Cairo University
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Intelligent Mobile Bus Ticketing System

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Abstract

The issue of fast, safe, and non-distracting payment method is very paramount in any transportation, especially if it affects the safety of passengers. Therefore, an efficient solution has to be applied to enforce the separation of driving the vehicle and issuing tickets responsibilities.

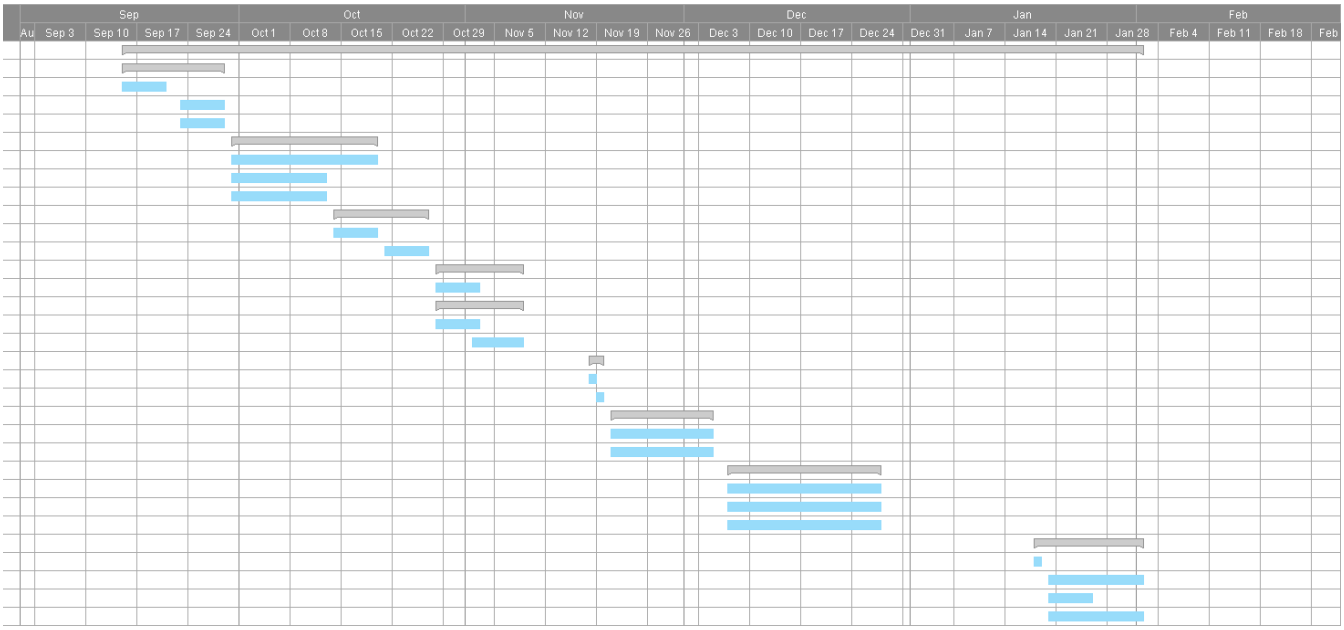
Our solution intends to replace old-fashioned methods of issuing tickets by an efficient digital system that falls under the realm of *internet of things* (*IoT*). A software application is downloaded on the passenger's smartphone. Every passenger can have an account on that application containing his/her information. The passenger's account can be charged with a predetermined amount of balance specified by the passenger at anytime and anyplace. Once enough balance is charged on the account, the passenger can ride any transportation that provides our digital service. The transportation contains an attached IoT device in which passenger can pass his/her smartphone over. That IoT device works as a reader to check passenger's balance against the transportation ticket price. After the process of validation, the IoT device communicates with a back-end server which in turn sends a digital ticket to passenger's account and deducts the price of the ticket from the current balance. At this moment, the passenger has a digital ticket on his/her smartphone containing the necessary details that work as a proof of payment.

The tools used to implement our solution are *Android*, *PHP Laravel framework*, *MySQL database*, and *Near Field Communication* technology (*NFC*). *Android* is used as a front-end technology representing the mobile application downloaded on the passenger's smartphone. *NFC technology* is used in both smartphones and the IoT device mentioned earlier as a way of communication between them. Modern smarphones come with NFC component which is mostly attached to their back. The IoT device device consists of a board which is connected to NFC component. *PHP Laravel* is used as back-end server framework representing the implementation of our services. *PHP Laravel* communicates with *MySQL* database to store and retrieve passengers' data.

Work plan

Completed

	Task Name	Duration	Start	Finish
1	**Project Initiation**	121 d	09/15/17	02/01/18
2	**Explore the Problem**	13d	09/15/17	09/28/17
3	Understand the problem and previous solutions	1w	09/15/17	09/20/17
4	Creating a survey to collect data	1w	09/23/17	09/28/17
5	Understand our solution and its benefits	1w	09/23/17	09/28/17
6	**Understand Methodologies**	18d	09/30/17	10/19/17
7	IoT techonolgy	3w	09/30/17	10/19/17
8	Android	2w	09/30/17	10/12/17
9	NFC research	2w	09/30/17	10/12/17
10	**NFC prototype**	12d	10/14/17	10/26/17
11	Sending text via NFC to another mobile	1w	10/14/17	10/19/17
12	Send phone number via NFC to another mobile and give a response	1w	10/21/17	10/26/17
13	**Mock-up and Prototypes**	11d	10/28/17	11/08/17
14	Android mockup	1w	10/28/17	11/02/17
15	**IoT proof of concepts**	11d	10/28/17	11/08/17
16	Light one light without input sensors	1w	10/28/17	11/02/17
17	Light leds based on input sensors	1w	11/02/17	11/08/17
18	**Work on documentation**	2d	11/18/17	11/19/17
19	Collecting data from survey	1d	11/18/17	11/18/17
20	Fill the documentation (Definition, solution, scope)	1d	11/19/17	11/19/17
21	**Techonology next step**	12d	11/21/17	12/04/17
22	Learning laravel	2w	11/21/17	12/04/17
23	Access API via board	2w	11/21/17	12/04/17
24	**Technology practice**	18d	12/07/17	12/27/17
25	Laravel proof of concepts(generating tickets, charge simulation,..etc	3w	12/07/17	12/27/17
26	Android layouts	3w	12/07/17	12/27/17
27	Go deeper in IoT	3w	12/07/17	12/27/17
28	**System Analysis and Design**	13d	01/18/18	02/01/18
29	Determine functional, non-functional requirements	1d	01/18/18	01/18/18
30	Establish use cases	2w	01/20/18	02/01/18
31	Establish class diagram	1w	01/20/18	01/25/18
32	Establish sequence diagram	2w	01/20/18	02/01/18



Expected

	Task Name	Duration	Start	Finish	Jan	Feb
1	**Software**	4m	02/10/18	05/31/18		
2	**Sprint 1 (Sign Up - Sign In - Forget Password)**	1w	02/10/18	02/15/18		
3	**Android**	1w	02/10/18	02/15/18		
4	Android Layout	1d	02/10/18	02/10/18		
5	API Calls Classes	4d	02/11/18	02/14/18		
6	Testing	1d	02/15/18	02/15/18		
7	**Laravel**	1w	02/10/18	02/15/18		
8	Service Parameters and Return(JSON)	1d	02/10/18	02/10/18		
9	Service Implementation	4d	02/11/18	02/14/18		
10	Testing	1d	02/15/18	02/15/18		
11	**Sprint 2(view Profile - Edit Profile)**	1w	02/17/18	02/22/18		
12	**Android**	1w	02/17/18	02/22/18		
16	**Laravel**	1w	02/17/18	02/22/18		
20	**Sprint 3(view Tickets - view Ticket Details)**	1w	02/24/18	03/01/18		
21	**Android**	1w	02/24/18	03/01/18		
25	**Laravel**	1w	02/24/18	03/01/18		
29	**Sprint 4 (Cut Ticket)**	2w	03/03/18	03/15/18		
30	**Android**	2w	03/04/18	03/15/18		
33	**Laravel**	2w	03/03/18	03/15/18		
37	**Sprint 5 (Charge)**	2w	03/17/18	03/29/18		
38	**Android**	2w	03/18/18	03/29/18		
41	**Laravel**	2w	03/17/18	03/29/18		
45	**Sprint 6 (Extra Features)**	2m	03/31/18	05/31/18		
60	**Hardware**	29d	02/10/18	03/15/18		
61	Connect NFC component to Galileo board	1w	02/10/18	02/15/18		
62	Send a Piece of Data from Smartphone to Galileo Board Through	2w	02/17/18	03/01/18		
63	Send data across online API actual Testing	2w	03/03/18	03/15/18