Expected impact: Cheap, safe, non-invasive, and rapid turnaround time for detection of active Covid-19 including individual self-collection of the sample. This intervention minimizes transmission risk faced by health care practitioners and facilitates effective diagnosis, efficient contact tracing and community surveillance.

Figure 2: Schematic of the Proposed COVID-19 Saliva test kit

C. Development of Portable Mask Sterilizing Pod

The mask sterilization technique being presented here utilizes a pod with heat sources powered by electricity from the onboard batteries. The rechargeable Lithium ion batteries provide the DC current needed by the heating element to raise the pod temperatures up to 100 degrees Celsius enough to kill the Corona virus. Figure 1 shows the mask inside the pod and the associated user interfaces such as charging port and switch button.

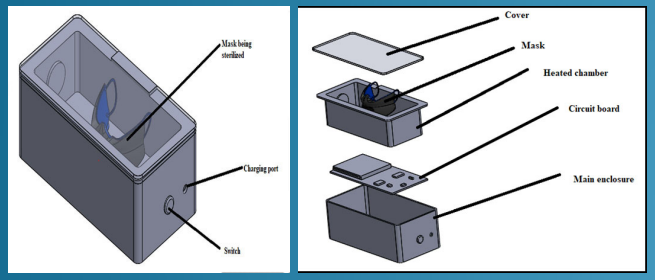


Figure 3: Pictorial image of Portable Mask Sterilizing Pod

D. Solar Powered Sanitizer Booth for Highly infectious Pathogens (Covid-19)

MAPRONANO ACE at Makerere University in partnership with CODEK ENGINEERING CO LTD, private company have jointly developed a walk-through solar powered sanitization booth to enable instant sanitization as the people walk through it. The booth is designed with entrance proximity sensors, which detect a person walking through and release fog or atomized disinfectant. The justification of designing and producing this machine is that it can work on all emerging and re emerging highly infectious pathogens. The heating element has a built-in thermostat to control its temperature and prevent self-destruction under extreme heat. The booth is also built with a temperature sensor that records the temperature of anyone laving or entering a public place.

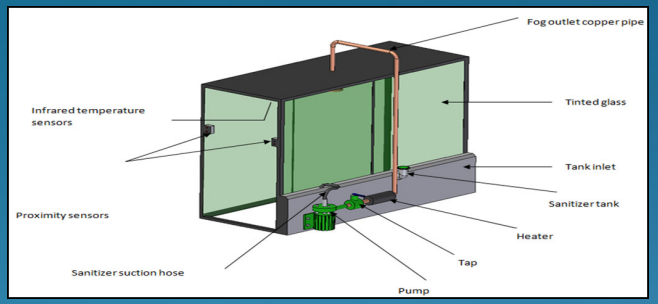
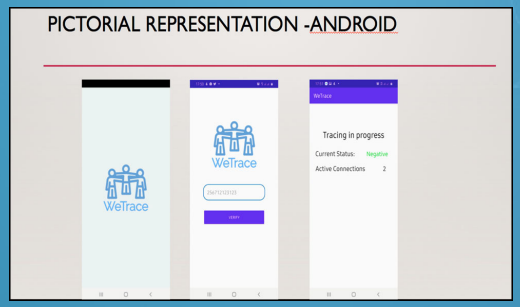


Figure 4: Design Model of the Solar Powered Sanitizer

E. We Trace: Mobile contact tracer application for Covid-19 in Uganda

MAPRONANO ACE, Makerere University in partnership with Nanobits has developed a contact-tracing App for surveillance and real-time detection of Covid-19 positive cases named "WeTrace". The application publishes the user's phone number in form of an encrypted message in intervals of 30 seconds and then listens continuously for incoming messages published by other phones with the same application.

The mobile app is accessible by both Android and IOS users this mobile app keeps tracing the people that a single user has come into contact with using Data over sound. (See schematic of Mobile app on Android Phones).



DEVELOPMENT OF BIOMASS BRIQUETTES ENHANCED USING NANOTECHNOLOGY FILDAH AYAA, JOHN BAPTIST KIRABIRA, MICHAEL LUBWAMA ET AL 2019

- 94% of Africa's rural population and 73% of its urban

MAPRONANO ACE

Africa Center of Excellence in Materials, Product Development and Nanotechnoloy

DIESEL ENGINE LAUNCH

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BRIEF DESCRIPTION OF CENTER:

The Center was developed out of the need to strengthen research and training in the thematic areas of materials science and engineering, nanotechnology and nanomedicine in order to develop human resource capacity in applied science engineering disciplines for the development of the great lakes region. MAPRONANO ACE will also offer highly specialized short courses in welding technology, health safety engineering, Oil & gas, Monoclonal and Nanobodies generation, Bioinformatics & Next Generation sequencing techniques. Nanomedicine Program will be implemented in partnership with College of Health Sciences (MakCHS).

MISSION:

To promote and harness innovation in nanotechnology

VISION:

To establish a world class regional R& D Center for Nanotechnology

PROJECT DEVELOPMENT OBJECTIVE:

To strengthen selected Eastern and Southern African higher education institutions to deliver quality post-graduate education and build collaborative research capacity in the regional priority areas.

KEY OBJECTIVES:

1) To increase capacity of research and training materials engineering and product development
2) To enhance teaching and training in Nanotechnology and Nanomedicine
3) To promote linkage among academics, industry practitioners and policy makers
4) To promote research spins offs for industrial development

OUTCOMES

a) State of the art research Laboratory for Materials, Nanotechnology and Nanomedicine in the Eastern and Southern Africa Region.

b) Graduate professional scientists who can contribute to regional development through research and development.

c) Accredited Master's Programs (curricula) in Materials and Product Development and Nanotechnology

d) Well-trained technicians and engineers in Materials Science, Product design and Nano-enabled technologies

e) Strengthen research and publication

f) Strengthen teaching quality through Pedagogical training.

Major Accomplishments to Date: 5 PhD students admitted nationally, Annual steering committee meeting held between ACE and UIC, Procurement of Office furniture and IT Equipment in final stages, drafted Short courses curricula developed, M.Sc./B.Sc. curriculum review in progress, 5 students identified from University of Rwanda that will benefit from ACE research funding, Laboratory Space identified.

COVID INNOVATIONS

BRIEF DESCRIPTION OF CENTER INNOVATIONS:

A. Development of low cost Alcohol Based Hand Sanitizers MAPRONANO ACE in partnership with Makerere University College of Health Sciences (MakCHS) have developed low cost hand sanitizer for use in resource-limited settings and use in institutions and communities for effective hygiene and infection control.

B. Development of Saliva Diagnostic Kit for Covid -19 Severe acute respiratory syndrome (SARS)-CoV-2 virus present in saliva, stool, and blood causes COVID-19 [Zhou et al, 2020]. Rapidly rising COVID-19 incidences are partly attributed to ineffective population screening and inappropriate surveillance tools – primarily poor testing capacity in many countries including Sub-Saharan Africa. Further, current recommended sampling strategies like swabbing and aspiration are painful, uncomfortable and invasive [WHO report, 2019] necessitating use of new methods. Indeed, these approaches often pose high risk of virus transmission to health care workers during sample collection. Saliva is a comfortable and quick mass sampling option [Wang et al, 2004] with demonstrated high accuracy for COVID-19 diagnosis.

We have started development of COVID-19 diagnostic rapid test kit for detection of the virus in saliva in Partnership with Makerere University College of Health Sciences and Uganda Virus Research Institute. Expected impact: Cheap, safe, non-invasive, and rapid turnaround time for detection of active Covid-19 including individual self-collection of the sample. This intervention minimizes transmission risk faced by health care practitioners and facilitates effective diagnosis, efficient contact tracing and community surveillance.

This is an alcohol hand sanitizer with 99.9% alcohol and is locally made from locally available materials and effective to kill the pathogens such as fungi, bacteria and viruses.

The manufacture and preparation processes are done in the college of health sciences in partnership with Ryatumwa Ltd a marketing company. The instant hand sanitizers are packaged in the following quantities (100mls, 60mls, 500mls,1000mls /1Liters, 5 Liters and 20 Liters) Below pictorial images of sanitizers.

B. Development of Saliva Diagnostic Kit for Covid -19 Severe acute respiratory syndrome (SARS)-CoV-2 virus present in saliva, stool, and blood causes COVID-19 [Zhou et al, 2020]. Rapidly rising COVID-19 incidences are partly attributed to ineffective population screening and inappropriate surveillance tools – primarily poor testing capacity in many countries including Sub-Saharan Africa. Further, current recommended sampling strategies like swabbing and aspiration are painful, uncomfortable and invasive [WHO report, 2019] necessitating use of new methods. Indeed, these approaches often pose high risk of virus transmission to health care workers during sample collection. Saliva is a comfortable and quick mass sampling option [Wang et al, 2004] with demonstrated high accuracy for COVID-19 diagnosis. We have started development of COVID-19 diagnostic rapid test kit for detection of the virus in saliva in Partnership with Makerere University College of Health Sciences and Uganda Virus Research Institute.