-on lecture classes	20 Old computers taken out of Lab-3034 and were re-used in the other 2 Computer Labs in Old building.
Procurement of peripheral devices including; 1. 30 Mouses 2. 30 Keyboards 3. 15 power extensions 4. 16 VGA Cables	Delivered	Replacing absolute one and emergence breakdowns	• Reduces machine downtime • Preventive Maintenance and Repairs.	Breakdowns of VGA cables used to support projections in Lecture theatres is common. The technology also is phasing out, we plan to switch to HDMI connectivity.
Procurement of Power backup; 10 UPS 100 UPS Batteries	Delivered in store	To avoid electricity power intermittences during production hours	Protects the machines and increases machine lifetime.	College users can apply for the power backups units.

Fiber Cuts and repairs; 1. To the CREEC Office 2. CEDAT North-wing(Old and New building Connection)	Restored	Restored internet that was needed during the end of Semester two to support financial and academic online clearances	General Internet resource access restored in one day.	We should maintain vigilance at eliminating rodents, they cause the most fiber cuts and expenses.
Procurement of 1. 40 Ncomputing L300 2. 40 USB Keyboards 3. 40 USB Mouses	Delivered and installation on progress	To replaced 40 l250 Ncomputing units in Comp Lab-3034	To Maintain student access to internet resources or Teaching and learning	Because of the budget constraints we're able to procure 40 l300 units to work on the old monitors in the Comp Lab.
Installation of 20 unified WIFI booster of MAK-AIR SSID	Completed	Increase WIFI Coverage area around the College	Mobile devices internet access to stakeholders	Finalising setups on a few of the devices is followed. We also wish to thank DICTS to have considered the College among the few who were considered on this, I think that was because of our good collaboration with the unit.
Routine maintenance of the college information systems including; AIMS, MUELE, WEBMAIL.	Ongoing	Staff and students' queries are solved with in the College	Enhances teaching and learning in the University.	
IT Technical support to staff and students	ongoing	Reducing machine downtime	Improves efficiency in the College productivity	

Challenges

1. No funds to service and repair ICT equipment including Air-conditioners and lecture room projections
2. Uncoordinated requisitions of ICT devices in the College which makes it difficult to track and update the assert registry.
3. CCTV Camera installation to Old-building and MTSIFA halted because of lack of funds.

4. Human resource issues including understaffed and contract irregulates.
5. Lack of latest versions of software for learners(Auto-cad, Adobe Creative suit, arch-GIS, Windows and ms-word suit)

Selected Events at CEDAT in 2019

CEDAT celebrates 50 years of the existence of Faculty of Technology and Art Gallery

The College of Engineering, Design, Art and Technology organised a stakeholders' and fundraising Dinner on Friday 26th July 2019 at Hotel Africana in Kampala. The dinner acted as a curtain raiser for the celebration of 50 years of the existence of the former Faculty of Technology and Art Gallery. The Minister of State for Karamoja Affairs Honourable Moses Kizige graced the occasion by representing the Right Honourable Prime Minister Ruhakana Rugunda and launched the CEDAT@ 50 celebrations.

The CEDAT dinner was witnessed by a number of personalities from all walks of life but mainly engineering and industrial sector. Some of the guests included corporate companies, government ministries, CEDAT alumni, students, teaching and non-teaching staff, sponsors and partners. The notable sponsors and partners included; the Royal Academy of Engineering, Uganda Communications Commission, National Water and sewerage corporation, Kampala Water, Uganda Electricity Generation Company Limited, Petroleum Authority of Uganda, KIRA Motors, Uganda Road Fund, Electricity Regulatory Authority and Umeme Limited among others.

Guests at the dinner

In his welcome remarks, the College Principal Prof. Henry Alinaitwe appreciated all the stakeholders and partners for honouring the event with their presence. He explained the main reasons and the objectives of the event, which include; creating awareness about CEDAT and its immense contribution to national development, to mobilise alumni to form CEDAT Alumni Association (CEDATAA) and to select an interim executive, to formally launch activities for and towards a twin celebration of Technology@50 years and Makerere Art Gallery @ 50 years, and to mobilise resources from the stakeholders for the advancement of science, technology innovation and creativity(STIC) at CEDAT.

“The college is happy to be celebrating 50 years since the establishment of the Faculty of Technology and Art Gallery. This is our golden jubilee,” the Principal said. He called for the stakeholders’ support because the College is growing and requires more support in terms of space, laboratories, research and strong collaboration with industry especially the private sector.

Dr Umaru Kakumba, the Deputy Vice Chancellor for Academic Affairs represented the Vice Chancellor Professor Barnabas Nawangwe. Dr. Kakumba acknowledged CEDAT’s immense contribution to the visibility of and reputation of Makerere University and the country as a whole. He thanked the government of Uganda for providing an environment that is conducive for teaching and learning, research and knowledge transfer partnerships.

Alumni and staff of the College that had been nominated to serve on the CEDAT Alumni committee pose for a photo

“The university is very proud of CEDAT and its various units. CEDAT is greatly contributing to research leading to industrialisation and provision of infrastructure, the built environment and creativity,” the Deputy Vice Chancellor stressed.

While launching the activities of Technology and Art Gallery @50 years, the State Minister for Karamoja Affairs Honourable Moses Kizige said CEDAT is a pillar in the implementation of the government programmes; National Development Plan II and the Vision 2040 Require a lot of input from the programmes that the college is mandated to deliver. “CEDAT works with the government and the industry in a triple helix model,” Honourable Kizige emphasised. He further saluted the College for the innovations such as the KIIRA Ev project which has culminated into the Kiira Motors Corporation. The Kiira Motors Corporation and plant facility will start rolling out cars by 2022. “Such home-grown innovations will steer Uganda to a middle-income country in the shortest time possible.

The guests at the dinner showed their sincere love and support to the college by raising funds that shall be used for renovation and rehabilitation of the old building and support towards research; UGX60M and UGX 370M was collected in cash and pledges respectively. Some of the stakeholders who committed funds towards research, translation and dissemination. These include; Uganda Communications Commission towards hosting a conference on telecommunications, National Water and Sewerage Corporation towards research in the water and waste water related areas, Uganda Electricity Generation Company Ltd towards research in the energy related areas and Kiira Motors Corporation committed funds towards research on vehicle and transportation.

CEDAT Principal receives a cheque of UGX121 million from UCC for a research conference

At the climax of the dinners, an interim executive committee for the CEDAT Alumni Association (CEDATAA) was formed. The association is to be headed by Eng. Dr Badru Kiggundu, the former Chairman of the Uganda Electoral Commission. Other events of the celebration of Technology @50 years and Makerere Art gallery @ 50 years will be organised through the year 2019/2020.

Dr Angelo Kakande admitted as Fulbright Scholar

Dr. Angelo Kakande, the Chair of the Department of Industrial Art and Applied Design was admitted to Illinois State University as a Fulbright Scholar. Illinois State, through the Fulbright Scholar-in-Residence Program, put out a call for an African scholar to teach in the School of Art. Dr. Kakande answered that call and was appointed visiting lecturer from Uganda.

Dr. Kakande's work interrogates how art serves to defend individual and collective rights in the face of political oppressions. His current research revolves around art, human rights, and development in Uganda, investigating the ways in which artistic forms like buildings reflect political landscapes.

“I expressed exactly what I wanted to come teach and why, and the search committee and I produced the faculty to teach the course I’m teaching,” Kakande said. “My visit to the University helped to create a continuation of a curriculum that speaks to the African diaspora. It was a wonderful and productive experience.”

Dr Kakande at Illinois State University

UCASDR holds Community Skills Development Workshop in Kalerwe

Uganda community Art skills Development and Recycling (UCASDR) was joined by a team of Makerere University – CEDAT (Home of Innovations) during their Community Skills Development Workshop in Kalerwe, a suburb in Kampala. The team from Makerere University, led by Prof. Philip Kwesiga, the Chair of the Department of Visual Communication, Design and Multimedia included Mr. Kanuge John Bosco, Mr. Nsereko Raymond and Mr. Ssewanyana Robert (lecturer and PhD Student). The LC1 Chairman of Kalerwe graced the workshop. The Kalerwe community received training in candle making, metal fabrication, shoe making, sand metal casting, leather works, soap making, tailoring and curving.

UCADSR is an organization founded by Mr. Mathias Tusiime to reach out to communities and equip them with technical skills that can enable the unemployed youths to earn an income for themselves. Mathias is a self – taught artist who paints with oil and acrylics on has come up with many innovations like his own hand- made paper.

Public Lecture by Prof. Sridhar Bhaskar

On Tuesday, 23rd April 2019 the Department of Geomatics and Land Management hosted Prof. Sridhar Bhaskar from Texas Southern University in the USA for a public lecture. Prof. Bhaskar’s lecture was on Geospatial Analysis for Environmental Health and Management. His presentation started at 2:30pm – 4:00pm and was held at the CEDAT Conference Hall.

At the end of his presentation, Prof. Bhaskar shared with his audience more information about Texas Southern University, including graduate study opportunities and how best to utilize these opportunities to further one's career in research.

Prof. Bhaskar's research interests include the application of remote sensing and geospatial techniques for environmental planning and management, landscape ecology, human and environmental health monitoring and economic development. He has developed several satellite models to monitor the soil and water quality, contaminant fate, environmental disasters, invasive plant species and evapotranspiration. He has also served as a principal investigator on several research grants funded through NSF, NASA, DOE and USDA.

Prof. Sridhar Bhaskar from Texas Southern University in the USA giving a public lecture

Irish Ambassador Launches Innovation Labs at netLabs!UG

The Irish Ambassador to Uganda, His Excellency William Carlos, launched four new Innovation laboratories belonging to netLabs!UG, a research center under the Department of Electrical and Computer Engineering, College of Engineering, Design, Art and Technology (CEDAT), Makerere University. The new laboratories are:

1. EPA Ireland Core Networking Lab
2. Marconi Society Machine Learning Lab
3. Uganda MikroTik Academy
4. Wireless and Advanced Networking Lab

At the event held on April 10 2019, H.E. Carlos encouraged research staff and students to seize the opportunity to carry out useful research and solve local problems. "Make use of any opportunity that comes. An opportunity just gives a clear understanding of what you want," he said. He was happy to note that the labs would spur innovative research and convert ideas into real solutions to local problems. He was happy to note the cordial relationship between Makerere University, particularly netLabs!UG, and Irish institutions. Through Eng. Diarmuid Ó Briain who is a netLabs!UG senior researcher and also a faculty member within the

Department of Electrical and Computer Engineering, the Department has established a strong partnership with the Irish Embassy as well as Irish companies and the Institute of Technology Carlow.

Most of the lab equipment at the research center was generously donated by The Marconi Society, Computer Facilities Technical Services and the Irish Embassy. NetLabs!UG now has the capacity to carry out research in the areas of Artificial Intelligence (AI) and Deep Learning, Big Data, Internet of Things, Advanced Routing and Switching, Wireless Communications and Networking, Software Defined Networks (SDN) and Software Development among others capabilities. The Research Center also prides itself in having the capacity and expertise to carry out practical network installations and deployments. Eng. Dr Dorothy Okello, the Principal Investigator of netLabs!UG, thanked the Ambassador for making time to officiate at the launch of these important laboratories. She called on students, research staff and faculty members to fully utilize the labs. She congratulated five researchers of netLabs!UG who have received MikroTik training and are now certified trainers. She also thanked the Marconi Society and other donors for their donations.

Speaking at the event, the Deputy Principal of CEDAT, Dr Venny Nakazibwe, thanked the Irish Embassy and the Irish partners for the donation of equipment and for their continued support and partnerships with netLabs!UG and Makerere University at large. She said the laboratories would create a wide base of knowledge for students and staff at the research center and the College at large. She thanked Eng. Ó Briain and other staff for their energy and commitment to finding support and resources for the center and for nurturing students to fully benefit from these resources.

Figure 2: The Ambassador is joined by the Deputy Principal of CEDAT, Dr Venny Nakazibwe and Dr Dorothy Okello and other members of the netLabsUG team to cut cake.

The labs are already being used to design and test innovations that promise to have a profound impact on our local industries. For example, two student researchers, Ms. Olivia Nakayima and Ms. Gorret Namulondo are carrying out research using Artificial Intelligence (AI) to identify common diseases in passion fruits way earlier than humans can. They have created an algorithm that classifies and detects diseases based on the image inputs of leaves and fruits. Currently, their innovation can identify woodiness, leaf blight and brown spot and test case studies have been performed at various passion fruit farms in Masaka, Luwero and Hoima districts. This innovation will help farmers to improve yields and enhance their household incomes. This is just one of many other projects that are currently being carried out at the Center.

PPP students complete Tour of South African projects

A team of 17 people have today November 17th completed a week-long tour of various PPP projects in South Africa. The team interacted and learnt from a host of experts in the field of PPPs. The team, comprising Uganda National Roads Authority staff, National Information Technology Authority, Kabale Hospital, Makerere University as well private business persons visited The South Africa National Road Agency, which is implementing a PPP toll road project in the Gauteng Province.

The road project is being implemented by TRAC which has got a 30-year concession. The Ugandan delegation was received by Mr Koos Smit the former CEO of SANRAL and Mr Alex **van** Niekerk, the Planning Toll & Transportation Manager of SANRAL. The delegation was informed of the N3 Toll road that runs from Pretoria in South Africa to neighboring Mozambique capital Maputo. The 564km road has six toll gates.

The concession agreement with TRAC in this case included design of the road, construction, rehabilitation, financing, operation and maintenance, transfer. The concession started in 1998. The Ugandan delegation toured the Diamond Hill Toll plaza to get a clear understanding of how a toll gate is managed. The team learn that the pricing is categorized by the type of vehicle on is driving. Passengers pay by credit card, cash and e-tickets.

The team also visited the Donkerhoek Traffic Control Centre which runs a weigh bridge and does vehicle checks to ensure cars are in good mechanical condition to use the road. The team also visited the Gautrain Office in Midland, to learn about the Gautrain PPP project. The story of Gautrain, as told by Mr William Dacks is not about a train, but rather the "How far we've come, the faces we meet, the places we see, and our everyday life journey".

"It's the story of a new face and pace of Gauteng's public transport." The project was funded mainly by the government, which provided 88% of the funding. The company runs a train, bus services and parking service which are all integrated. The project can be said to have achieved its objectives which included; stimulation of economic growth, development, investment and job creation. It has also promoted efficient public transport.

South Africa has also got PPP projects in Prisons, where a private investor sets up a prison and the government pays a certain fee for every prisoner sent to that jail. Other projects are in office accommodation such as the Department of Environment Affairs (DEA) which got a private investor to build their Green-Office Block. The government in tern pays the private investor a monthly fee for the period of the concession. The concessionaire is mandated with designing, construction and maintenance of the building. The breathtaking view of DEA office blocks is something to reckon with.

PPP participants in South Africa

Makerere graduates first PPP cohort

Makerere University started a six-unit short course in public-private partnerships. The first cohort of the intensive year-long certificate course was passed out on December 13 at a ceremony at the college of Engineering, Design, Art and Technology.

Some 27 people from government entities and the private sector graduated received in total six certificates covering Principles and Regulatory Framework, Inception Procedures, Feasibility Studies, Project Finance, Procurement and Agreement. In her speech, the guest of honour Education and Sports minister Janet Museveni, represented by state minister for

Works Gen Edward Katumba Wamala, praised public-private partnerships as better avenues for guaranteeing efficiency, and no wonder they are increasingly being preferred for financing infrastructure and public service by governments world over. She said it has been estimated that Uganda loses $300 million (about Shs 1 trillion) annually due to inefficiencies.

Ms Museveni challenged the graduands to ensure projects have broad stakeholder support, including political commitment and stability; be ready to up their marketing skills and publicise the projects to all stakeholders; check whether the legal and regulatory institutions and the fiscal and financial frameworks are supportive; and emphasise timelines, business sense discipline and achievement of value for money.

Uganda enacted the Public Private Partnership Act in 2015 but many ministries, departments and authorities are not fully aware of it. Public sector participants came from Unra, UPDF, Naro, Nita-U, National Planning Authority, Soroti University and Kabale hospital. The private sector had lawyers, bankers and other professionals. Dr Kenneth Ssemwogerere, the course coordinator, later told *The Observer* two preliminary certificates – had been presented at an earlier ceremony.