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Workshop on grant project: Electromagnetic Compatibility Monitoring and Prediction Models for Biomedical Devices (EMC-MPM)
CONCEPT NOTE

Background

The project entitled "**Electromagnetic Compatibility Monitoring and Prediction Models for Biomedical Devices**"; grant ref. No. RSIF/RA/010. The project has two years implementation period from 2022-2024 and it is sponsored by ICIPE-RSIF. Electromagnetic compatibility (EMC) is a big concern in electronic devices, particularly in hospitals' medical devices where there is high concern of health and safety. The unacceptable level of electromagnetic emissions from medical devices in hospitals can cause different illness to patients, doctors, nurses and other staff in hospitals such as cancer, mental and skin disorder, and other health and safety issues. Therefore, EMC monitoring and prediction on biomedical devices in hospitals would be a potential solution for the health and safety of people in hospitals.

The main objective of the project is to develop an Internet of Things (IoT) based monitoring system and EMC prediction algorithm for the hospital's biomedical devices. IoT is a low cost and emerging technology for data monitoring in real time and machine learning algorithms are powerful tools for data prediction. An IoT system will be designed and implemented with EMC sensors installed on selected biomedical devices. Data of field strength, frequency, voltage fluctuation and flicker emissions, electrostatic discharge, electrical fast transient, power frequency, magnetic field immunity and radiated RF electromagnetic (EM) immunity will be collected using sensors attached to medical devices, analyzed and compared with the standards thresholds for decision making. Prediction algorithm based on machine learning will be developed to predict the EM emissions of biomedical devices for prevention purposes, proper management and planning of electronic devices maintenance.

The implementation of the project will help the hospitals to prevent the effect of EM emissions and it will also assist the hospitals to plan for preventive measures and to have a clear management plan of biomedical devices. At the national level, there will be a reduction of illness as well as accidents caused by EM emissions, improvement of the health and safety of the people at hospitals and thus, the enhancement of performance of hospitals in general. This is in line with national and regional health policies and sustainable development goals (SDGs) for good health and wellbeing of the people.

The current project has been implemented from May 2022 until the present and some activities need to be evaluated and validated by all project members as part of the project requirements before submitting the pre-final report to the donor. Therefore, a team of project members and PhD students working in the project will gather and evaluate the progress of the project, document the user manual of the system developed and develop the pre-final report which will be submitted to the donor. These activities will be done from 27th February, 2024 to 03rd March 2024 in a workshop which will be held in Musanze District.

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Specific objectives of the workshop:

The specific objectives of the workshop are to:

1. To evaluate the project progress and take way-forward;
2. To inspect the develop the prototype and validate it;
3. To inspect the website and mobile application which is being developed and validate it;
4. To inspect the artificial intelligence (AI) algorithm and validate it;
5. To develop the user manual of the system;
6. To develop the pre-final project report to be submitted to the donor.

Agenda: 27 /02/2024– 03/03/2024

Time	Agenda Item	Presenter/ Responsible
D1: Tuesday 27th February: Departure to Musanze District at 03:00 PM		
Wednesday 28th February: Day 2		
9:00-9.30	Registration	Dr. Gerard Rushingabigwi, Co-PI
9.30 – 10.30	Presentation of the current progress of the project	Dr. Omar Gatera, PI
10.30 - 11:00	Coffee Break	
11.00 – 13.00	Discussion on the project progress and take the way-forward.	All members
13.00 – 14.00	Lunch break	
14.00 – 16.30	Discussion on the project financial report	Mr. Dismas Jean Paul/SPIU
16.30 – 17.00	Wrap up of the day 1	Dr. Gerard Rushingabigwi, Co-PI
Day 3		
8:00	Registration	UR/ACEIoT
8:10- 10.30	Demonstration of the prototype developed	Ms. Chiedza Hwata and Mr. Egas, PhD Students
10:30am – 11.00am	**Coffee Break**	
11:00– 13.00	Evaluation of the prototype against the project requirements.	All members
13.00 – 14.00	**Lunch break**	
14:00- 16.30	Demonstration of the AI algorithm and validate it.	All members
16:30- 17.00	Wrap up of the day 2	Ms. Chiedza Hwata and Mr. Egas, PhD Students
Day 4		
8:00	Registration	Dr. Gerard Rushingabigwi, Co-PI
8:10- 10.30	Demonstration of the website and mobile applications	Mr. Dieudonne Ukurikiyeyesu.
10:30am – 11.00am	**Coffee Break**	

11:00 – 13.00	Discussion on website and mobile applications and take way-forward.	All members.
13.00 – 14.00	**Lunch break**	
14:00- 16.00	Discuss the data collected from Muhima Hospital	Ms. Chiedza Hwata and Mr. Egas, PhD Students
16:00 – 17.00	Validation of the presented data	Prof. Bolaji Thomas (Online)
Day 5		
8:00	Registration	Co-PI
8:10- 10.30	Development of user manual of the system in Groups	Dr. Omar Gatera
10:30am – 11.00am	**Coffee Break**	
11:00 – 13.00	Development of user manual of the system in Groups	All members
13.00 – 14.00	**Lunch break**	
14:00- 17.00	Development of user manual of the system in Groups	All Members
Day 6		
8:00	Registration	Co-PI
8:10- 10.30	Development of the pre-final report to be submitted to donor.	Prof. Celestin Twizere and Dr. Didacienne Mukanyiligira
10:30am – 11.00am	**Coffee Break**	
11:00 – 13.00	Development of the pre-final report to be submitted to donor.	Prof. Celestin Twizere and Dr. Didacienne Mukanyiligira
13.00 – 14.00	**Lunch break**	
14:00- 17.00	Return to Kigali	All Members

Participants:

S/N	**Names**	**Institution**
1	Dr. Omar Gatera	UR – CST-ACEIoT
2	Prof. Bolaji Thomas (Online)	RIT

3	Dr. Gerard rushingabigwi	UR – CST-CEBE
4	Prof. Celestin Twizere	UR – CST- CEBE
5	Dr. Didacienne Mukanyiligira	NCST
6	Mr. Dieudonne Ukurikiyeyezu	UR – CST
7	Mr. Egas Jose Armando	PhD Student-ACEIoT
8	Ms. Chiedza Hwata	PhD Student- ACEIoT
9	Mr. Jacques Hakizimana	ACE IoT Administrator

Budget

Item	**Unit Price (Rwf)**	**Total (Rwf)**
Full package (2 coffee breaks + lunch) 8 participants for 5 days	14,500	580,000
Living allowances, 7 participants for 5 nights	44,200	1,547,000
Transport for 8 participants for 6 days	125,724	754,344
Executive room for 1 Professor for 5 nights	50,000	250,000
Hiring car for 1 Prof. for 2 days	134,000	268,000
Dinner for 1 Professor for 5 dinners	6,500	32,500
Contingencies for 1 Professor for 6 days	9,600	57,600
Contingencies for 7 participants for 6 days	7,200	302,400
Total		**3,791,844**

Prepared by:
Dr. Gerard Rushingabigwi
Co-PI of the project

Approved by:
Dr. Omar Gatera
PI of the Project