

Online Gas (LPG) Booking System (A Case Study of LPG Stations in Ghana)

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Abstract-Liquefied Petroleum, Gas (LPG) has become the cleanest, effective and efficient petroleum for domestic and commercial use. It is used in vehicles, for cooking, baking, etc. Although LPG is the most patronized and cost effective fuel for households and commercial use yet there is a major challenge associated with buying the gas at the stations. There is always long queue of people at the LGP stations especially during scarcity and this has become a persistent problem for several years in Ghana. In this study, an efficient web-based system will be designed and developed to avoid this unnecessary long queue and wasting of time at the gas stations.

Keywords-Liquefied Petroleum Gas, Online Booking System, Web-based System

I. INTRODUCTION

Liquefied Petroleum Gas (LPG) is a collection of combustible hydrocarbons gases which consists of propane, isobutane and butane. It was introduced in 1910 by Dr. Walter O. Snelling [1]. According to [2] (2016), LPG is the most commonly use sources of energy for household cooking in Ghana. It is used at homes and industries for cooking, baking of snacks, heating water and it is also used in vehicles. In Koforidua town, Eastern region of Ghana, most of the LPG stations are often stamped by people struggling to buy gas especially during scarcity of the commodity. This problem has persisted for several years without measures put in place to overcome the challenge.

1. Problem Statement

Most of the LPG stations in Koforidua often experience long queue of people spending several hours waiting to buy gas. This problem of time wastage at the stations has persisted for several years.

2. Significance of the study

- Customers who wish to buy LPG can easily access the availability of the gas at various stations through the web-based system.
- The system will enable customers to make online reservation of gas without necessarily going to the stations to queue.

3. Objectives

The, objectives, of, the, Online, Gas, (LPG), booking, system, are, as, follows,

- To, develop, a, system, that, will, provide information on the availability of LPG at different gas stations
- To, avoid queueing of buyers at the gas stations

II. LITERATURE REVIEW

The systems developed by some authors and scholars were reviewed adequately to discover gaps or issues that were not addressed. [3] designed and implemented gas booking system using a hardware called Radio Frequency Identity (RFID). The system worked successfully for the purpose but not cost effective. There was another hardware designed and implemented by [4] for gas booking and detection of leakages. [5] Implemented Arduino booking gas using Arduino board hardware All the reviewed literatures used hardware to implement the online booking of gas and this of course is not cost effective. In this study, a cost effective and reliable system will be designed and developed for online gas booking without the use of hardware.

1. Benefits of proposed system

It is a web base application that will enable customers to access information about the availability of gas at various stations. With the help of the system, they can make online gas booking at the comfort of their homes.

III. METHODOLOGY

Qualitative research approach and experimental research method were adopted in the study.

1. Data Collection instruments

Users requirements were collected through interview as a qualitative research method instrument.

2. Agile Model

Agile is a common software development life cycle model and all the phases will be applied in developing the proposed system.

3. Benefit of Agile Model

The model enables the developer to make changes in the requirements during the system development.

4. Phases of Agile Model:

The figure1 below shows the phases of Agile Model for developing the proposed system.



Figure 1 Agile mode showing the respective phases.

5. Use case diagram

All the requirements were analyzed to ascertain the practicality of the proposed system. The figure below further demonstrates the analysis of the system.

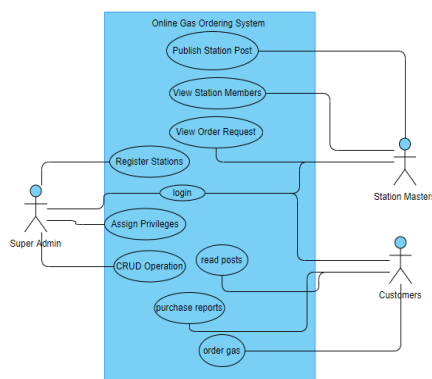


Figure 2 Use, case, diagram. It shows the relationship between the proposed system and the users.

6. Architecture Design:

The figure 3 below demonstrates the architecture design of the proposed system which comprises of main components, subsystem and interrelationships.

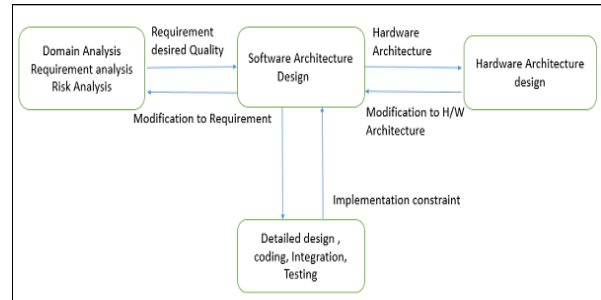
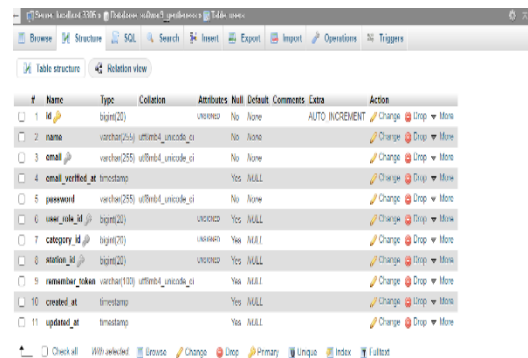


Figure 3 Architecture design.

The home page, admin and user interfaces are illustrated in the below figures.

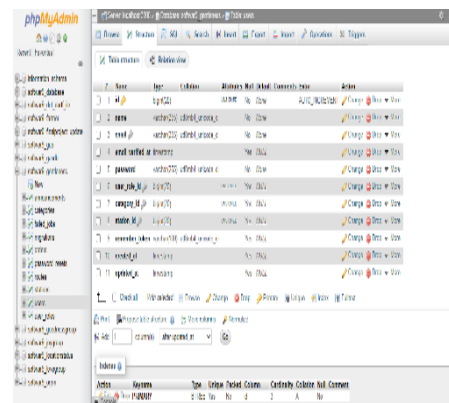
7. Database design:

The figures 4a and 4b show the database design of the proposed system.



#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	bigint(20)		unsigned	No	None		AUTO INCREMENT	Change Drop More
2	name	varchar(255)	utf8mb4_unicode_ci		No	None			Change Drop More
3	email	varchar(255)	utf8mb4_unicode_ci		No	None			Change Drop More
4	email_verified_at	timestamp		Yes	NULL				Change Drop More
5	password	varchar(255)	utf8mb4_unicode_ci		No	None			Change Drop More
6	user_role_id	bigint(20)		unsigned	Yes	NULL			Change Drop More
7	category_id	bigint(20)		unsigned	Yes	NULL			Change Drop More
8	station_id	bigint(20)		unsigned	Yes	NULL			Change Drop More
9	remember_token	varchar(100)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
10	created_at	timestamp		Yes	NULL				Change Drop More
11	updated_at	timestamp		Yes	NULL				Change Drop More

Figure 4a.



#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	bigint(20)		unsigned	No	None		AUTO INCREMENT	Change Drop More
2	name	varchar(255)	utf8mb4_unicode_ci		No	None			Change Drop More
3	email	varchar(255)	utf8mb4_unicode_ci		No	None			Change Drop More
4	email_verified_at	timestamp		Yes	NULL				Change Drop More
5	password	varchar(255)	utf8mb4_unicode_ci		No	None			Change Drop More
6	user_role_id	bigint(20)		unsigned	Yes	NULL			Change Drop More
7	category_id	bigint(20)		unsigned	Yes	NULL			Change Drop More
8	remember_token	varchar(100)	utf8mb4_unicode_ci		Yes	NULL			Change Drop More
9	created_at	timestamp		Yes	NULL				Change Drop More
10	updated_at	timestamp		Yes	NULL				Change Drop More

Figure 4b.

8. Software Design Tool:

Flowchart diagram as one of the designed tools will be used for the designing of the proposed system. It is a logical flow and graphical representation of the proposed system.

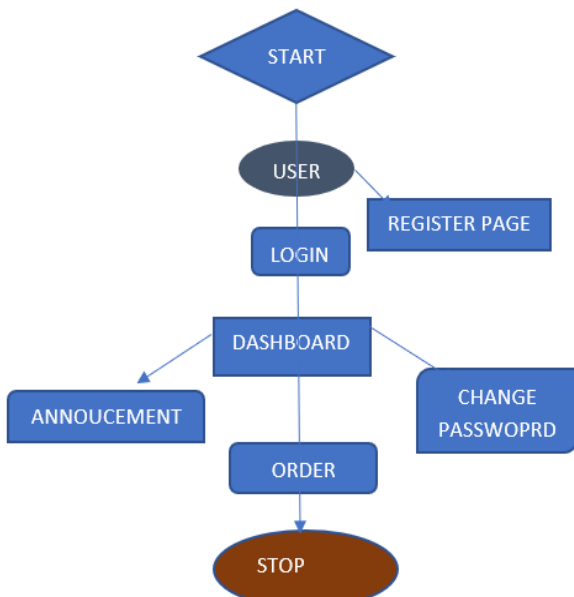


Figure 5 Flow, chart,

IV. EXPERIMENTAL RESULTS AND DATA ANALYSES

1. Software Development (Coding)

The following programming tools were used to develop the system namely: Bootstrap, CSS, HTML5, PHP, Laravel and MYSQL.

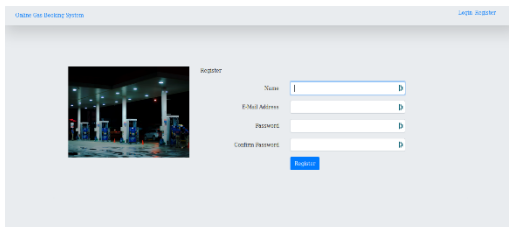


Figure 6 Register interface where customers can create their login accounts.

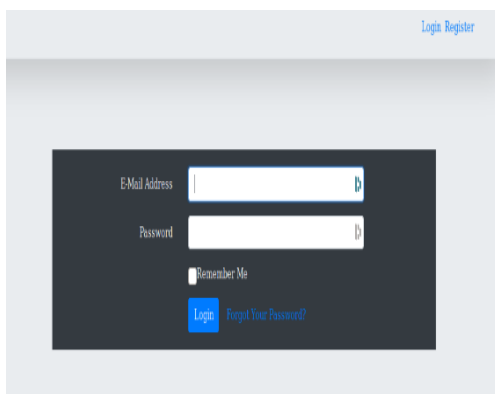


Figure 7 Login interface where customers can login with their credentials.

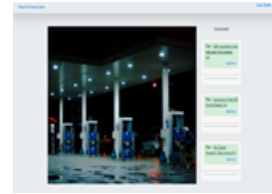


Figure 8 Admin dashboard where admin can perform several operations about LPG and customers data.



Figure 9 Customers dashboard where users can view the information on the availability of gas at different stations.



Figure 10 User order form where customers can place order for gas at any stations.

2. Software Testing

Various tests were performed to ascertain the usability and reliability of the system after it was developed. The tests include: unit testing, integration testing, code testing, usability and system testing. All the tests executed showed that the system is reliable and usable.

V. CONCLUSION

From the experimental results and data analyses, we have successfully designed and developed a reliable web-based system that provides LPG customers information on the availability of gas at different stations and this saves the buyers time by avoiding queue at the stations.

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