

EDUCATION COMPANION ROBOT FOR PRIMARY EDUCATION

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Abstract: Technology is growing at a very fast phase stretching up to almost every domain. In which the educational domain is not left alone. Shifting from conventional offline mode to online mode of education is one thing that has become more common and advantageous these days. Emphasizing this idea, the paper deals with the development of an android application that integrates teachers and students through one platform. The application consists of three interfaces viz, an interface to go through course-related materials, an interface to take up quizzes and an interface with embedded Chabot to help students with the queries related to the course. Along with helping the students in their learning, the online mode of education helps students in being technologically connected. A few of the other advantages are; instills self-confidence and responsibility in the child, saves time and the environment is peaceful and focused.

IndexTerms – Chatbot, Dialog flow, NLP, Firebase.

I. INTRODUCTION

Robotics is considered an effective instrumental tool in the educational system. Chatbot-based learning system provides an attractive teaching application for students and teachers. Hence it is considered as one of the effective teaching applications in modern days. In these learning processes, we have designed a chatbot using Natural language processing that guides the students and the teachers in their curriculum. An NLP based chatbot communicates with the user via the textual method.

Nowadays children are being used to technology in their everyday lives hence learning with technology will be easier than learning with paper and books. The usage of computers in learning environment helps in the development of computational thinking power in students. During this pandemic many students faced difficulties in academics and attending classes, hence we have proposed a solution in the form of chatbot which is user-friendly for students and also helps them in understanding concepts easily. This chatbot application is used in the educational field to help students in developing their own learning experience, accessing information and educational content. Chatbot acts as a virtual classroom because it provides various features for both students and teachers such as: taking quizzes, learning through materials provided, access results and uploading materials, scheduling quizzes respectively. The fundamental goal is to guide students in their respective curriculum.

The paper is organized as follows:

- The second section is the literature survey which describes the ideas that we have taken from various related papers.
- The third section is the proposed work. Here we are explaining the architecture and the data flow diagram of the application.
- The fourth section shows the expected outcomes of this application as a final result.
- The fifth section describes the conclusion of the application.
- The sixth section talks about the future scope of this application.

II. LITERATURE SURVEY

Title: A Subject-Specific Chatbots for Primary Education End-users using Machine Learning Techniques

Author: Dr. B. Santhosh Kumar, N.Kanagavalli, T.Daniya

Journal: International Journal of Control and Automation, 2020

Description: The paper[1] describes how to develop a chatbot that helps students to learn the course Computer Networks, answers any related queries raised by the students. This was implemented using NLP techniques. It also describes the various techniques that can be used for developing a chatbot, the main techniques highlighted are supervised learning, unsupervised learning and generative model. This model was trained using 21059 interactions between 11292 pairs of different characters from 617 movies. Upon completion, the chatbot could successfully answer FAQs. It also deals with the identification of moods of the user by using the concept of NLP and NPC dialog. It highlights how the chatbot is trained and also how to use the long short-term memory concept to make chatbots answer some of the frequently answered questions. The results showed that since they have less shared experience or common history their ability to answer a question is limited.

Title: Design and Implementation of Education Companion Robot for Primary Education

Author: Jie Chu, Gang Zhao, Yang Li, Zhen Fu, Wenjuan Zhu, Longlong Song

Conference: IEEE 5th International Conference on Computer and Communications, 2019

Description: The paper[2] discusses the construction of an educational companion robot for primary school students. The robot is built with the characteristics of primary school subject knowledge, voice question-answer and control functions. The voice control feature made enhanced the interactions between the robot and the learners. The technologies used to build the robot are Raspberry Pi 3B, 4 Mics-Pi microphone array, Arduino and steering engines. The voice question-answer module takes the voice of the learner as input, which is converted into text by voice recognition API, for this, the server would retrieve the answer from the local knowledge base; if it is present there and also if the semantic similarity between the given input and the data present in the local knowledge is greater 0.9. Otherwise, a Turing robot will be called to extract the answer from its built-in encyclopedia. The

voice control module is all meant to control the motion of the robot. Except for the fact that the proposed robot had a lesser amount of local data, it showed good results.

Title: How chatbots can be involved in the education process

Author: Stanislav Ondas, Matus Pleva and Daniel Hladek

Conference: IEEE 17th International Conference on Emerging eLearning Technologies and Applications (ICETA), 2019

Description: The paper[3] presents a modern approach, in which human-like interaction is used for accessing the information related to education. Written or spoken dialogue forms a very perceptive interface, where usage of human language serves as a platform for information exchange. Nowadays, the chatbot implemented services have become most popular.

The main advantage of using them is that they provide data without time consuming searches. The results obtained from this presented system shows that students consider these services as helpful and attractive. The main reason for their attraction is that this form of obtaining information saves their time, make them less stressful as it enables them to find information without searching the web application and also makes them comfortable in obtaining information. It is also believed that this technology is one of the ways which is leading to more attractiveness into the education domain and it motivates the students to gain more knowledge.

Title: The Role of Chatbots in Formal Education

Author: Gyorgy Molnar, Zoltan Szuts

Conference: IEEE 16th International Symposium on Intelligent Systems and Informatics, 2018

Description: The paper[4] starts by discussing the theoretical history of chatbots and the challenges of using them as educational auxiliaries. As the authors move ahead they describe the challenges and steps in the process of programming a bot. Moving onto the taxonomy of chatbots, two types have been briefly described; 'Retrieval-based models' and 'Generative models'. The Retrieval-based models imitate human memory and the way they respond to questions. These systems are based on predefined databases. Whereas the Generative models are more advanced, smarter and do not depend on the predefined answers. Rather they try to provide an output based on the given input. This paper proposed an idea of using the chatbots not only as educational assistants, but they can also be used to provide reminders about exams and answer the questions raised by students. NLP helped in understanding the messages of students, automating some of their replies, route conversations to the human teacher in case the bot was not able to find an answer. In the conclusion, the authors mention that a chatbot lessens the workload on the teacher and gains trust.

Title: A Tool of Conversation: Chatbot

Author: M. Dahiya

Journal: International Journal of Computer Sciences and Engineering, 2017

Description: The paper addresses the design and implementation of chatbots. Chatbots will recognize the user input by using the pattern matching technique and they are also capable of accessing the information to provide an answer. The paper shows the choices that are made regarding the selection of OS, software, design, features and purpose of the chatbot. The key things that are to be kept in mind while implementing the chatbot are; the features of the dialog box and the database. Further in the paper, a comparison is made among all the other chatbots and the chatbot implemented according to this paper. The pattern matching technique is used to represent the input and output. If the provided input is not found in the database, a default response will be generated. This chatbot can be used for entertainment purposes or it can also be used to provide information by implementing certain modifications. It can also be used as a learning tool, with the necessary information stored in the database. Hence the chatbot implemented using this paper is simple, conversational and easily modifiable for the application in other domains.

III. PROPOSED WORK

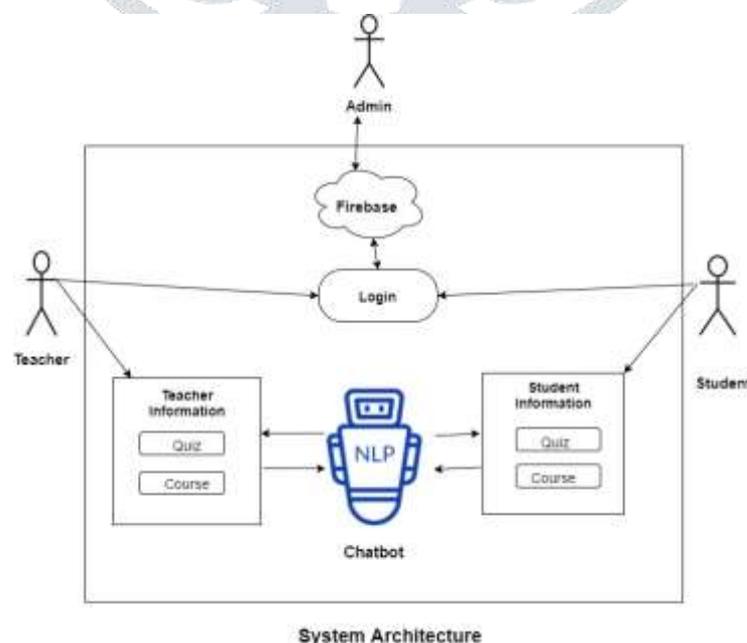
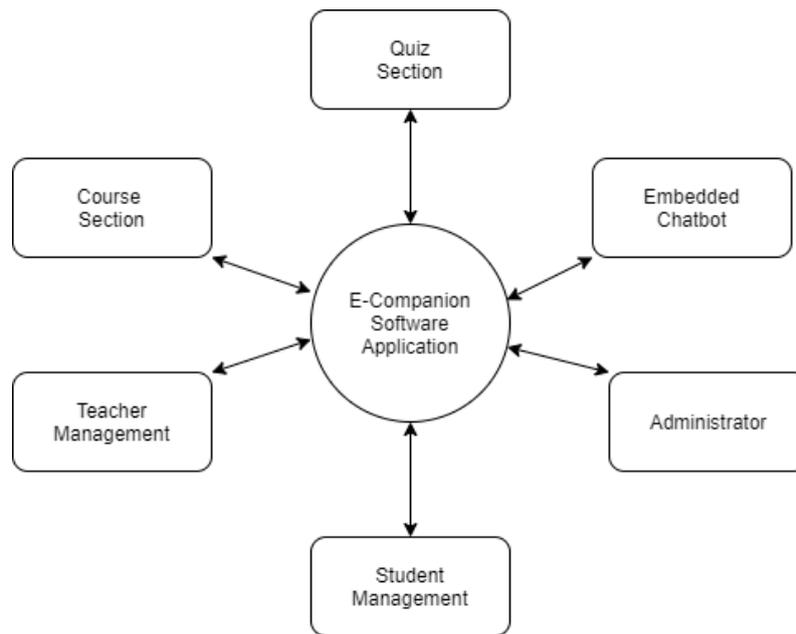


Fig 1: Architectural overview of the software

The proposed system brings in an easy-to-use application that will be helpful for both teachers and students. The system consists of three users, namely, student, teacher and administrator. The role of the administrator is to keep track of individuals using the

application. The students can use the application to refer to course-related materials and attend quizzes updated by teachers. In addition, there is a chatbot embedded in the application to help students in their studies.

The system presented in this paper is more effective as we have concentrated on the “keep it simple” model, ie., the user interface used is very simple which enables students to conveniently make use of the application at their best. Chatbot embedded in the application deals with various kinds of queries which help the user to understand the concept in depth. The system manages records of the performance of students which helps them to work on their weaker sections and also helps teachers in guiding them.



Data Flow Diagram

Fig 2: Represents Data Flow Diagram for the application

Data Flow Diagram consists of all the main components involved in the application.

- At the center we have our E-companion software application which includes all the major components as mentioned in the Figure 3.1.
- Quiz Section: It contains quizzing modules for conducting quizzes in a particular subject.
- Course Section: It contains various courses which can be enrolled by the students of their choice.
- Teacher Management: It contains modules to evaluate quizzes and to view scores of the students and it also helps to post the quizzes.
- Student Management: It contains records to keep track of the performance of the students.
- Administrator: He / She can add, modify or delete courses accordingly.
- Embedded chatbot: It enables students to interact with the application by their queries.

IV. EXPECTED RESULTS

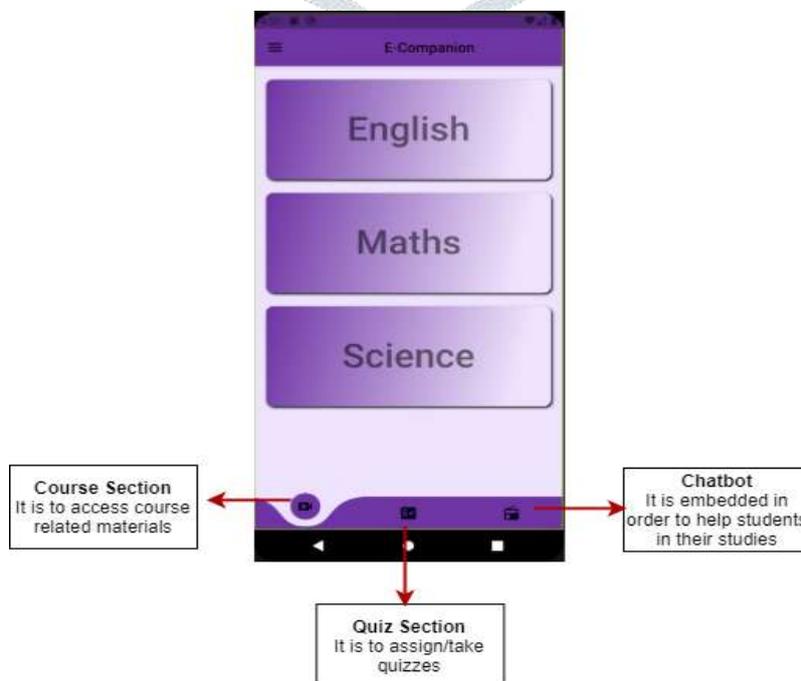


Fig 3: Snapshot of the application’s home screen highlighting the implemented features

In the proposed system, we are going to provide a user interface in the form of an application with chatbot features. The students can login to the app and enroll in the courses, can take quizzes, can view their scores and teachers can post the quizzes and analyze the performance of students. Since it is a very simple module it does not require any experience, it is as simple as chatting with a friend. This system allows the students to keep track of their performance which helps them to work on their weaker sections. Thus, in turn, it builds confidence in students to face examination. This system aims to provide a better environment for students to learn effectively to reduce the issues they face in classrooms by interacting with teachers.

V. CONCLUSION

The proposed paper presents an android application with an embedded chatbot that can be utilized by both teachers and students. This paper aimed to establish effective utilization of Chatbot in the application to intensify the student experience in Education field. By study, it indicates that Chatbots are consistently used by students in solving problems, due to their easy to use interface with respect to other existing methods.

This user-friendly application can help students to become virtual experts in various topics, and help other students to explain things to their fellow-mates by making them into study partners at different levels, helping them understand and develop each topic at their own speed, questioning what is necessary, and generating positive exchange environment that allows student to gain more knowledge.

VI. FUTURE SCOPE

The application presented in the paper can be used as a learning-teaching companion, both by the students and the teachers. This idea could be implemented on a large scale, generating channels where students can discuss any topic with an 'expert', clarifying doubts by asking questions, and reach conclusions that would improve their understanding of different topics. In the future, we plan to implement emotion analysis using AI to enhance the experience of students in learning and interaction with the bot.

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