Post Doc Fellowship experience at University of Rwanda: Dr Emmanuel Masabo

During my PhD studies at Makerere University, I obtained research funding support from Carnegie Corporation through RUFORUM. It helped me to undertake the research activities and finish on time. I exactly graduated in January 2020. After graduation, I returned to University of Rwanda (UR). At UR, in addition to teaching, I also had to supervise the students (both undergraduate and past-graduate), write grant proposals, do advanced research, do some administrative work, etc. The after PhD journey had started, I was eager to serve better. How could

The research team meeting farmers at Burera District in 2021

I do better? What expertise did I need? How could I get it? Many questions came to my mind. I found myself in a situation, where I needed to learn more and do more than expected. So experience was needed.

A few months after my graduation, in May 2020, a PostDoc call for applications was received from RUFORUM to support former Carnegie beneficiaries. It was a first quick opportunity after my doctoral studies. It was a way to address some of the aforementioned issues, and acquire the relevant expertise that will allow me to undertake my professional activities successfully. I wrote a grant proposal, applied for and obtained funding from RUFORUM. I thank RUFORUM for this opportunity. The proposed PostDoc research was about developing an AI-enabled IoT system for early detection and prevention of Mycotoxins in Cereals. The research focused on Maize, with the aim to scale to other cereals later.

This research was motivated by the fact that in Rwanda maize is currently a major food for children, adults and even heavily used in animal feed. As a major food, farmers have become interested in growing it as an opportunity to not only feed them but also bring income into their homes. However, according to some reports and other information provided to me by some local manufacturers, a significant amount of maize is not accepted in the market due to mycotoxin infections. This negatively affects farmers. On top of that, rejected maize could end up being used in fodder or in small local markets, which could pose serious health

risks to the consuming population. The project offered an opportunity to learn more about this problem and to propose better solutions.

To carry out this project, we set up a research team comprising my mentor, myself, two master's students, a doctoral student as well as three undergraduate students from the University of Rwanda. Each member played their specific role with commitment. Our mentor often used to give us useful advice and guidance. With limited time due to daily course activities, the students had to work very hard to complete the project related tasks as well. Moreover, the working conditions were not very easy also due to the lockdowns and restrictions related to COVID-19. Regular meetings have been held to plan and discuss the way forward. The project helped students successfully complete their studies. Masters and undergraduate students respectively defended their final thesis and their projects. The doctoral student submitted his thesis for examination.

During the implementation, many stakeholders were involved such as Government institutions, private institutions as well as farmers. They all provided relevant inputs that helped the overall implementation. Especially, with regards to farmers, we visited them, visited their maize farms and storage facilities. This gave us an overall understanding of how they handle their maize yield. We got to know what farmers knew about Mycotoxin disease, and what they expected to get their work done better.

The research team meeting farmers in Musanze District in 2022

At the time of writing this story, the project is still ongoing and not all goals have been achieved yet. Among the achievements, the project successfully developed a prototype with real-time monitoring capabilities of environmental parameters that promote the development of mycotoxin infections in maize using IoT sensors. The data collected by the sensors is monitored via a mobile application. The mobile app also an AI model that helps to identify maize diseases through

analyzing the pictures taken by a mobile phone.

One paper has been published so far at the time of writing, with others submitted to different journals. The project aims at publishing at least 5 papers.
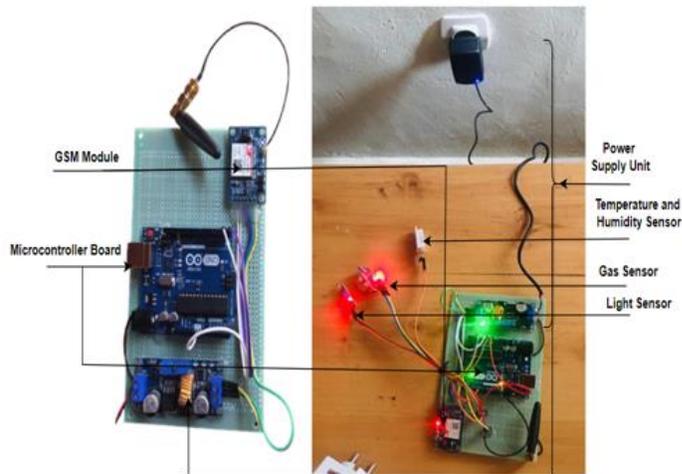
Preliminary smart maize storage and monitoring prototype

This research opened doors to more responsibilities at the University of Rwanda. At the time I had joined back UR after PhD studies, I was a lecturer in Software Engineering Department, School of ICT, College of Science and Technology (CST) and affiliated with the African Centre of Excellence in IoT (ACE-IoT), CST. Shortly after starting my postdoctoral activities, I was given an additional responsibility as Head of Research and Doctoral Studies at the African Center of Excellence in Data Science (ACE-DS), College of Business and Economics (CBE), UR. In addition, the Postdoc provided further training opportunities through RUFORUM. Among them was writing a grant proposal. Using the knowledge gained from this training and working with others, I have successfully written a number of grant proposals, some of which have been selected for funding.

The postdoctoral opportunity has become an excellent career development opportunity for me. It involved supervision, connecting with others, leadership, mentoring, budget monitoring, time management, challenges addressing as well as various other project implementation activities. This was not easy to me as it was the very first experience. I learned a lot, I'm still learning and improving. Of course, I was molded to be a senior who will further contribute and help many people in their college careers. Many thanks to RUFORUM for the overall support provided to me towards a better future.