Components of Smart Chatbot Academic Model for a University Website

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2020 Emerging Technology in Computing, Communication and Electronics (ETCCE) | 978-1-6654-1962-8 /20/$31.00 ©2020 IEEE | DOI: 10.1109/ETCCE51779.2020.9350903

***Abstract*—In current days, Chatbot has been increasingly in demand and become popular among the communities of media, end-users, and even vendors. There are two types of Chatbot which are Smart Chatbot and Simple Chatbot. The Smart Chatbot provides more functions and it is the most used in current days. As the Smart Chatbot has becomes the tool that eases the interaction between the human and the site, most of the companies, institutions, and even the individual have look for it. This is including the universities. Having a Chatbot embedded in the University Website is able to increase the service level and the interaction between the stakeholders and the university itself. However, there is lacking in the guideline on the general or core components that must have before developing a Smart Chatbot for the University Websites. Hence, to overcome the problem, this paper comes out with a research study on identifying the components needed in developing a Smart Chatbot for University Website. For now, the research work is focusing on the academic category only on the website. As the first step of the research process, the list of components of the Smart Chatbot Academic model was gained through Literature Review from the year 2017 to 2020. The identified components will be next evaluated through a survey process. The idea of the work is to develop a Smart Chatbot Academic model that will be significant as a guideline for the University to develop its own Smart Chatbot.**

Keywords*—*Smart Chatbot, components, University Websites, interaction, service level, Academic

I. INTRODUCTION

The websites have been popular in today's world, where people tend to search and get the information through browsing a website. Websites are making the searching information process easier toward people's daily life as compared to twenty years ago. Thus, most of the companies, institutions even government have built up their own websites including the universities. The use of websites could be various purposes based on the owner's intention to have it. However, the growing adoption of the websites has brought many problems in engaging the engagement between the university websites and the stakeholder. The stakeholder defined in this study as a person or a group of people who are involved as internal or external with the organization and beneficial to the organization.

Based on researchers Pittsley and Memmott, they have stated in their studies, that usability studies of LibGuide have focused on four selected university website and has addressed the navigation issue [1]. However, navigation is one of the factors that increase the likelihood of stakeholder to return to the site again [1]. Besides, complicated navigation structures, dynamic website content, and heavy graphical user interfaces are the major obstacles of website accessibility [2].

Another important criterion that used to disseminate information to a stakeholder is website accessibility and the major problem of this criterion is when it comes to persons with disabilities [2]. This group of stakeholders must be provided with high web accessibility when browsing it.

In order to increase the interactivity of the website, most website's owner has implemented an added technology to overcome it. One of the rise technologies currently is Chatbots. In addition, researchers [3] have studies the implementations of a Chatbot in hotels and guesthouses websites. Both Lasek and Jessa found that there are 63% of stakeholder prefers to interact with the Chatbots through the website [3]. This shows that added technology is an alternative way to improve website engagement.

However, there are still lacking in generalizing the identified components that need to have in order to develop a Chatbot. Having an embedded Chatbot in a website could be an interesting yet added the additional value to the University Website. Thus, this paper is purposely to identify the components needed for developing the Smart Chatbot Model for University Website.

The outlines of this paper as follows. The first section is the introduction of the research study. Section 2 describes the literature review from the previous researcher. Section 3 describes the methodology of this research study. The next section shows the finding which is the result gained of this research study. Meanwhile, the conclusion has been discussed in Section 5. This paper ends with a description of the future work as describes in Section 6.

II. LITERATURE REVIEW

A. University Website

The University website is a platform for connecting the interaction between the university and its stakeholders. Thus, most universities in today's world have used the initiative to improve their way of interaction with the stakeholders by developing their own website. In addition, the universities that prioritize their user experience take advantage to leverage the website in order to reach larger institutional goals and see a clear return on investment [4]. However, a university must clearly define its website's

978-1-6654-1962-8/20/$31.00 ©2020 IEEE

purpose and related issues in order to have a good performance on the university website.

The purpose of the university website is to bring forward the university's mission and brand to the stakeholders [5]. The different university has a different mission and brand. Thus, the website is used to differentiate those universities around the world and indirectly make the branding of the university well-known. Besides, the website must be dynamic and user-friendly as it needs to be adaptive toward the diverse and changing needs of the stakeholders [5]. This means the website must be up-to-date with the needs of the stakeholder.

Another purpose of university websites is used in disseminating information to the stakeholders from the start of website evolution until today, as it is a phenomenon referred to as online information dissemination (OID) [6]. Where the OID attentively focuses on improving the stakeholder's knowledge based on the searched topic. Moreover, the stakeholder took advantage in seeking information easily through the website as it is ubiquitously available in today's landscape. By referring to the previous study, there is 94 percent of the stakeholders used the university website as a medium to find the information [7].

B. Common Categories on University Websites

Moreover, there are common categories that lie in the university websites as there are presenting the contents for the website. Where all the contents of the university website are grouped into specific categories that enable the stakeholders to easily find the information as illustrated in Fig. 1.

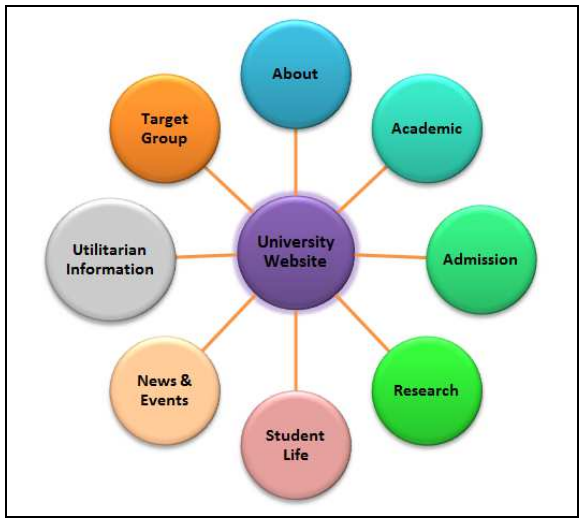

Fig. 1: Common categories on University Website

Based on Fig. 1, there are common categories of groups of contents on the university website. The category of About is most common to have for the university website [8] as it is the introduction page toward the overview information of the university [9]. This page is important as the stakeholders get the information about the university as general before exploring other information regarding the university [10]. Apart from that, the category of academic also plays an important role in the university website as it is the place for all the academic information gathered [8]. The stakeholders are able to get to know the information regarding the list of departments of faculties and programs offered in the university under the academic category [10], [11]. Besides, they are able to collect information regarding the academic centre of the university.

As for the Admission category, it is the place for all gathered information regarding the admission of the university [8], [12]. This category is important to the prospective students as it does provide detailed information regarding the application to the university. Besides, the Research category on the university website is all about the information regarding the area of the research of the university [12] such as a list of awards, achievements, grant and funding. The research information is able to attract the stakeholders to join the research opportunity under the university. Another category is Student Life [10], [12]. This group of category provides the stakeholders with information regarding the student's activities and expose them to the university's environment. This information is able to give the stakeholders an overview of methods to connect with other students, a larger community of campus, and an extension of what it means to be a university student [10].

Apart from that, the category of News and Events is the collected information regarding to the updated news and events that have in the university. This category is able to make the stakeholders alert with any issues or events that occur within the university. Other than that, the common category on the university website is Utilitarian information [12], [13]. Basically, the utility pages under this category are not grouped under their main menus [13]. These are included privacy policies, terms and conditions, legal disclaimers, or even technical pages such as sitemap [13]. Besides, another category is Target Group. It is important to arrange the content by categorizing it into the target group of different types of stakeholders as it is consolidating information to minimize the number of clicks required by the stakeholders [10]. By this effort of splitting the information based on the group such as prospective student, student, alumni, visitor, vendor, and staff, helps to direct users to their focus while browsing the website. Table I indicates the summary of categories of content on the university website.

TABLE I. SUMMARY OF CATEGORIES OF CONTENT IN UNIVERSITY WEBSITE

Reference	Categories	Description
[8]–[10]	About	- Encompass the overview or the university. - Give information regarding to university profile.
[8], [10], [11]	Academic	- Encompass list of faculties and program offered in the university. - Encompass academic centre in the university.
[8], [12]	Admission	- Encompass the information regarding to the admission of the student.
[12]	Research	- Give the information regarding to the awards and achievement of the area of research of the university. - Give the information regarding to the grant and funding.
[10], [12]	Student Life	- Encompass the information regarding to activities of students in the university. - Encompass the information regarding to the environment of student life in university.
[14], [15]	News and Event	- Give the information regarding to the news and events that related to the university.
[12], [13]	Utilitarian Information	- Encompass the information in different pages such as

Reference	Categories	Description
		privacy policies, terms and conditions, legal disclaimers and sitemap.
[10]	Target Group	- Encompass specific information for different users (student, prospective student, alumni, visitor, vendor and staff).

Based on Table I, it is derived that the common categories in the university website have their own specification and reason to be placed on the university website. However, among those categories explained above, this study focuses more on the Academic category because it is the major business of a university website.

C. Chatbot

The technology of Chatbot started in the 1960's [16] and the first Chatbot called ELIZA was developed by Joseph Weizenbaum at Massachusetts Institute of Technology (MIT) on 1966 later [17]. The term of Chatbots is differently defined by the researches, including Artificial Intelligence conversational entities [18], [19], Virtual assistant [18], [20], Chatterbot [16], [19], [21], Digital assistant or Chatbot [16], [18]. Meanwhile, the purpose of the Chatbot is to mimic the human conversation [16], [18], [20], [22].

The Chatbot is widely known as the software program that has the ability to present a natural conversation to people as parallel with its purpose mentioned, which is mimicking the human conversation. In addition, Chatbot is designed to simulate an intelligent conversation with the stakeholders [18], [20] by uses artificial intelligence through a medium of text-based such as Natural Language Processing (NLP) [20], [23], [24]. Where the NLP is defined as a field of computer science and linguistics that concerning the interactions between computers and the human natural language [23].

Besides, there are two types of Chatbot, which are simple Chatbot and smart Chatbot which are also known as Rule-based and AI-based Chatbot [21], [25], [26]. The simple Chatbot is known as a rule-based Chatbot [27] as it is a type of Chatbot that answer the questions based on a series of rules [26]. Where, the rules are predefined and built-in responses in a dataset by the developer as a decision maker to identify both knowledge and response [21], [25], [26]. Meanwhile, smart Chatbot is more to AI-based Chatbot [27]. As developer utilizes a machine learning model in order to train the Chatbot in handling the questions from the stakeholders [27] by generating a response based on the data provided and adapt their behavior based on the stakeholder's interactions [21], [25].

D. Existing Research on Various Usage of Chatbot for University Website

There are existing researches on various usage of Chatbot for the university website that identify the type of Chatbot, its characters or roles, and its contents as illustrated in Table II. There are two types of Chatbot as presented in the table below which AI-based and Rule-based. The characters and the contents for Chatbot are depended on the purpose of the Chatbot being implemented along with the field where it belongs too. Where the previous researchers, [28] indicate that the Chatbot is used for different purposes such as organization's advisor and museum assistant which then, lead to the shape of the Chatbot's character and contents. As in Table II below, there is the various defined character of the Chatbot such as university's receptionist, admission assistant, university's booking resource assistant, and virtual assistant. Meanwhile, the content found for the Chatbot model from the existing researches is consists of the university's FAQs, information related to university admission, faculties, booking resources, and administrative and academic issues.

TABLE II. EXISTING RESEARCH ON THE USAGE OF CHATBOT FOR UNIVERSITY WEBSITE

Reference	Type of Chatbot	Character of Chatbot	Content of Chatbot
[29]	Smart Chatbot	Admissions assistant	Encompass the information about the university admission
[30]	Smart Chatbot	University's receptionist	Encompass university's FAQs, Faculties
[31]	Smart Chatbot	Booking resources assistant	Encompass the information for booking university's resources
[32]	Simple Chatbot	Virtual assistant	Encompass the administrative and academic issues
[33]	Simple Chatbot	University's receptionist	Encompass all the information related to admission to university

Based on Table II, most of the Chatbot are AI-Based, which also known as Smart Chatbot. The character and the contents of the Chatbots are encompassing the information related to the University.

E. Existing Chatbot Application for University Website

There are existing researches on the Chatbot application that can be referred to in order to identify the components as illustrated in Table III below. The researchers [34] have developed a Chatbot for the university website which enables the stakeholders to get information about the university efficiently.

TABLE III. EXISTING CHATBOT APPLICATION FOR UNIVERSITY WEBSITE

Reference	Name of Chatbot	Pattern/ Approach	Content	Programming Language
[34]	Unibot	AIML	Information related to University/ College	PHP
[22]	-	AIML	Encompass university's FAQs	-
[35]	-	AIML, Pattern Matching	Encompass the admission related enquiries in the university	-
[36]	-	Algorithm	To identify answers related to user submitted questions	PHP

Based on the existing work in Table III, the existing Chatbot has used the Artificial Intelligence Markup Language (AIML) pattern in developing the Chatbot and the focus content for the Chatbot is regarding the information related to the university.

III. Methodology

In this research study, the method used to identify the components needed for developing the Smart Chatbot Academic model is through the preliminary study, which is Literature Review.

This research has studied the previous researcher's works and able to identify the components being used in developing the Smart Chatbot. Most of the Chatbot are using the basic general components, which acts as core components that must have in order to develop the Smart Chatbot.

IV. Result

Based on information gained in Literature Review, this research has identified the components needed in developing a Smart Chatbot Academic model as shown in Fig. 2.

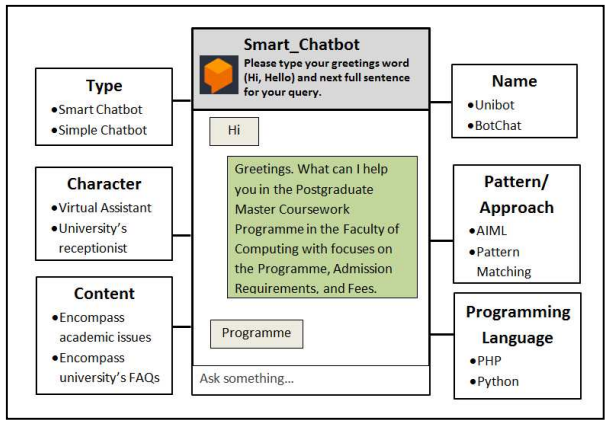

Fig. 2: Conceptual diagram of the components for the Smart Chatbot

From Fig. 2, there are six (6) components of the Smart Chatbot Academic model that has been identified along with the examples for each component. Meanwhile, the description for each component is stated in Table IV.

TABLE IV. Components Needed for Smart Chatbot Academic Model

No.	Components for Smart Chatbot Academic Model	Description
1.	Type of Chatbot	The type of Chatbot will determine the whole process of the Chatbot's development as it has different proceeses to each different type of Chatbot.
2.	Character of the Chatbot	The character of the Chatbot will help in achieve the purpose of the Chatbot.
3.	Content in the Chatbot	The content of the Chatbot will drive the developer to provides right information in the Chatbot.
4.	Name of the Chatbot	The name of the Chatbot will help it to having it own name as different to other Chatbot.
5.	Pattern/Approach for the Chatbot	This pattern or approach of the Chatbot will help in determining of what kind of the suitable pattern/approach that needed in developing a Chatbot.
6.	Programming language needed	The programming language needs to be classified before the development of the Chatbot based on the expertise of the developer and the suitableness with the Chatbot.

The components that have been identified are the general components that are needed in developing a Smart Chatbot model, which most Chatbot developments are using it. From this result, it has achieved the objective of this research study.

V. Conclusion

In conclusion, a Smart Chatbot has increased in demand as it is the best tool that provides fast response in order to interact with the users. It is very helpful as it allowed the users to enter the questions in natural language to communicate with humans and able to gain the responses in time. Apart from that, it can be related to the concept of sign language recognition as it is needed for realizing a human-oriented interactive system as it can be performed similarly to the normal communication with human [37]. Besides, it is similar to the human reactive behavior that will respond whenever there is a request on any question [38]. In this research study, the components which act as the guideline in developing a Smart Chatbot have been identified and presented. The information has been gained from the Literature Review. Meanwhile, the limitation of this research study is lacking a validation of the components of the Smart Chatbot, thus it is unable to proceed with the designing and development of the Smart Chatbot. To ensure the Smart Chatbot able to keep lots of data, a cloud service is required.

VI. Future Work

This research study is focusing on identifying the components needed for developing the Smart Chatbot Academic model. Thus, the future work of this research study is to complete the components validation through the survey. Following with the confirmation, then the next work can proceed with the design and development of the Smart Chatbot Academic model based on the identified components. In addition, the preparation on cloud services also required for the future work, where most of the cloud services are provide virtualized resources and build around a distributed environment [39].

Acknowledgment

This research work is supported by Faculty of Computing, University Malaysia Pahang.

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