1.0 RESEARCH PRODUCTS/ INNOVATION

1.1 Wet Solid to Dry Solid Waste: A Sustainable Waste Management

The research product is by Dr. Solomon Omwoma of the School of Biological and Physical Sciences. The research uses sunshine harvesters to concentrate sunshine at very high temperatures and the generated heat is directed to a central metal box containing the wet waste. The moisture and volatile compounds from the wastes are collected in an overhead pipe condensed into a liquid and the water taken through a water treatment system. This research product (see Figure 1) produces a dry waste of high calorific value that is sortable at land fill level. It also produces organic fertilizer from the biogas plant and clean water for domestic use.

Fig. 1: Green technologies in solid waste treatment

1.2 Enhanced Automated Fire Detection and Alert System (SMS/Caller System)

The product is a research work of Mr. Daniel Onyango Okumu of School of Informatics and Innovative Systems. This is a low-cost fire detection and control system based on smoke and heat detection. It comprised of a combination of electrical devices working together to detect the presence of fire and alert people through audio or visual medium after detection.

1.3 Blood Pressure Diagnostic Kit

This is a research product from the School of Informatics and Innovative Systems (SIIS). The research output is by Mr. Jackson Mwirigi, Murangiri Mugambi and Phanuel Mutuma all of whom are students from SIIS. The Blood Pressure Diagnostic kit is a real time integrated system which monitors blood pressure of a client and share the data with a medical practitioner

for further treatment. The kit incorporate a mobile application, Bluetooth technology and a wearable wrist band to worn by the client.

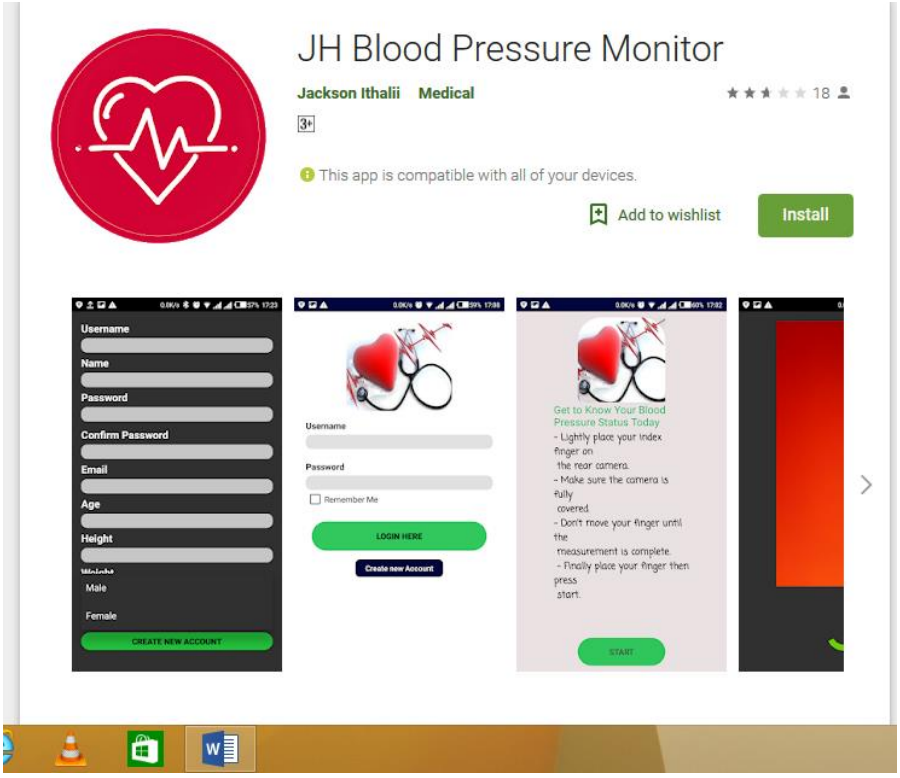

Fig. 2: Blood Pressure monitoring kit

1.4 Solar Milk Cooling System

This is a joint research product between JOOUST through Dr. Benard Muok and Hohenheim University in Germany University that involves introduction of a solar-based cooling system that can be operated independently of electricity supply. The system (Fig. 2) involves innovative insulated milk-cans that have the capacity to cool down and store milk using ice compartments.

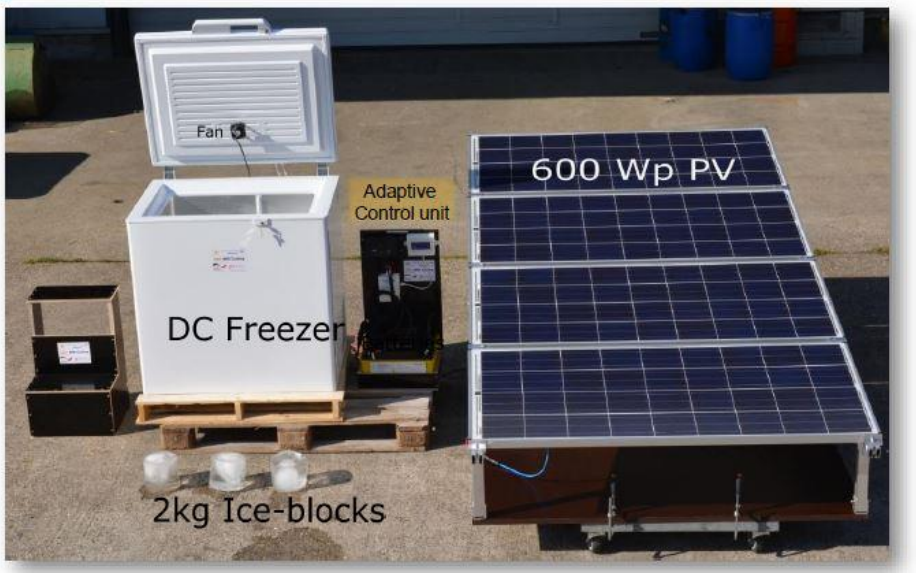

Fig. 3: Solar Milk Cooling System

1.5 Portable Sorghum Thresher and Dryer Technology

The University in collaboration with Egerton University developed and transferred the Portable Sorghum Threshing and Drier Technology (Figure 3) to selected community in Siaya County. The research product was developed through the project '*Enhancing Sorghum*

Fig. 4: Portable sorghum thresher and dryer technology

1.6 Spatial Data Infrastructure

The University successfully completed implementation of a project titled: 'Resilience to Climate Change through Building Capacities in Spatial Data Infrastructure (SDI) For Uptake by Selected County Government in Lake Victoria Region' The project developed the Spatial Data Infrastructure (see Figure 4) as the main product of the research. The product aims at improving application and use of geospatial technologies at county-level to inform and enhance climate change interventions and resilience. Water Evaluation and Planning Model

Fig. 5: Spatial Data Infrastructure

1.7 Water Evaluation and Planning Model

The University completed implementing a project titled: '*Development of Decision Support System for Sustainable Participatory sub-catchment Water Resources Management in the face*

of Deteriorating Climatic Conditions' The project developed a Water Evaluation and Planning (WEAP) model. The process involved configuration of the sub-catchments within the WEAP model framework using the sub-catchments' water resources parameters. After validation, the configured catchment models imitated the respective sub-catchments' behaviour with regard to the water resources.

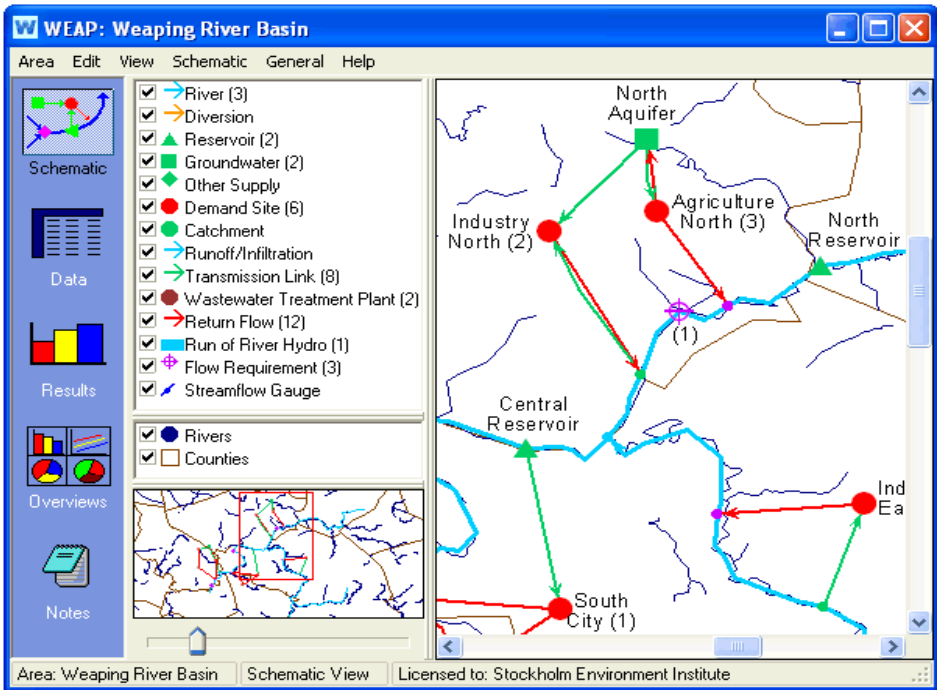

Fig. 6: Water Evaluation and Planning Model

1.8 Cricket Enriched biscuits

The Innovation is by Prof. Monica Ayieko of the School of Agricultural and Food Sciences. Cricket based biscuits (commonly known as cookies) are healthy snacks made by combining roasted crickets that is freshly grounded (to enhance flavor) or sun dried cricket powder, with popped amaranth seeds to enhance the nutritional value of the final products. The patent is registered at Kenya Industrial Property Institute (KIPI) as Patent No. KE 304

Fig. 7: Sample of cricket products

1.9 Lanthanide double hydroxide nanocomposite materials and their application in measurement of heavy metals in aquatic systems

The innovation is by Dr. Solomon Omwoma of School of Biological and Physical Sciences. The University will commercialize the patented claims. Specifically, the manufactured tablet will be tested in different field samples and the data used to market the tablets to different companies and organizations such as the National Environmental Management Authority and various research groups. The University has made Patent Application No. KE/P/2018/2880 of this innovation to KIPI.

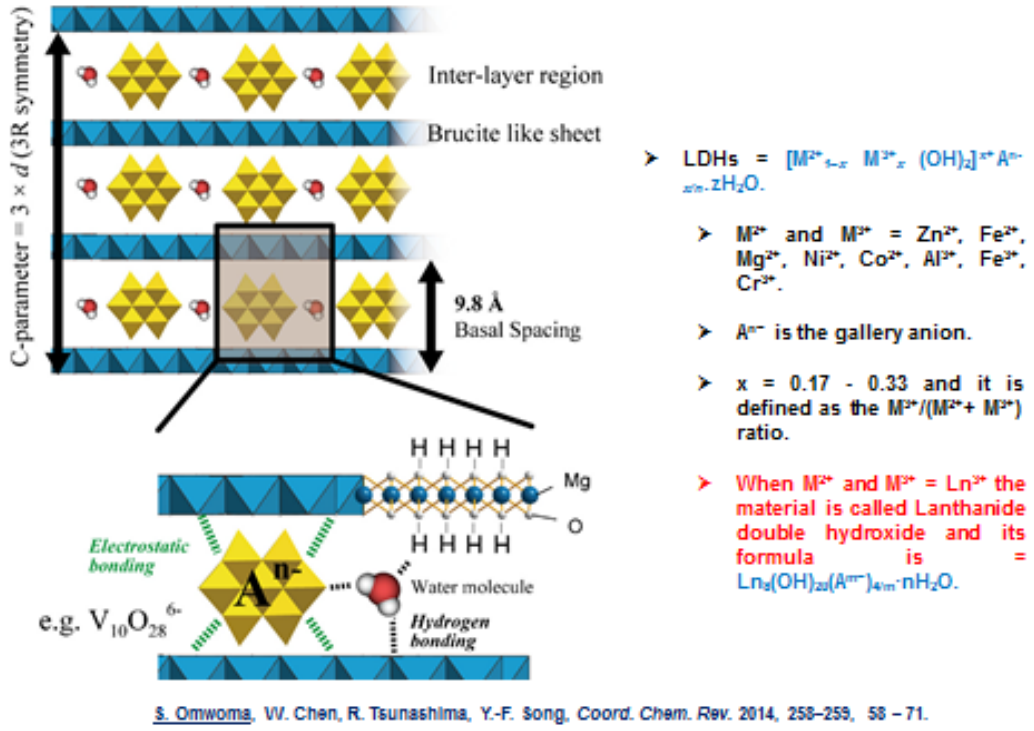

Fig. 8 Structure of Lanthanide double hydroxides

1.10 Technology Enhancement of the red light luminescence from $(EuW_{10}O_{36})^{9-}$ anion

The innovation is by Dr. Solomon Omwoma of School of Biological and Physical Sciences. The University will commercialize the patented plants from temperatures or damage by intense UV radiations as well as intensifying the red light needed by plants for growth. In addition, paint is made up of different shades that result from LDH-EuW_{10} which luminesce under UV irradiations. The point is designed to be used in house decoration such as disco and cinema halls that may be fitted with UV lamps. Turing on the UV lamps in such a room changes its design and colour. Furthermore, another application is to use LDH-EuW_{10} doped ormosil glass films to be placed on top of silicon solar cells so as to improve the efficiency of these *photo-voltaic devises* through red color emission mechanism. The University has made Patent Application No. KE/P/2018/2881 of this innovation to KIPI.

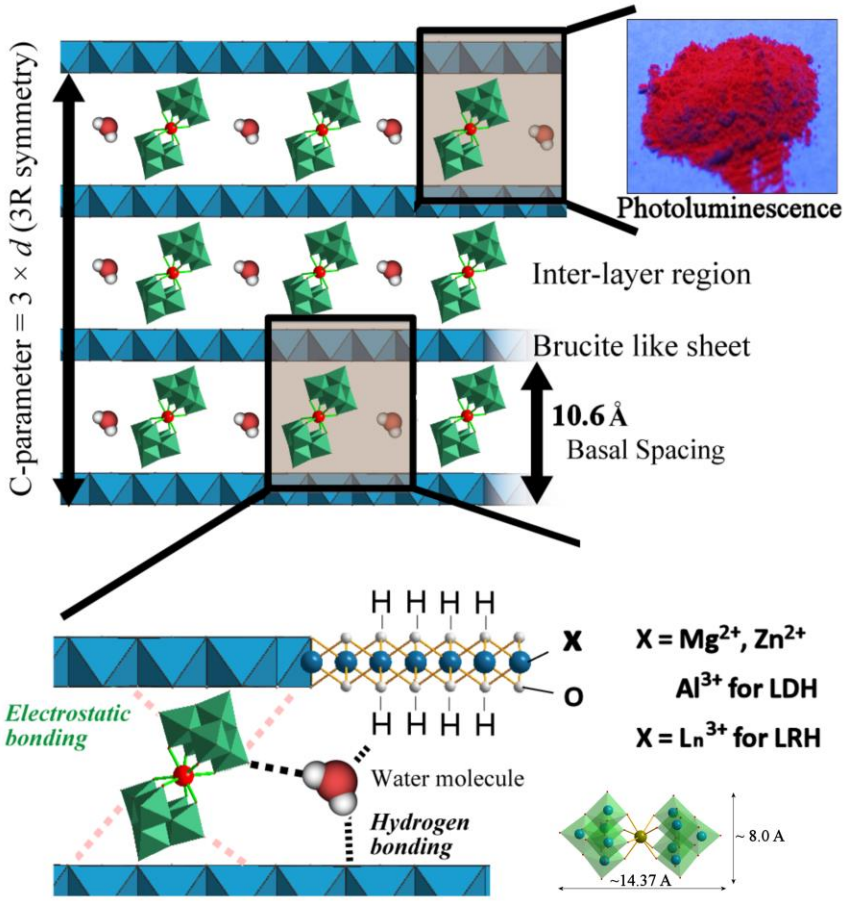

Fig. 9 Schematic representation of the well ordered $[EuW_{10}O_{36}]^{9-}$ ion intercalated within gallery spaces of LDHs.

1.11 Digital Maritime Safety and Tracking System

The innovation is by Mr. Jack Abibo of School of Biological and Physical Sciences. The system is designed and implemented based on a sensor circuit that senses the water influx into a water vessel and automatically relays a warning signal to the vessel crew and triggers a relay to automate a GSM mechanism to relay a distress call to an offshoe rescue team. The University has made Utility Model application No. KE/UM/2016/00704 of this innovation to KIPI.

2.0 INNOVATION UNDER CONSIDERATION FOR PATENT BY KIPI

2.1 Cricket enriched biscuits
2.2 Lanthanide double hydroxide nanocomposite materials and their application in measurement of heavy metals in aquatic systems
2.3 Technology Enhancement of the red light luminescence from (EuW10O36)9- anion
2.4 Digital Maritime Safety and Tracking System