

## Appendix 5.2

### [P2EI-WEALTH (Physiological and Psychological Edge Intelligence WEARable LoRa Health) System for Remote Indigenous Community and Disaster Recovery Operations] [Traveling to Field Test Sites & Closed Project meeting] Report Form

#### I. Proposer:

Name:	Asma' Abu Samah
Position:	Project Leader PJ2022-03, Senior Lecturer and academic researcher
Institution:	University Kebangsaan Malaysia

#### II. Objectives:

1. To evaluate the developed system with its functionality in realistic environments in Tasik Chini villages. The test will be a 1 day and a half test will all members. More tests will be performed separately later by the students (Targeted in August/September 2023).
2. To hold research advancement task coordination meetings and results analysis between UKM academic researchers and the members from Mapua University and GTek enterprise.
3. GTek will hold a one-day training workshop to our wireless lab Students and to MU members on the production of the LoRa P2EI-WEALTH device prototype. GTek is responsible for designing and testing TWO (2) P2EI-WEALTH Prototypes. UKM will reproduce 8 more devices with students for data collection.

More details of the workshop as follows,

TITLE: P2EI-WEALTH Assembly Day

TARGETED PARTICIPANTS: 4 postgraduate students under Wireless Lab@UKM

ACTIVITY TYPES: i) Theoretical explanation of the different parts of the device (More than 70 components) and the assembly process ii) Hands-on of the assembly.

GOALS: To outsource the reproduction of the devices to the students while training the students in the lab which are mostly experts in PHY layers simulation.

OUTCOME: 4-8 devices for the testing and data collection in Tasik Chini in August/September 2023

4. To conduct site visits to Kuala Lumpur identified sites and monitor the management of wireless communications and network performance tests related to LoRa/LoRAWAN to compare with results in Manila City.

### III. Schedule:

Date	Time	Work	Person in charge
July 3	9.00 - 13.00	Travel UKM - Tasik Chini Research Centre (PPTC)	Asma
	13.00 - 14.00	Lunch break	Radzi
	14.00 - 17.00	Installation of Gateway	Nor Fadzilah + Rosdiadee
		Visit to the 2 Villages (Ulu Melai and Ulu Gumum) for the introduction of the devices and how to use it. We will conduct a short survey with the community	Asma' + Radzi
Hotel: PPTC Guests: 4 UKM Members			
July 4	8.00 - 20.00	Field Test in Kampung Ulu Gumum and Kampung Ulu Melai for 2 persons (Day 2)	Reggie
Hotel: PPTC Guests: 4 UKM Members			
July 5	8.00 - 12.00	Field Test in Kampung Ulu Gumum and Kampung Ulu Melai for 2 persons (Day 2)	Reggie
	12.00 - 14.00	Lunch break	Radzi
	14.00 - 18.00	Travel (PPTC) – UKM 4 hours for travel from PPTC to UKM	Asma
Hotel: Bangi Resorts Guests: 2 MU members			
July 6	9.00 - 12.00	Demonstration and workshop by Reggie on the reproduction of the Device as mentioned in the	Asma

		Objective 3	
	12.00 - 14.00	Lunch break	Asma
	14.00 - 16.30 Hotel: Bangi Resorts Guests: 2 MU members	Continuation of the Demonstration and workshop by Reggie on the reproduction of the Device	Asma
<b>July 7</b>	9.00 - 12.00	Project advancement meeting at the UKM AST	Asma
	12.30 - 14.00	Lunch	Asma
	14.00 - 15.00 Hotel: Bangi Resorts Guests: 2 MU members	Test of the device + outdoor gateway in Kuala Lumpur City Centre to compare with Manila City. We will setup a gateway in the City (Exact place to be determined later using results from simulation). We will also do a drive test using our 2 sets of devices in the city.	Asma

#### IV. Participants:

No.	Name	Organization	Itinerary
1	Asma' Abu Samah	UKM (Team 1)	3-7th July 2023
2	Rosdiadee Nordin	UKM (Team 1)	3-7th July 2023
3	Nor Fadzilah Abdullah	UKM (Team 1)	3-7th July 2023
4	Radzi Mohd Rahim	UKM (Team 1)	3-7th July 2023
5	Jennifer Dela Cruz	MU (Team B)	5-8th July 2023
6	Glenn Magwili	MU (Team B)	5-8th July 2023
7	Reginald J. Mercado	GTek	2-8th July 2023

#### V. Summary of the activities corresponding to the objectives

The summary of the activities can be structured based on the objectives set for the visit.

- 1. To evaluate the developed system with its functionality in realistic environments in Tasik Chini villages. The test will be a 1 day and a half with all members. More tests will be performed separately later by the students (Targeted in August/September 2023).**
  - a. We made the trip to Chini Safely. The testing has been performed in the lab prior to the visit. Unfortunately, complications arise when we want to configure the setting for testing. The computer of Mr. Reginald Juan Mercado (Reggie) which includes all the programs, software and firmware to run the test was down. We suspected, it is due to the bumps under challenging terrain/road to enter the Tasik Chini Research Centre (PPTC) area.
  - b. Due to this, we spent time fixing it on the first day. The problem was identified as scratched SSD. We travel to Kuantan on the 2<sup>nd</sup> day to fix the problem in the Capital City.
  - c. Upon the fixing of the computer, we then have compatibility issue as the one running was on Windows 10 but the new SSD was installed with Windows 11. Despite many efforts to reinstall all codes, debug and solve it, we could not fix the problem by ourselves and within the time that we had in PPTC
  - d. As a result we couldn't do the planned testing. But we have nevertheless tried to scout and temporarily install the RAK Wireless gateway on a pre-planned/simulated position in the nearby mountain which could provide the most compromised performance tests for targeted villages.
  - e. We also brought Mr. Reggie to access the different villages for environment scouting by boat. The chance was taken to show him the water sensor projects owned by UKM around the lake.
  - f. As a result, Reggie has proposed several recommendations to improve the maintenance and also provided the perspective to link the water sensors with LoRa gateway.
  - g. We managed to meet the representative of the indigenous group who has showed us the routes suitable for the test.
  - h. The time spent was also used to initially configure the connection between P2Ei-WEALTH wearable device with the RAK Wireless Gateway.
  
- 2. To hold research advancement task coordination meetings and results analysis between UKM academic researchers and the members from Mapua University and GTek enterprise.**
  - a. A research meeting with all members was held on the 7<sup>th</sup> of July. All members were present except Professor Rosdiadee Nordin who couldn't make it due to a conflicted schedule.
  - b. Some of the meeting's decisions will be elaborated in Objective 3 accordingly.
  - c. One major result from the meeting is to ask for a 12-months extension to the project due to the complications that have arisen and were not considered in the initial planning. All members agreed to accommodate the extended deadline.
  - d. The meeting was profited to discuss the case study and scenario for the testing with all parties understand about each other parts more.

- e. A live demonstration was also done to the MU on the set up and configuration of the RAK Wireless gateways that we have purchased under the project.
- f. An indirect outcome of this visit is the understanding and level of comfort between the members to work together. We believe the team can achieve more activities together in the future.
- g. Following is the proposed new Gantt Chart.

Phases by Quarter of 3 months	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023	Q1 2024	Q2 2024	Q3 2024	Q4 2024
Device design, optimization and multiple prototype production	85%					25%				
Back-end data monitoring platform with LoRa Connectivity	80%					20%				
Edge intelligence modelling		55%				45%				
Lab system testing		90%				10%				
Back-end data data analysis frameworks and models						100%				
System testing and validation in Chini						30%			70%	
Impact analysis and project finalization (+Publications)							100%			

3. **GTek will hold a one-day training workshop to our wireless lab Students and to MU members on the production of the LoRa P2EI-WEALTH device prototype. GTek is responsible for designing and testing TWO (2) P2EI-WEALTH Prototypes. UKM will reproduce 8 more devices with students for data collection.**
  - a. **TARGETED PARTICIPANTS: 4 postgraduate students (1 postdoc, 1 PhD and 2 Msc) under Wireless Lab@UKM.** 3 out of the 4 students were part of the measurement team in Tasik Chini. 1 Msc student was recruited to fill in the 4<sup>th</sup> student gap.
  - b. **ACTIVITY TYPES: i) Theoretical explanation of the different parts of the device and the assembly process ii) Hands-on of the assembly.**
  - c. **GOALS: To outsource the reproduction of the devices to the students while training the students in the lab which are mostly experts in PHY layers simulation.** Prior to the assembly workshop, GTek assembled two sets of P2EI-WEALTH wearable device – P2EI-WEALTH Gateway. Both the wearable and gateway were designed based on Raspberry Pi Pico and based on a proprietary Point-to-point protocol developed by Mr. Reggie. During this workshop, 3 more wearable devices were assembled.
  - d. **TARGETED OUTPUT: 4-8 devices for the testing and data collection in Tasik Chini in August/September 2023**
    - i. **ACHIEVED OUTPUT:** We could only initiate 15% of the assembly for 3 wearable devices due to the time and lack of supporting equipment.
  - e. **TARGETED OUTCOME: Additional skills for the wireless communication students.**
    - i. **ACHIEVED OUTCOME:** This outcome was a success. All students appreciate

the knowledge and know-how from the 1-day session. Students were also exposed to the use of Portable Logic Analyzer that was purchased prior to the session.

- f. **LIMITATIONS:**
    - i. Some of the components were not available to purchase (Still on back-end order). Thankfully we received some missing pieces from Mr. Reggie. We could have proceeded with 2 full copies only.
    - ii. We don't own a soldering station for the components the scale of the device. During the session, we used the soldering station that was engineered and brought by Mr. Reggie. Once the session is finished, we need to purchase the pieces to mount similar station.
    - iii. The step-by step debugging process were not recorded yet, so we needed to rely fully on Mr. Reggie's experience. Post the session, Mr. Reggie's has agreed to provide the step-by step documentation.
    - iv. Mr. Reggie managed to solve the connection and communication issues between the P2EI-WEALTH wearable device – P2EI-WEALTH Gateway by the time we started the session, but with the time limitation, the connection with RAK Wireless gateway still cannot be established.
    - v. The UKM group purchased and pay for a lot of cost for this visit and this session under different initiatives (Approximately MYR 8,000). The continuation will need to go through several process to generate the additional financial support.
    - vi. At presence, the ethics is still not ready for testing in August or September. We planned to do it in October the earliest.
4. **To conduct site visits to Kuala Lumpur identified sites and monitor the management of wireless communications and network performance tests related to LoRa/LoRAWAN to compare with results in Manila City.**
- a. Due to the many unforeseen complications and the time taken to achieve objectives 2 and 3, we could not performed this final objective.
  - b. This bonus objective will be held separately by UKM Team once the devices are ready.

## VII. Picture Reports

### TASIK CHINI





**UKM**







