1. **INTRODUCTION:**

In industry, users use database applications to get information related to employees. This needs knowledge about the database to non-technical employees such as the HR department. Other applications developed are not much user friendly and they are not smart enough to evolve on themselves and to understand what user actually wants. Other applications give programmed options restricting user to explore all aspects. The Chatbot for HR department aims to provide efficient and accurate answers for queries asked by HRs from the database using Artificial Intelligence Markup Language (AIML) and Latent Semantic Analysis (LSA). Chatbot for HR department will be able to answer questions, query results. Chatbot will be able to answer questions related to salary, attendance, product growth as well as it will give suggestions if it doesn't get proper answers for the user's query. Chatbot will have full HR data.

**1.1. Need:**

Today’s world is running very fast, so HRs don’t have much time to look personally into the database to find answers to their queries. They need some fast approach to do their work. There is a need for an assistant who can work faster. So, it is better if they have a virtual computer-based assistant which can answer fast to their queries. A simple virtual assistant is a Chatbot. In the past few years, Chatbots have been very popular because of their fast and accurate response capability and less need for any physical resources as they are not paid. Using Chatbot will reduce and make faster the work of HR people effectively increasing the productivity of them.

**1.2. Problem Statement:**

Searching for details of employees in a huge database is a tedious and hectic task. Also, it is difficult to customize searches and results. User has to type various queries to get different results. The appearance of an application is not interactive.

**1.3. Aims and Objectives**

* **Aim :** The Chatbot for HR department aims to provide efficient and accurate answers for queries asked by HRs from the database using Artificial Intelligence Markup Language (AIML) and Latent Semantic Analysis (LSA
* **Objectives:** To give virtual assistance to HRs so their work could be simplified and productivity could be increased.

**1.4. Application and Scope:**

Chatbot will be able to answer questions based on attendance like getting the attendance of a particular company location also can give suggestions like if the user wants an employee who can work on a particular technology and if no such employee exists chatbot will give suggestions of employees who can work on similar technologies. Chatbot gives response in various formats like text, tables, graphs, etc. Thisproject can be further modified for other departments as this project only works for the HR department. Frontend can be improved to grab maximum attention of the user. The model can be trained to analyze data and then display results.

**2. Literature Surveyed**:

**2.1 Literature review**

* **Chatbot for University Related FAQs[1]**

Chatbots are programs that mimic human conversation using Artificial Intelligence (AI). It is designed to be the ultimate virtual assistant, entertainment purpose, helping one to complete tasks ranging from answering questions, getting driving directions, turning up the thermostat in smart home, to playing one’s favourite tunes etc. Chatbot has become more popular in business groups right now as they can reduce customer service cost and handles multiple users at a time. But yet to accomplish many tasks there is need to make chatbots as efficient as possible. To address this problem, in this paper we provide the design of a chatbot, which provides an efficient and accurate answer for any query based on the dataset of FAQs using Artificial Intelligence Markup Language (AIML) and Latent Semantic Analysis (LSA). Template based and general questions like welcome/ greetings and general questions will be responded using AIML and other service based questions uses LSA to provide responses at any time that will serve user satisfaction. This chatbot can be used by any University to answer FAQs to curious students in an interactive fashion.

User discussion as a rule begins with welcome or general questions. User inquiries are first taken care by AIML check piece to check whether entered inquiry is AIML script or not. AIMLis characterized with general inquiries and welcome which is replied by utilizing AIML formats. This operation is divided into three parts:

* User post the query on chatbot
* Processing is done on the user’s query to match the predefined format by the developer
* Pattern matching is performed between user entered query and knowledge (pattern).

As discussed earlier, user can post their query on chatbot and response is generated based on pattern matching techniques presented in this paper[1].

* **Automated Thai-FAQ Chatbot using RNN-LSTM[2]**

In the e-commerce model that has online customer service, such as email or live chat, customers mostly use live chat because it is fast and comfortable. Thus, a company needs to hire and pay for admins. However, this incurs the problem that admins need to spend an extensive amount of time for writing an answer and customers have to wait for the answers. Several chatbots are available, but they require users to set up key phrases manually. In this article, we propose and develop a Frequently Asked Questions (FAQs) Chatbot which automatically responds to customers by using a Recurrent Neural Network (RNN) in the form of Long Short- Term Memory (LSTM) for text classification. The experimental results have shown that chatbot could recognize 86.36% of the questions and answer with 93.2% accuracy.

1. Preparing data

In our case, we have 2,636 pairs of questions and answers. We then manually categorized such pairs into 80 classes (according to the number FAQ types) and labeled them with an integer. Then split questions and answers. Questions were used for training AI while the answer would be prepared for replying to customers

1. Pre-processing

Pre-processing consists of three main components: tokenization, mapping dictionary, and zero padding. Tokenization or word segmentation is an essential task in natural language processing (NLP) for the Thai language that does not have word boundaries. After the text was segmented into words, each word would be mapped to an integer by dictionary index for processing. We would get the length of the list of integers equal to the number of words of the text. However, the classification model needed a fixed length of the input, so we used zero padding to make every input have the same length.

1. Classification Model

The classification model is a neural network that takes an input from pre-processing for learning to categorize the questions. It consists of three layers. First, the embedding layer is the NLP module where words (an integer) are mapped to vectors of real numbers that learn representation for predefined fixed sized vocabulary from a corpus of text. Second, the long short-term memory (LSTM) layer is a particular kind of recurrent neural network (RNN), which is capable of learning sequential data such as text and video. LSTM enables RNN to remember inputs over a long period. Third, Dense layer (Output layer) with softmax activation function is used in various multiclass classification methods. The softmax activation function in the output layer represents a categorical distribution over class labels and obtaining the probabilities of each input belonging to a label. Because of softmax activation function is used at the output layer, we have to encode the label of questions to one-hot format for the learning process of the model[2].

* **A Pilot Study Integrating an AI-driven Chatbot in an Introductory Programming Course[3]**

As AI software tools become more commonplace, their potential to transform the student experience has greatly increased. By integrating these tools into a course, students can begin to receive real-time, around the clock, instructor moderated support. The potential benefits for students are significant. In addition to increasing their ability to work constructively on their schedule, it has the potential to engage students who might otherwise avoid directly interacting with another person. Before these tools can be meaningfully actualized into a course, work must be done to build a knowledge base about the course.

For this research, the team sought to develop an intelligent chatbot interface for an introductory computer programming course. The interface had an initially limited knowledge base with the intent that it would be populated based on students’ interactions with the chatbot. This model allowed the bot to evolve with the needs of the students. This paper seeks to present the methodology for how the chatbot was developed and integrated into the course, how the knowledge base was developed, the usage during the pilot, and the next steps for improving the chatbot’s interface. Additionally, the paper will discuss the mechanisms added to handle issues such as false-positive responses and how faculty may be able to integrate such tools into their own courses as supplementary assistance.

EduBot was used for 48 interactions by 21 unique users (31% of possible users) in 33 different usage sessions. Six of the 21 unique users initiated more than one session, with the other 15 only using the chatbot once. A majority of these interactions occurred within the first third of the academic term.The initial knowledge database for EduBot was only populated with common MATLAB functions used in the Introduction to Computing for Engineers course. As a result, it was expected that there would be a high percentage of “No- Answer Found” responses from EduBot. Overall, these responses comprised 33.3% of the chatbot’s responses.