



**An IoT-based Public Transport Collection and Analytics Framework using Bluetooth  
Proximity Beacons (BLE)  
Project Meeting and Knowledge Sharing  
Report/Minutes Form**

**I. Organizer:**

Name:	Prof Sharul Kamal bin Abdul Rahim (P2205R01)
Position:	Project Leader
Institution:	Universiti Teknologi Malaysia

**II. Program:**

Date: 12 June 2023 (Monday)

Venue: Trove Hotel (Johor, Malaysia)

**Program Agenda:**

- 09:20 – 09:50      Introductory Session**
- Welcome by Prof Sharul Kamal bin Abdul Rahim (10 mins)
  - Overview of the deployment in Johor (20 mins)
- 09:50 – 10:20      Coffee Break**
- 10:20 – 13:00      Visit location of installation and knowledge sharing *(please refer to the map for the location of these sites) [Note 1]* :**
- Larkin Sentral Bus Terminal
  - Kipmart
  - Taman Ungku Tun Aminah
  - Skudai
  - UTM Bus Stop
- 13:00 – 14:00      Lunch**
- 14:00 – 15:30      IoT Deployment Discussion**
- Showcase of mobile app and dashboard for the deployed system
  - Knowledge sharing of the deployed system
  - Feedback on the deployment from project members



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- 15:30 – 16:00**      **Coffee Break**
- 16:00 – 17:00**      **Data Analytics Framework Discussion**
- Machine Learning base model
  - Datasets and requirements
  - Data Engineering
- 17:00 – 18:00**      **Project Management**
- Milestones
  - Next year's work plan
- 18:00**                **End of meeting**

### III. Participants:

No.	Name	Organization
1	Prof. Ir. Dr. Sharul Kamal Abdul Rahim	UTM
2	Mrs. Siti Fatimah bte Ausordin	UTM
3	Mr Aslam (Representing Dr Mohd Adib bin Sarijari)	UTM
4	Mr Roziqin	UTM
5	Mr Haziq	UTM
6	Ms Fatin	UTM
7	Dr. Sye Loong Keoh	UGS
8	Dr Achmad Basuki	UB
9	Mr. Adhitya Bhawiyuga	UB
10	Dr. Noor Farizah Binti Ibrahim	USM
11	Dr. Mohd Najwadi Yusoff	USM
12	Prof. Somnuk Phon-Amnuaisuk (online)	UTB
13	Dr. Eko Setiawan (online)	UB
14	Ms. Chong Yung Wey (online)	USM
15	Dr. Tham Mau Luen (Online)	UTAR
	Dr. Kok Chin Kor (Online)	UTAR



*Fig 1: Location of the installed RPi*

*The team then proceeded to visit the sites with RPi installed. A UTM bus was arranged to ferry the participants to all sites. We first visited the Larkin Sentral Bus Terminal, where the RPi is installed, and the team from USM and UB had the chance to see the bus muafakat johor arriving and departing from the platform. Discussion was done with respect to the accuracy of the BLE detection and the range of BLE signals as the bus platform is rather wide.*

*Due to heavy rain and traffic congestion, we visited the UTM bus stop directly and opened the battery charging system to be shown to teams from USM and UB. Discussion on the configuration of the RPi and 4G dongle took place, as the UB team is planning to use a 4G modem, so that RPi connects to the 4G modem through Wifi.*

*In the afternoon, UTM team Mr Aslam described the battery charging system and its circuit and the team discussed various deployment challenges for the Johor system. They are:*

- (1) No power supply during the day*
- (2) Unreliable power supply of the street lighting*
- (3) Detection of the bus travel direction*
- (4) Maintenance of the batteries*
- (5) Internet connectivity of the RPi*
- (6) Accuracy of the Estimated Time of Arrival*

*Dr Keoh also showed a video of the dashboard / mobile app displaying the ETA of the bus arriving at Hospital Kulai. As the current ETA is computed based on historical data, its accuracy can be improved once the prediction model is done and integrated.*

*Mr Adhitya presented the deployment plan in Malang, in which they will be using a 4G modem connected to RPi via Wifi. For Malang deployment, there is continuous power supply and hence no battery is required. The approval of equipment purchase has finally been received, and the UB team plans to install the system from 28 June to 12 July.*

*For the data analytics, Dr Keoh presented preliminary insights on the journey duration of P-411 based on the data collected from the Johor deployment. One noticeable finding is that during public holiday (e.g., 21 Apr 2023), the journey duration for the entire day was very consistent. USM and UB team requested for the data to be shared with them. In fact, Dr Noor Farizah from USM has completed a preliminary model of the journey duration prediction and the next step is to use the latest data from our deployment for validation. Additionally, Prof Somnuk mentioned that the insights derived for P-411 is very similar to what they found as reported in his paper presented at ICIBIR in Bangkok in May 2023.*

Finally for Year 2 planning, the Johor team proposes to extend the deployment to P101 (subject to PAJ approval) and reach out to other operators that ply the existing P411 and P211 routes such as Maju Corporation and Transit Link (City Bus). Other potential extension discussed include the installation of passenger information dashboard at bus stops using E-link Display and the use of solar-power to power the RPi.

3. Describe, in detail, if there are changes in the work plan, project schedule, budget allocation, etc. from the initial proposal.

There is no change to the current project schedule or budget allocation.

### V. Others

*(It is best if you put event pictures here)*

#### 1. Pictures



Figure 2: Participants present during the hybrid meeting





Figure 3: Visit to Larkin Sentral Bus Terminal

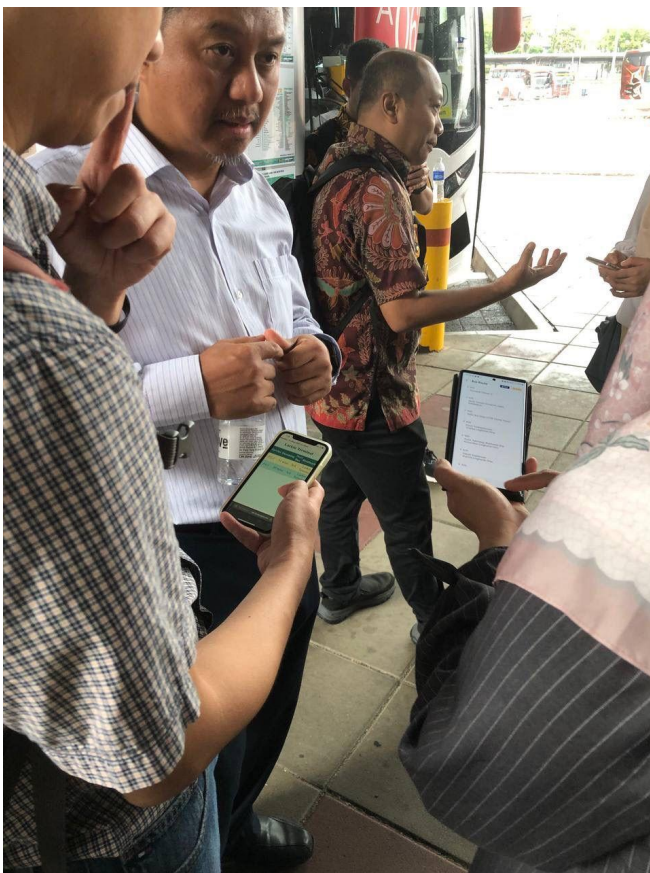


Figure 4: Discussion on bus ETA at Larkin Sentral



Figure 5: One of the BMJ in Johor parked at Larkin Sentral Terminal



Figure 6: Visiting the UTM bus stop site

Figure 6: Visiting the UTM bus stop site





Figure 7: Inspecting the battery charging system



Figure 8: Discussion on the deployment challenges





Figure 9: Group photo at the end of the meeting