

Welcome Message



It gives me great pleasure, as Project Lead of the KNUST Engineering Education Project (KEEP), to welcome you to the KNUST Engineering Education Project (KEEP) Bulletin. This bulletin, which is a quarterly newsletter publication, will highlight activities of KEEP in the College of Engineering (CoE).

KEEP, Kumasi-Ghana, seeks to deliver high quality postgraduate courses, conduct and disseminate applied research focused on addressing challenges in development related to industrialisation, digital development (ICT),

energy systems, renewable energy, manufacturing, exploration and developments in the oil and gas industry.

KEEP is funded by the Government of Ghana as part of the World Bank's Africa Centers of Excellence for Development Impact (ACE Impact) Project in the College of Engineering, KNUST. KNUST has over half a century, maintained its reputation for quality training and has been at the forefront of preparing manpower to support the advancement of technology and engineering in Ghana and the world.

Our staff takes great pride in providing a safe and secure learning environment to enable our students to grow intellectually, emotionally and socially, while offering a wide array of exciting and challenging academic programmes.

The best way to get to know CoE, KNUST, is to enrol with us to be trained and be geared toward the ever-changing global economy.

Welcome once again, to walk with us, and to this maiden edition of the KEEP Bulletin!

Signed

Prof. Kwabena Nyarko
(Project Lead, KEEP)

INTRODUCTION TO THE MAIDEN EDITION

KEEP Bulletin will offer readers insight on the innovations taking place under KEEP. It updates readers on the thematic areas such as power systems, digital development technologies, renewable energy technologies, distributed computing and digital forensics. The Bulletin will also be used as a mouthpiece to capture and share students' learning experiences, industrial trips, as well as exchange activities between the CoE and the international faculty, that take place under the KEEP.

Subscriptions and relevant submissions to the KEEP Bulletin are welcome. Interested parties are to register their email addresses at the project website (keep.knust.edu.gh).

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Meet Our Team

KEEP Management Team



Prof. Kwabena B. Nyarko
(Project Lead)



Dr. Jerry John Kponyo
(Deputy Project Lead)



Dr. Helen M. K. Essandoh
(Research Programmes Coordinator
(MPhil/PhDs))



Dr. Eunice Akyereko Adjei
(Monitoring & Evaluation Officer)



Dr. Henry Nunoo-Mensah
(MSc Programmes Coordinator)



Dr. Kwaku Amaning Adjei
(Quality Assurance & Innovation
Coordinator)



Dr. David Ato Quansah
(Partnership Coordinator)



Dr. Daniel Opoku
(Marketing/Outreach Officer)

Production Team

Editor-in-chief: Prof. Kwabena B. Nyarko **Managing Editor:** Kwadwo Nyantakyi Marfo

Content Editor: Irene Otuba Nunoo **Production Editor:** Francis K. N. Nunoo



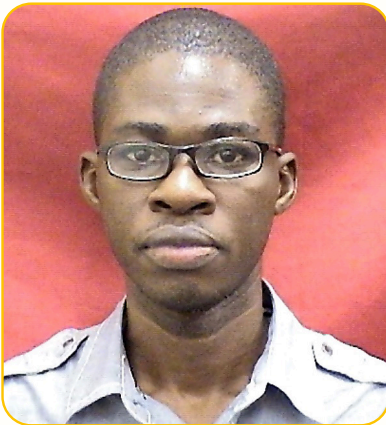
Dr Emmanuel A. Frimpong
(Power Systems Research Theme Lead)



Dr James Dzisi Cadze
(Digital Development Technologies Research Theme Lead)



Dr Francis Kemausuor
(Renewable Energy Technologies Research Theme Lead)



Dr Peter Amoako-Yirenkyi
(Distributed Computing & Digital Forensics Research Theme Lead)



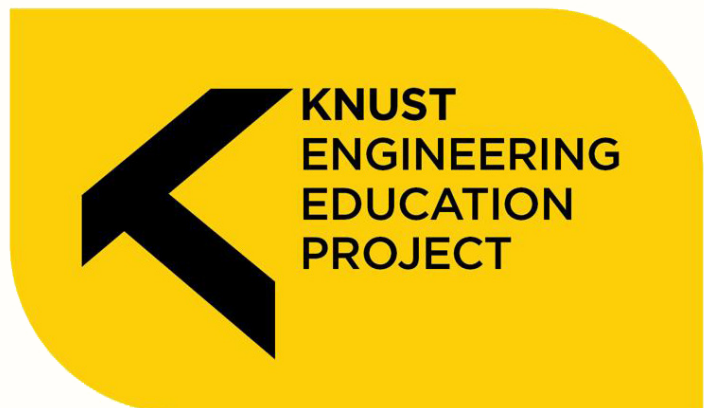
George Asante
(Project Accountant)



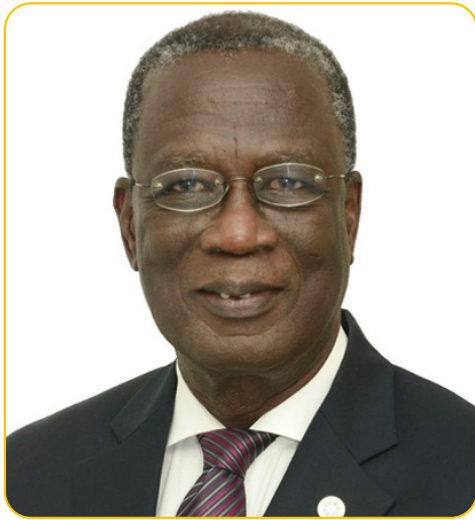
Kwadwo Nyantakyi Marfo
(Project Manager)



Ikpo Valentine Chibueze
(Student Representative)



KEEP Industrial Advisory Board



Ing. Asare Yeboah
(Board Chairman, Associate Consultants Limited)
(Board Chairman)



Mrs. Brenyah Boateng
(Senior Consultant, Associate Consultants Limited)
(Board Secretary)



Dr. Ben K. D. Asante
(CEO, Ghana Gas Limited)
(Member)



Ing. William Amuna
(Technical Controller, Millennium
Development Authority)
(Member)



Mrs. Patricia Obo-Nai
(CEO, Vodafone Ghana)
(Member)



Nana Joe Mensah
(CEO, Cosmos Ghana)
(Member)



Dr. Kwaku Aning
(Board Chairman, Ghana Atomic Energy
Commission)
(Member)



Dr. Victor Atiemo-Obeng
(Retiree, Dow Chemical Company, USA)
(Member)

International Scientific Advisory Board



Prof. Albert Ebo Richardson
(Chairman)



Dr. Joseph Odartey Cruickshank
(Member)



Prof. Johnson Asumadu
(Member)



Prof. Jon Kleppe
(Member)



Prof. Muyiwa Sam Adaramola
(Member)



Dr. Richard Okine
(Member)

MAIDEN INDUSTRIAL ADVISORY BOARD MEETING



Industrial Advisory Board Members in a group photograph with KEEP Management Members

The maiden meeting of the Industrial Advisory Board (IAB) was held on 8 November 2019, at the Associated Consultants Limited, Kokomlemle in Accra.

Prof. Mark Adom-Asamoah, Provost, CoE, gave an exhaustive presentation on the College. He said the College of Engineering comprises of three (3) Faculties, eleven (11) Departments and five (5) Research Centres. CoE, he added, runs eighteen (18) different programmes at the undergraduate level, and thirty (30) at the postgraduate level, with a student population of six thousand, five hundred and three (6503) undergraduates, five hundred and thirty three (533) postgraduates, one hundred and eighty three (183) international students, and one hundred and forty five (145) full time teaching staff.

The Provost also gave insights on the three (3) Africa Centers of Excellence which are the KNUST Engineering Education Project (KEEP), Regional Water and Environmental Sanitation, Kumasi (RWESCK) and the Regional Transport Research and Education Centre, Kumasi (TRECK).

He also addressed the financial challenges, which he attributed to the fact that the amount of the students' fee which is allocated to the CoE is not adequate as compared to the amount which is actually needed to train students. This has created a huge deficit in the financing of CoE in carrying out their mandate of training the best professionals for industry in Ghana and the world as a whole.

He mentioned that despite such challenges, his administration has managed to establish a fund to support some needy students in the College, to help them meet their financial obligations of their training and upkeep in school. To this, members of the IAB were touched by the plight of these students and promised to see how best they could help to alleviate the burden of these students.

The Board members gladly accepted the terms of reference and responsibilities spelt out to them at the meeting. They pledged to work assiduously to ensure the sustainability of the Project, and also to ensure that KNUST would continue to remain the desired destination for engineering in Africa. The Board

would aid in sourcing for funds from stakeholders, strengthening the academia-industry linkage such that the College of Engineering becomes the solution centre for practitioners of the industry when faced with any challenge. They thus adopted the slogan "KEEP Beyond Aid", as a reminder to gear them on.

The Board Members who participated were Ing. Kofi Asare-Yeboah who is Board Chairman of Associated Consultants Limited and also Chairman of the IAB, Mrs. Patricia Obo-Nai (CEO, Vodafone Ghana), Dr. Ben K.D. Asante (CEO, Ghana Gas Company), Dr. Victor Atiemo Obeng (Dow Chemical Company, USA), Ing. William Amuna (Technical Controller, Millennium Development Authority), and Nana Akua Brenya Boateng (Board Secretary). The team from KNUST comprised of Prof. Mark Adom-Asamoah (Provost, College of Engineering), Prof. Kwabena Biritwum Nyarko (Project Lead, KEEP), Dr. Jerry John Kponyo (Deputy Project Lead, KEEP), Mr. Kwadwo Nyantakyi Marfo (Project Manager, KEEP) and Mr. George Asante (Project Accountant, KEEP).

COLLEGE OF ENGINEERING TO MENTOR THE GTTI

The World Bank has selected KNUST as a mentor institution for the Gambian Technical Training Institute (GTTI). This mentorship mandate tasks the College of Engineering (CoE) to provide mentorship in curriculum development, as well as staff development (upgrade of lecturers to obtain Doctorate degrees).

In order to meet the ever-changing standards in the industry, CoE would also assist GTTI with issues of academic governance and infrastructural development to address the current challenges of training in engineering,

Four programmes have been proposed, Civil Engineering, Electrical Engineering, Geomatic Engineering and Mechanical Engineering.

The mentoring process which is slated for five (5) years would transition the Gambian Technical Training Institute into the University of Science, Engineering and Technology (USET).

This was made known by the Provost of the College of Engineering during the maiden industrial board meeting.



KEEP – IMPLEMENTATION PLAN AND ACTIVITIES

KEEP is an Africa Centre of Excellence (ACE) Impact project, funded by the Government of Ghana as part of the World Bank's Africa Centers of Excellence for Development Impact (ACE Impact) Project.

The ACE-Impact project is a World Bank initiative for Regional Higher Education Centers for Excellence in Africa, which aims to improve the quality, quantity and development impact of postgraduate education in selected universities in beneficiary countries, through regional specialisation and collaboration in the fields of Science, Technology, Engineering and Mathematics (STEM).

The ACE-Impact projects currently support fifty-three (53) Centres of Excellence aimed at building regional capacity to deliver high quality postgraduate courses and conduct international calibre applied researches, of which KEEP is one such centre.

Prof. Kwabena Nyarko, the Project Lead, KEEP, in a presentation at the maiden meeting of the Industrial Advisory Board, detailed the implementation plan of KEEP. He pointed out that the Project is marked to last over a period of five (5) years, spanning from 2019 to 2023, with a maximum budget of us \$5.5m. The disbursement of the budget is based on meeting specified Disbursement Linked Indicators (DLIs) which are detailed below:

- i. DLI 1 Readiness (Basic and Full) - us \$ 850,000
- ii. DLI 2 Development Impact- This indicator does not apply to the KEEP Project.
- iii. DLI 3 Quantity of students with focus on gender and regionalisation (us \$1,035,000). The number of postgraduate students to be trained after the five-year period are:
 - a. *PhD – 75 students*

b. *MSc -100 students*

- iv. DLI 4 Quality of Education and research: Accreditation and Infrastructure comprising of postgraduate building with lecture rooms and laboratories - us \$ 1,400,000.
- v. DLI 5 Relevance of Education and Research (Tuition and other student fees, research consultancies, fundraising and competitive grants (us \$ 1,775,000).
- vi. DLI 6 Timeliness and quality of fiduciary management (us \$ 440,000).
- vii. DLI 7 Institutional Impact- This indicator does not apply to the KEEP Project.

Prof. Nyarko further enumerated the expected outcomes of the project which include:

- Improved applied research in engineering and technology programmes;
- Increased research uptake in priority sectors (such as energy and digital development);

- Increased number of highly skilled workforce to drive economic transformation; and
- The College of Engineering establishing itself as the training centre of choice for engineering and technology postgraduate studies in Africa.

He further elaborated on the sustainability approach for KEEP, a regional outreach plan for recruiting students in Africa, its institutional impact, as well as laid down incentive structures and mechanisms.

In highlighting how KEEP is meeting the DLI of the project implementation plan, Dr. Jerry John Kponyo, (Deputy Project Lead, KEEP), threw some light on activities

that have been undertaken so far under KEEP. The basic readiness aspect of DLI had been met through the project implementation plan, designation of core team members, procurement and financial manuals; whilst the full readiness criteria has been addressed through the creation of project website, institution of sexual harassment and scholarship policies, and establishment of Industrial Advisory and International Scientific Boards.

On DL3, Dr. Kponyo gave statistics on the enrolments of students admitted into the PhD and MSc programmes at the CoE. There are 37 PhD students and 81 MSc students, comprising of 10 international students and 108 national students, of which 101

are males and 17 are females. The international students enrolled are nationals of Nigeria, Tanzania and Cameroon.

Dr. Kponyo highlighted some of the works undertaken by the students at the Innovation/Incubation centre at the CoE. The incubation projects being carried out include an egg sorter, solar powered traffic lights, drone for agricultural uses, a piezoelectric generator, a smart oxygen tank and a vibration cassava sieve.

Members of the IAB encouraged the College to keep up the good work and help students commercialise their projects.

Industrial Visit of Dr. Victor Atiemo-Obeng

Dr. Atiemo-Obeng, has paid a courtesy call on the Provost of the College of Engineering, Prof. Mark Adom-Asamoah, and also visited the laboratories at the Departments of Chemical Engineering, Electrical and Electronic Engineering, Petroleum Engineering, and Mechanical Engineering together with Prof. Kwabena Biritwum Nyarko (Project Lead, KEEP) and the respective Heads of Departments, during his two-day visit to KNUST which span from 20-21st November 2019.

Dr. Victor Atiemo-Obeng, a retired Chemical Engineer who worked with the Dow Chemical Company of USA for

34 years and a member of the Industrial Advisory Board for KEEP, was very impressed with the innovations at the College, and has reiterated that innovations taking place at CoE be made available to stakeholders outside of the University community.

He was particularly impressed with an invention he saw at the office of the Head of Department of Electrical and Electronic Engineering, which has a device that senses the presence or exit of an occupant and switches the air conditioner either on or off, as the case may be. The device uses the concept of motion detection so that

when there is no one in the office, it turns off the air conditioner after beeping for about 10 seconds. However, when an occupant enters the room, the device turns on the air conditioner after a delay of about 10 seconds.

He later met with the KEEP management team led by Dr. Jerry John Kponyo (Deputy Project Lead), and some Heads of Departments to discuss very important issues such as the GAP Assessment (a study to identify and remedy gaps in CoE postgraduate education and training in order to meet international standards and good practices), and how to strengthen the academia-industry linkage. He also held discussions with some faculty members on issues centred on engineering education.

Dr. Atiemo-Obeng also attended the launch of the Tullow Oil Scholarship Scheme later in the day, to conclude his industrial visit to KNUST. ✨



Dr. Atiemo-Obeng interacting with the Lab Manager and some students at the Department of Electrical and Electronic Engineering laboratory

INDUSTRIAL VISIT TO THE VESTER OIL MILLS



The Finance & Administration Manager explaining a point to Faculty and Students of the College of Engineering

The College of Engineering, KNUST and the Association of Ghana Industries (AGI) jointly organised an industrial visit to the Vester Oil Mills, located at Abuontem in the Bosomtwe District of the Ashanti Region in Ghana, for academic and research staff of the College.

The aim of the visit was to bring academia closer to industry and in the process, have a better and deeper understanding of industrial operations and their existing challenges. It was also to afford academia the opportunity to discuss concrete ways of (re-)directing some of its intellectual resources towards addressing some of the challenges in the industry and help make them more competitive.

The visit took place on 14th January 2020 and comprised of staff from various Departments of the College of Engineering, notably, Departments of Mechanical Engineering, Chemical Engineering, Agricultural & Biosystems Engineering, The Brew-Hammond

Energy Centre and the Centre for Business Development (a unit within the Vice Chancellor's Office). Additionally, six (6) postgraduate students pursuing various MPhil and PhD degrees joined the visit.

The group was received at the premises of the Vester Oil Mills, and was conducted around the facility by Mr. Sefah-Boakye, a member of the management team of the company.

The KNUST team was briefed on the operations of the company and some of the challenges that it currently faces and for which it is seeking solutions.

The Managing Director, Mr. Kwasi Nyamekye, who is also the Vice President of the AGI in the Ashanti, Bono, Bono East and Ahafo regions, was pleased with the visit and looked forward to a stronger partnership with academia.

The College of Engineering will be working with Vester Oil Mills to improve the efficiency of its production plant. The collaboration will also hinge on specific areas such as the use of alternative fuel for boiler operations, reduction of hexane consumption, and interventions for the reduction of electricity consumption in their operations.

Vester Oil Mills is a Ghanaian-owned company which processes soya beans into edible oils and animal feed, for both local and export markets.



A technician explaining a point to some of the students

Visit of Prof. Sam Adaramola to KNUST

Prof. Adaramola, a Renewable Energy expert at Norwegian University of Life Sciences and a member of the International Scientific Advisory Board (ISAB) of KEEP interacted with Prof. Kwabena Biritwum Nyarko (Project Lead) and Dr. Jerry John Kponyo (Deputy Project Lead) when he visited the institution on 16th January, 2020. Their discussions centred on the curriculum of programmes, equipment to be purchased for effective teaching and learning purposes, academic/staff capacity, and joint theses supervision. Issues relating to the impending maiden International Scientific Advisory Board meeting were also discussed.

He later held a seminar with the students under the Renewable Energy Theme. He gave a detailed overview of issues in Energy. His presentation covered energy access, energy uses, electricity generating systems, climate change, energy management and sustainable energy. ✨



Prof. Adaramola explaining a point to Prof. Nyarko (Project Lead). Looking on are Dr. Kponyo (Deputy Project Lead) and Mr. Kwadwo Nyantakyi Marfo (Project Manager)

Research Seminar for KEEPerS

Dr. Emmanuel Frimpong (Theme Lead, Power Systems) and Prof. Francis Kemausuor (Theme Lead, Renewable Energy) gave presentations on the research direction of the Power Systems and Renewable Energy themes.

Dr. Frimpong gave an overview on smart grids and energy management systems. He exposed the students to possible research topics on smart grids which included communication integration smart grid with distributed generation, security and privacy for integration of smart grid with cloud computing, modelling and stability of smart grid, smart grid

computing and smart grid controls technologies.

Dr. Frimpong also gave the students research areas under the energy management systems which include contingency ranking, constraint and congestion management, security analysis, economic dispatch with emission control, demand side management, real-time optimal operation, of distribution networks, wide area monitoring and control systems, voltage stability assessment and control and power system state estimation.

Prof. Kemausuor gave an overview of the Renewable Energy Theme. His presentation covered global energy

transformation, Africa energy sector, Africa case for renewables, Economic Community of West African States (Ecowas) Renewable Energy Policy (EREP) and some key challenges. Prof. Kemausuor also touched on research areas such as resource assessment and feasibility studies, development of models and tools, materials, environment and other cross cutting areas.

The Project Manager for KEEP answered questions on the modalities for accessing the research fund. The Seminar was very interactive and gave students a much better clarity on the research focus. ✨



Some cross section of the students at the research seminar

KEEP HOLDS OPEN FORUM WITH STUDENTS



Cross section of the students and the Project Manager at the Open Forum

A two-session open forum was organised for KEEP students on 13th March 2020. The morning session was for Digital Development students, whilst the afternoon session was for Energy students.

The sessions started with Prof. Kwabena Biritwum Nyarko (Project Lead) giving a detailed overview of the KEEP project, covering the vision, mission, project duration (2019-2023), disbursement linked indicators, and internships.

The students were then given the opportunity to ask questions. Questions asked were in relation to scholarships, internships, faculty exchanges, research support and course curriculums which were thoroughly answered by the Project Lead and Project Manager.

The students gave very good suggestions that KEEP management would do well to work on. Some of these suggestions included liaising with industry to organise seminars and forums that would

enable students present their research findings. Other suggestions included, facilitating engagements with international professors, idea seminars, sporting and recreational activities, and providing all postgraduate rooms with internet cables.

It was agreed that open forums would be held more frequently, at least once every semester. ✨





KEEP Management Team members at the 3rd ACE Impact Conference in Senegal

KEEP Attends 3rd ACE Conference

KEEP participated in a workshop held in Abuja from 24th-28th February, 2020. The KEEP delegation was led by the Project Lead.

Team members participated in all the plenary sessions which covered areas such as International Accreditation, Revenue Generation, Internships and Innovation. There were also parallel sessions on Monitoring and Evaluation, Verification, Financial Management and Safeguards.

The team from KNUST also participated in thematic sessions where the Colleges of Engineering gave presentations on their various partnerships that they have with academic institutions. The Colleges of Engineering were applauded by the moderator, Dr. Chux Daniels for forging partnerships. He however encouraged that more

attention be given to partnerships with universities in Africa. The thematic sessions also offered the various Colleges of Engineering the opportunity to respond to issues raised in their implementation plans and to finalise them.

The team also met the team from the Gambia Technical Training Institute with regards to their preparedness to roll out undergraduate programmes in Engineering.. ✨



KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

CORONAVIRUS ALERT!

HOW YOU CAN PROTECT YOURSELF AGAINST CORONAVIRUS INFECTIONS

1. Wash your hands frequently with soap under running water
2. Use alcohol based hand sanitizers to rub your hands when your hands are not visibly dirty
3. Keep a distance of at least one step (1 Metre) from the person showing signs of fever, cough, and difficulty breathing
4. Do not touch your eyes, mouth or nose with unwashed hands
5. Thoroughly cook meat and egg
6. Be physically active, eat well, drink plenty of fluids, reduce stress and have enough sleep.

KEEP info

Locate KEEP in Room 304 on the 3rd floor of the Petroleum Building at the College of Engineering.

Follow KEEP on



keep.knust.edu.gh,



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To make any enquiries about KEEP, you can send a mail to keep@knust.edu.gh

Contact the Project Manager for KEEP on 0502519057