Old Dominion University Call Centre using Twilio

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***Abstract*—Every company that deals with consumers and other third parties, whether directly or indirectly, relies on call centres. Similar to companies, universities need to have call centres in order to increase the campus departments' flexibility as they deal with a huge number of students on a daily basis. In this paper we have come up with a call centre management system for Old Dominion University using Twilio, which will cater to students who have any queries regarding the Computer Science department and Student Health Services. Once you dial the phone number associated with the call centre, you will be given two options: Enter 1 for CS Department or enter 2 for Student Health Services and based on your need you can enter the specified number on your phone keypad.**

***Index Terms*—Call Centre, Twilio, flexibility, Computer Science, Student Health Services**

I. Introduction

Generation Z is the most technologically advanced generation to date. Today's students expect rapid results and excellent customer service in everything from ride sharing to food delivery to streaming media. Many colleges are looking to student call centers as solutions to boost their outreach, recruiting, and retention measures in order to stay on top of this trend. Old Dominion University being a vast campus with each department having its own building, students usually face a problem of finding details about the department like their phone number, email id, chairperson, faculty office hours, etc. Usually students will have to walk to the specific building or look up in the website for the details which is a tedious task. Hence we came up with a call centre management system, which is a one-place stop for all kinds of queries regarding the Computer Science Department. In addition to that, one can also book appointments at the Student Health Services. Once you dial the phone number associated with the call centre, you will be given two options: Enter 1 for CS Department or enter 2 for Student Health Services and based on your need you can enter the specified number on your phone keypad to be directed to the respective department.

II. Advantages of a university call centre

A. Improved Customer Service

Having a call centre, which is dedicated to helping students, is necessary for universities these days as the number of students are increasing every year and its getting difficult for the university management to address every students concern or problem. This is where the Call Centre will come into picture, which will have solutions to most of the frequently asked questions. The call centre will in turn improve the quality of services provided to the students.

B. Managing seasonal peaks and valleys

Since there is a surge in the intake of the universities, the queries of students, to be addressed, will also increase simultaneously. In order to manage all the students at the same time, there is a need for a common platform like a call centre to address the frequently asked questions of students.

C. Increased flexibility

As most of the frequently asked questions have answers built in the system already, there is no need for a human to address those questions, which will reduce the efforts from the university's point of view. Students tend to feel valued when their queries are addressed and will therefore feel respected by their institution and in turn are more apt to succeed in their classes and achieve the degree they are aiming for.

III. Background

A telephone based human service operation is referred to as a call centre. A call centre delivers tele-services, which are services where the consumers and service agents are remote from each other. In addition to the tele-services, they also provide services via internet, email, chat and fax. There are many universities that have human-to-human interaction in their respective call centres but we haven't come across a university call centre that has a bot answering their queries or a call centre that has pre-defined information built in the system which addresses most of the frequently asked queries of the students in such a way that the students can control which option to choose from. In order to overcome this, we decided on building a call centre system using Twilio such that it has most of the information built in the system, which could be the probable solution to most of the students' queries.

IV. Methodology

A. Approach

The main objective of the project is to build a university call centre which will be a one place stop for students for retrieving solutions to the most frequently asked queries about the Computer Science Department and also if they wish to book an appointment with the Student Health Services. We

intended to come up with a phone number using which the students can connect with the call centre which will in turn present the students with options like the computer science department and student health services to choose from. Upon selecting the desired option, the student will in turn be presented with other detailed options in each category, for example in the computer science department, they will be given options like faculty office hours, computer science building timings, tutoring services offered, etc.

B. Target Audience

For this project, the target audience that we wished to focus on are Old Dominion University students, faculty, administrative staff, academic personnel and alumni.

C. Technologies/ Tools used

Twilio: It provides programmable communication tools for making and receiving phone calls, sending and receiving text messages and performing other communication functions using its web service APIs (Application program interface). Twilio is a layered architecture [3]. The Twilio ecosystem is depicted in Figure 1. It's bottom layer has the Twilio servers which lay its foundation by exposing a set of data and voice communication APIs for sending and receiving voice calls and messages. The middle layer has the application servers, which are usually installed by the users who have a registered account in Twilio. For example, these application servers might belong to a company that wishes to provide VoIP service to its customer. Every Twilio account will be linked to (i) one or more Twilio numbers (ii) an account SID and (iii) an authentication token. A Twilio number is a 10-digit phone number and in our case it is 6626666613. Account SID is a unique identification number for a Twilio account. Authentication token is a token used by Twilio servers to authenticate an account. The application server will use the authentication token and the account SID to access the Twilio APIs. In the top most layer lie the Clients, which could be browser based or phone based. The clients here are not the direct customers of Twilio, instead they are the customers of the services that are built on top of Twilio.

Auto-Pilot: This is a tool which is a part of Twilio, which is used for delivering messages to the user. When a user selects faculty office hours as in the computer science department option, then if the respective faculty has virtual zoom office hours, then the zoom meeting link will be forwarded as a text message to the respective student's phone number.

Studio: The tool offered by Twilio that is used to build IVR's (Interactive voice response system) and chat bots by connecting pre-packaged widgets in a visual editor.

Terms used in Twilio needed for this project:

- Say - Read text to the caller
- Play - Play an audio file for the caller
- Dial - Add another party to the call
- Record - Record the caller's voice
- Gather - Collect digits the caller types on their keypad
- SMS - Send an SMS message during a phone call

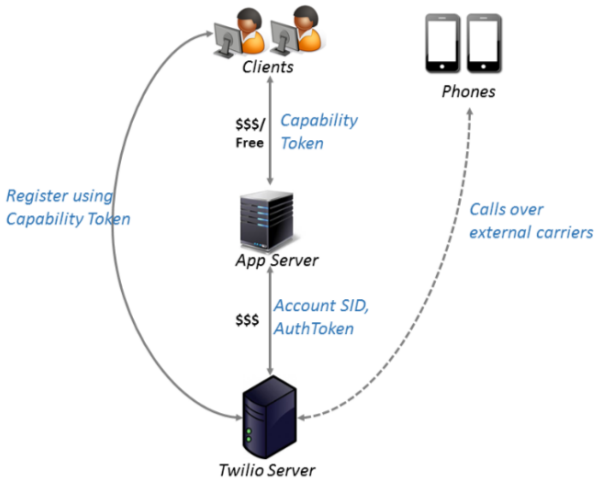

Fig. 1. Twilio Ecosystem

- Hangup - Hang up the call
- Queue - Add the caller to a queue of callers.
- Redirect - Redirect call flow to a different TwiML document
- Pause - Wait before executing more instructions
- Reject - Decline an incoming call without being billed
- Automated calls : Twilio APIs can be used to place automated calls to phone numbers to deliver a pre-recorded message
- Voice calls : VoIP applications can be built atop Twilio voice APIs which can be used to place voice calls. There are three scenarios possible for VoIP applications:
  - Call between VoIP Clients
  - Call from Phone to VoIP Client
  - Call from VoIP Client to Phone
- Messages : Twilio message APIs can be used to send automated messages.

D. Features offered

Faculty office hours: This feature lists all the faculty in computer science department for the student to choose from. Upon choosing one faculty, the student will be given their office hours timings and if they have virtual office hours, then a text message will be forwarded to the students which has the zoom meeting link for the office hours.

Tutoring services: This feature lists the tutoring services offered by the computer science department.

Timings of the Computer Science Building: This feature lists the timings of all the computer science buildings like the Dragas Hall, ECS Building and the Web Centre for the students.

Graduate Program Advisor: This feature lets the students to retrieve the details of the graduate program director for PHD students who is Danella Zhao and her email will be listed for the students. Also, this feature also provides an option for the students to know the graduate program director for the masters

program who is Yaohang Li and their email address will also be listed for the students information.

Facilities offered for computer science students: This option lists the students with the facilities offered for the computer science students and they are the open research lab in ECS building, the access to vcportal.odu.edu and move.odu.edu

Student Health Services: This feature redirects the call to the student health services office for the students to book an appointment with them to meet the doctor or the respective officer.

E. Design

1) The user can call the Old Dominion University Call Centre and they will be given with two options: Press 1 for CS Department or Press 2 for Student Health Services.
2) If the user presses 1, they'll be given with options about the CS Department like: Faculty office hours (press 1), Tutoring Services (press 2), Timings of CS Buildings (press 3), Graduate Program Director (press 4) and facilities offered for CS students (press 5). In order to repeat these options, the user is supposed to enter 6.
3) Else if the user presses 2, they'll be redirected to the Student Health Services representative where they can talk the representative and book an appointment with the Student Health Services.

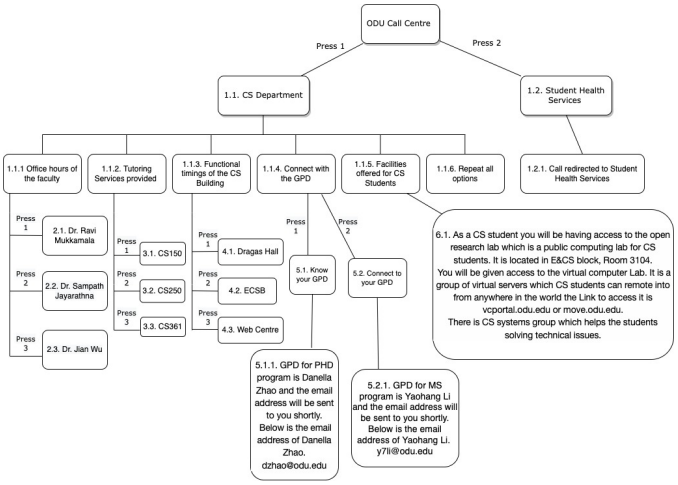

Fig. 2. Hierarchical Task Analysis of the Call Centre

V. Results

When the user/ students call the phone number 6626666613, they will be given two options to select from: Computer Science Department and Student Health Services. The user can enter their desired choice as 1 or 2 on their phone keypad. Based on the choice entered, the call will be redirected to Computer science department or the student health services. In the computer science department the student will be offered with 6 options: Faculty office hours, tutoring services, building timings, graduate program director, facilities offered and repeat all the options again whereas in the student health services option, the user will be redirected to the student health services office for them to directly connect with the designated official to book an appointment with them.

Evaluation:

We have evaluated the project based on answering most frequently asked queries of students like information about faculty office hours, facilities offered for computer science students, information about graduate program advisor, tutoring services offered for the students of the computer science department. We even achieved to redirect the call to the student health services if the user types in 2 from the phone keypad in the beginning when provided with Computer science department and student health services. The call will be then answered by one of the representatives at the student health services.

VI. Discussion

This call centre will help students to know information about their respective department (in this case the computer science department) in terms of their faculty office hours, building timings, tutoring services offered, graduate program director and the facilities offered by the university to its respective students. This call centre will make the students lives at the university much easier by providing the trivial and most important information like the ones mentioned above. This call centre also offers to redirect to the student health services, which is the go to place for students if they have any issues related to their health.

VII. Future Work

For future implementation, we have plans to include chat bots which are interactive and will be trained using machine learning algorithms. We also intend to expand the scope of the call centre by including other departments like Electronics and communication, English Literature, Biotechnology, Medical Sciences, etc. We have plans to include options like booking studio rooms in Student recreation centre or booking programs for outdoor adventure programs using the chat bot of the call centre. The call centre could also be built as a web application or a mobile application for much easier access.

VIII. Conclusion

The university call centre is a one place stop for all kinds of queries pertaining to the university's computer science department and the student health services which will address the most frequently asked queries of the students in the university. Instead of a human being answer all the queries of the students, most of the information is in built in the system which will provide options to the students to select from and based on the option, the desired information will be read out or sent as a text message to the user

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