



**Introduction to Artificial Intelligence (IAI)**  
**Mobile Virtual Geek**  
 ASSIGNMENT

**Instruction:**

- Marks will be awarded for good presentation and thoroughness in your approach.
- Referencing Code: If you use some code, or ideas for code, which are taken or adapted from another source (book, magazine, internet, discussion forum, etc.), then this **must** be cited and referenced using the Harvard Name convention within your source code. Failure to reference code properly is considered as plagiarism.
- Complete this cover sheet and attach it to your project.
- This project is to be attempted by a group of 3 students.

Project Title: <b>Virtual Mobile Geek</b>			Intake: UC1F1611
Member's Names		Designation/Role	Signature
1	MUSTAFA AHMED ABDULJABBAR	Project Manager and Knowledge Engineer	
2	MUKABAK ORAZBEK	Programmer	
3	BAHY MOATAMER ELSLAM	Knowledge Engineer	

**Student declaration:**

I declare that: *\*We understand what is meant by plagiarism.*  
*\*The implication of plagiarism have been explained to us by our lecturer.*  
*\*This project is all our work and we have acknowledged any use of the published or unpublished works of other people.*

Group Leader's Signature: .....

Date:.....

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## **ABSTRACT**

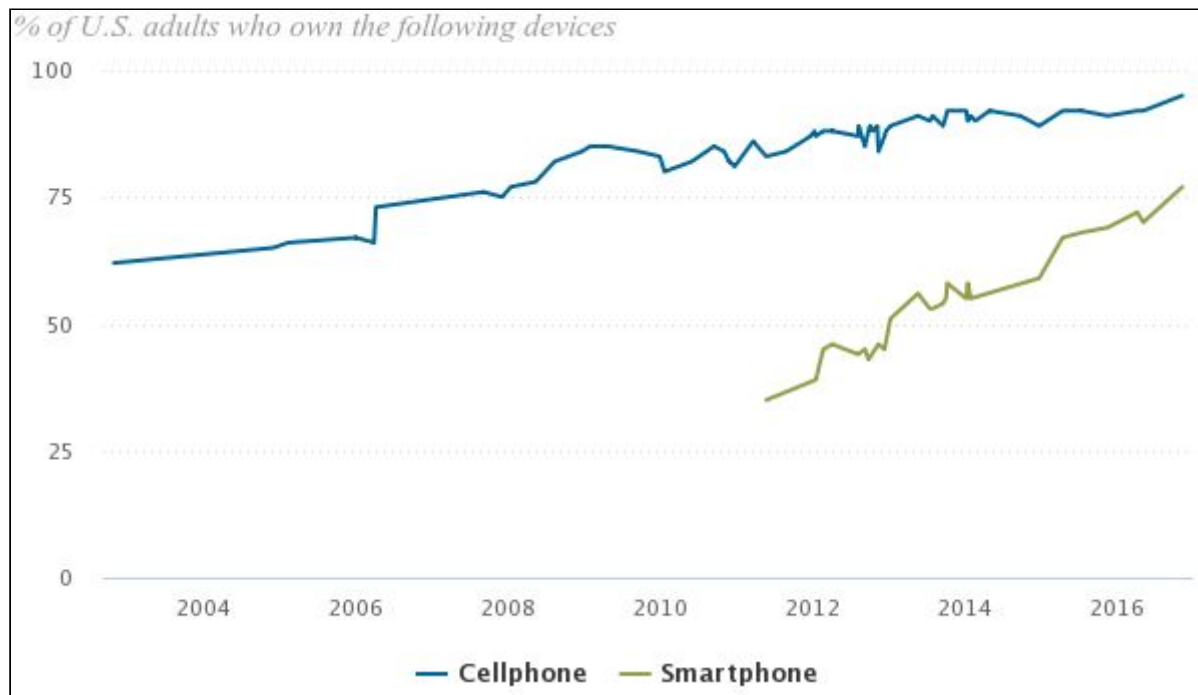
*By far, the greatest danger of Artificial Intelligence is that people conclude too early that they understand it*

-- Eliezer Yudkowsky (artificial intelligence researcher and writer)

In addition to Eliezer's saying, contexts given by AI program are abstract responses resulted by set of rules (for expert system case) designed and engineered by technical engineers. Thus adding conversational and learning aspect to it can potentially improve the interaction experie.

## INTRODUCTION

Smartphones enhanced people's life and reduced efforts in different aspects along with internet from navigation to checking news on e-newspaper, It became an essence and a must to own which derived different tech companies to manufacture smartphones devices because demand proved it self according to surveys conducted between 2002-2016 by PEW Research Center (Figure 1). (PEW Research Center: Internet, Science & Tech, 2017)



*Figure 1.0: Demand for smartphones are increased by 25% in matter of 4 years.*

The variety of smartphones in the market leads to confusion to the customer to select the right device especially if the customer wasn't keen on technology part of the purchase which makes him totally blinded or mis-lead by advertisement and biased opinions from blogs and tech review videos online.

## 1.0 THE PROPOSAL

### 1.1 Implementation Strategy

The system going to provide a narrowed list of options of mobile devices from wide variety of mobile phones in the market by asking key questions to break down user's requirements and match it up with the latest devices in the market with respect to other different factors like :

1. Accelerometer	24. Internal Storage
2. Ambient Light Sensor	25. Internal Storage Size
3. Autofocus	26. Manual Focus
4. Back Camera	27. Operating System
5. Back Camera Resolution	28. Physical Keyboard
6. Battery Capacity	29. Pixel Density
7. Battery Removable	30. Price
8. Battery Type	31. Protection Glass
9. Bluetooth	32. Proximity Sensor
10. Cellular Connectivity	33. RAM
11. Chassis	34. Resolution Height
12. Clock Speed	35. Resolution Width
13. Color	36. Ruggedness
14. CPU Cores	37. Screen Size
15. Digital Compass	38. Screen Tech
16. Dual Simcard	39. Thickness
17. External Storage	40. Touchscreen
18. Flash	41. Video Record Fps
19. Front Camera	42. Video Record Res
20. Gps	43. Weight
21. Gpu	44. WiFi
22. Gyroscope	45. Image Stabilization
23. High Dynamic Range	46. Wireless Charging

*Table 1.1: Features.*

The system will make use of different aspect (list mentioned above) in order to provide a specific solution for people for instance:

based on questionnaire conversations that occurred in verbot requirement concluded in:

*"A normal person that uses the phone only for making calls, checking emails and using facebook"*

Thus for normal people different aspects will be a plus features to be considered yet:

- making calls would require a decent battery life so it can covers a day at least.
- applications like facebook or email clients to be runned properly in a productive manner it demands an operating system that have wide-range of applications in the application marketplace.

Such a problem can be automated and settled into rules because it complies to certain logic as the differences listed below between human expert and expert system:

	Human Expert	Expert System
<u>Experience</u> (Data Source)	Human cannot experience all variety of mobile phones due to financial factors or time related factors due to huge volume of devices being released on daily bases.	Tech review channels on youtube or gadget review articles can be a good source of experience where can be collected with ease where most of the reviews are being done abstractly from any form of biasing. which is going to be used as a main source of knowledge for the expert system
<u>Availability &amp;</u> <u>Querying</u> <u>Concurrency</u>	human are subjected to exhaustion which eventually will leads to unavailability in recuperation period. Not forget to mention serving concurrency at a time which will bottleneck if high demand occurs	the system can be scaled in both directions Vertically (Software) and Horizontally (Hardware) to contain the demand volume which will guarantee high availability and high user serving concurrency at a time.

<u>Knowledge</u> <u>Maintainability &amp;</u> <u>Dynamic</u> <u>Acquisition</u>	Human by nature are great pattern recognizers it help them to shape and store information in relational form where retrieval of these information can be from different type of querying (questionings). New attributes for the entities can be considered without restric rethinking or remodeling which gives the human great adaptability for every case possible.	While adaptability in expert system requires periodic administrations on weekly basis at least, for such a system to include new mobile phones and do the regular data acquisition part. Yet querying and retrieval of data will be way faster than human expert. New attributes for entities will be adapted dynamically according to our database architecture kindly find it in appendices
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*Table 1.2: Comparison between Human and Computer Expert.*

## 1.2 Expert Suitability

Based on the comparison in table 1.2 and [section 1.1 implementation](#), the suggesting process can definitely be computerized with high probability of better results as long as the database or knowledge base is up-to-date and the fact that human is objected to exhaustion and cannot process big chunk of data or at least search through them gives credit to the computerized expert system to accomplish such a limitation along with querying engine across the database.

## 1.3 Need For the Expert System

Based on the statistics provided in [section 1.0 Introduction](#) the demand for such an expert system is proportionally increasing with the variety ratio of the manufactured smartphone devices to reduce the amount of confusion that typically occurs when the buyer tries to purchase newer or better smartphone, Especially for wide segment of buyers where most of them comes from non-technical background which doubles the confusion.





## 2.0 PROBLEM SPECIFICATION

### 2.1 The Aim Of Expert System

Human being cannot experience every device produced. In fact it is almost impossible to do so, Because of the high production ratio or new smartphone device along with spending power of an individual which consequently will lead the expert to be biased to a certain brand or criteria which may not satisfy or dilute the buyer.

The aim of the proposed system is to overcome the financial limitations thus defeating the idea of biased opinions to a specific gadget and provide a computerized comprehension of how mobile devices can be acquired based on its key features. As it mentioned in [features table 1.1](#).

The responsible team designed the proposed system to minimize the efforts of maintainability of the system, As in any typical expert systems maintainability demand day-to-day information update to stay informational and beneficial to the user. Thus smartphone virtual geek is built on hybrid knowledge base where the knowledge or features of the smartphones are stored in a features pool which is a 48 columns in table powered by relational querying engine to apply logic across the stored information which can be easily integrated with a web crawler or interfaced with insertion form for system administrator, And conversational flow is backed by Verbot engine all together combined by C#.

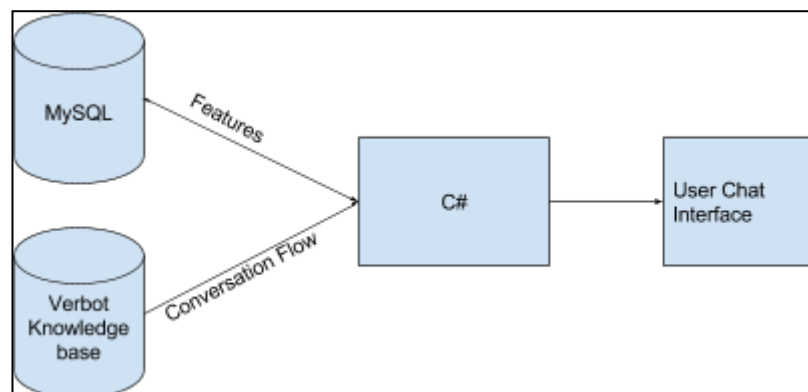


Figure 2.1: System architect

## **2.2 Domain Expert**

Mr. Salih Zain was our domain expert. Mr Salih helped us with all the information we needed, and all information we got from him were extremely insightful and useful. As a result we could determine a vast list of key features which are necessary to determine and shape user's requirements for instance: If a user is a gamer and plays mobile game it would be better to suggest a device with a GPU for better gaming experience.

Mr. Salih Zain comes from a solid technical background especially in smartphones industry as he previously had a YouTube channel to review latest technology gadgets. He had the chance to experience considerable number of smartphones and its operating system thus he was a perfect match for the project to be accomplished at it best.

He was so kind and open, even he suggested some websites to visit and it really was a valuable addition to our database for the expert system.

## **2.3 The Project Team**

Every member in the group played an important role in the assignment, and everyone worked very hard to achieve the goal.

### ***2.3.1 Mustafa Ahmed (Group Leader, Knowledge Engineer):***

As a group leader Mustafa was responsible of directing team's activities and objectives and as a knowledge engineer he was responsible for designing of structures of smartphones specifications in relational model along with building required MySQL queries to achieve the needed results.

### ***2.3.2 Bahy Moatamer (Knowledge Engineer)***

As a knowledge engineer Bahy was responsible for collection of information from Mr. Salih Zain (Domain Expert) and setting up questions and conversational flow of the Verbot.

### ***2.3.3 Orazbek Mukabak (Programmer)***

As a programmer Oraz was responsible for integrating Verbot SDK into C# and use MySQL to empower verbot knowledge base with processing power and querying engine.

### 3.0 KNOWLEDGE ACQUISITION

#### 3.1 Summary of the Interview

The researches have found adequate data from the domain expert. The domain expert has proposed websites where all the data we needed is found there as well as conceptual methodologies to overcome certain computer limitations in mimicking human reasoning sense.

#### 3.2 Beneficial Outputs/Impacts Of The Interview

1. Key [features list \(table 1.1\)](#) of 48 features that shapes smartphone owner's segment which can be categorized into different options for instance: Gamer spec set, Photographer spec set. where each of has its own major focus point in term of usability.

2. Categorization of specification set based on owner's smartphone major usability for instance: a phone with GPU and numbers of core equals to 2 or more can be a good candidate for a gaming phone. Thus we converted these facts or statements into a relational query across the specification table like:

```
SELECT smartphone.name FROM smartphone_features WHERE gpu = 1 AND  
number_of_cores >= 2 INNER JOIN smartphones ON smartphone.id =  
smartphone_features.smartphone_id;
```

The result is:

smartphone.name
iPhone 7
Galaxy S8

3. Helped to design custom interface based on his experience as UI/UX designer which can guarantees better human interaction with respect to HCI guidelines.

## 4.0 KNOWLEDGE REPRESENTATION

### 4.1 Semantic Net

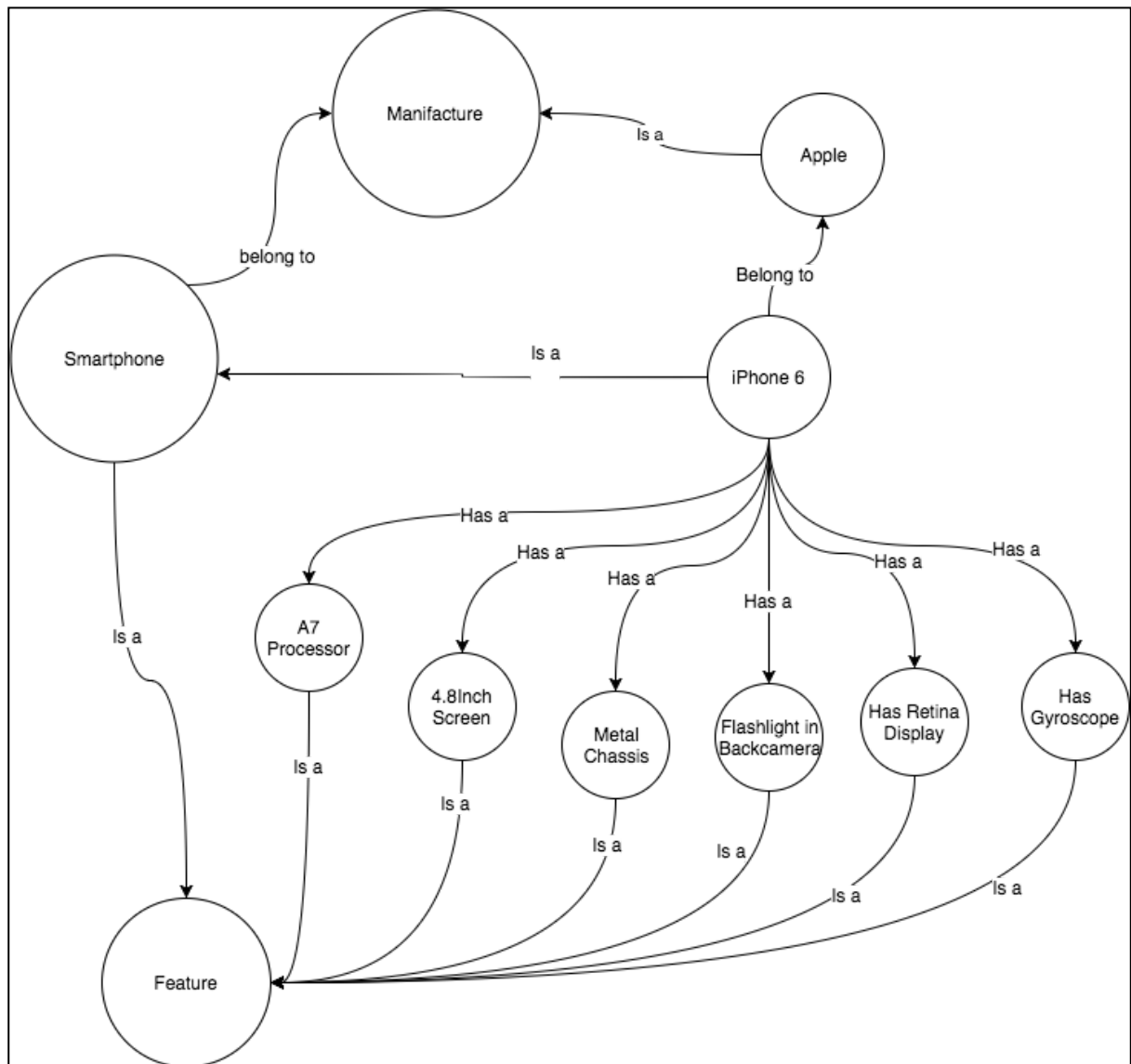


Figure 4.1: Semantic net.

## 5.0 IMPLEMENTATION

### 5.1 Features

#### 5.1.1 User Interface Design

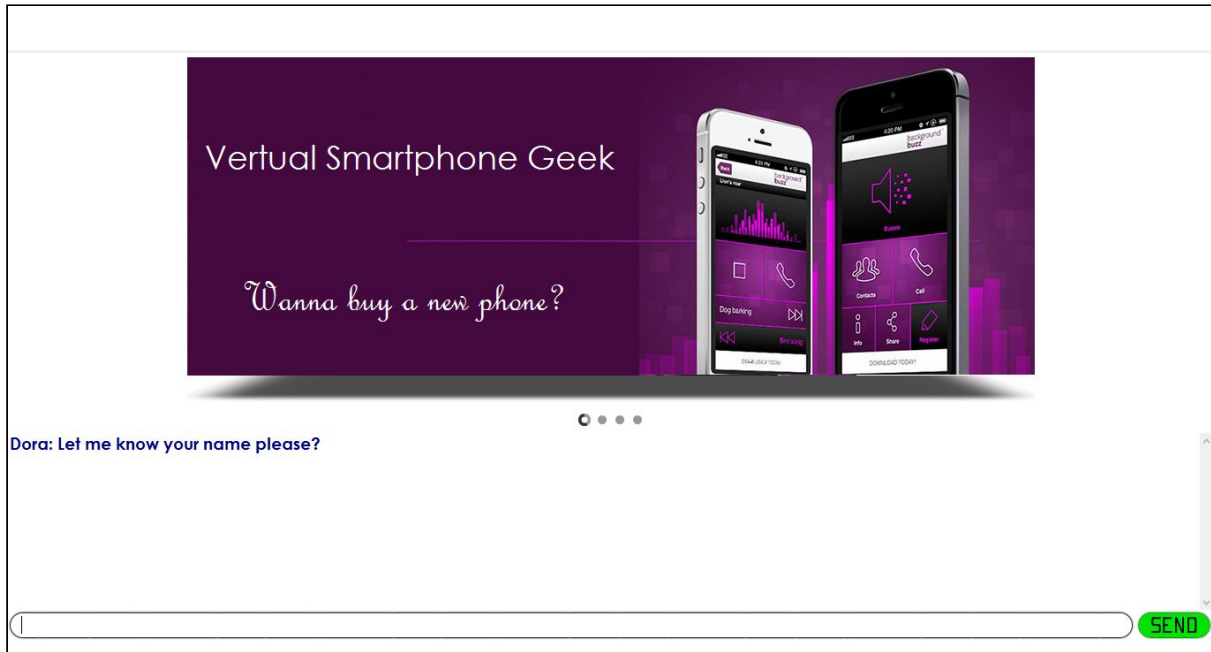


Figure 5.1: Welcome page of Geek Adviser.

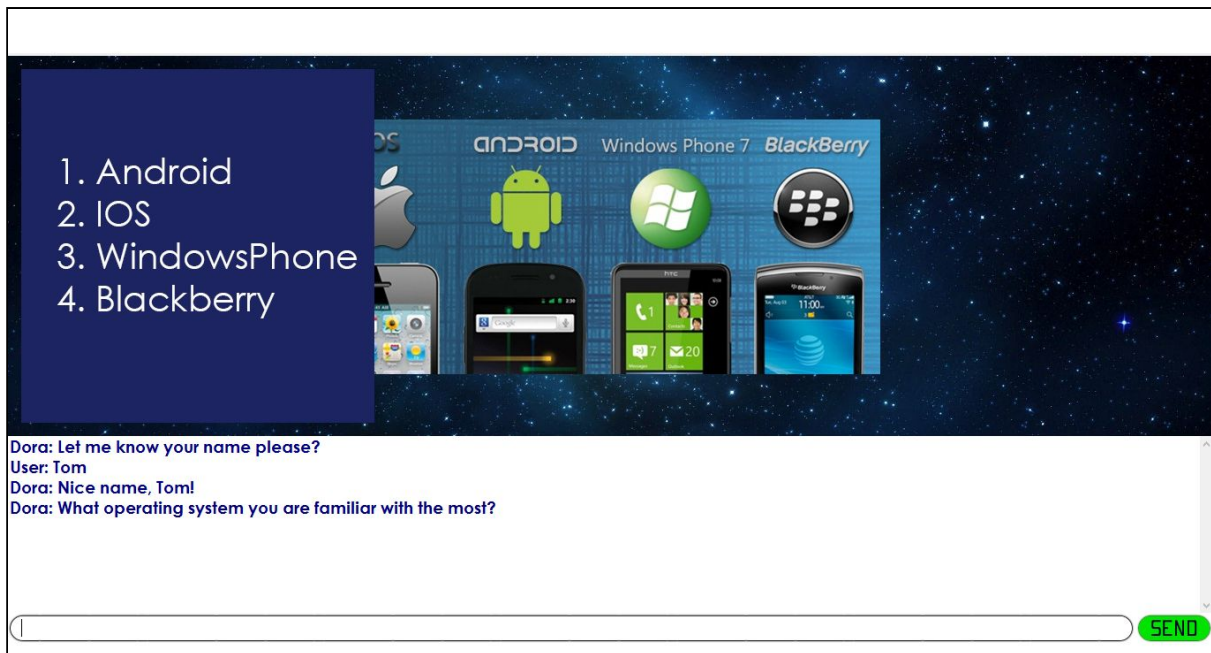


Figure 5.2: The Geek Adviser asks question from user (Tom).

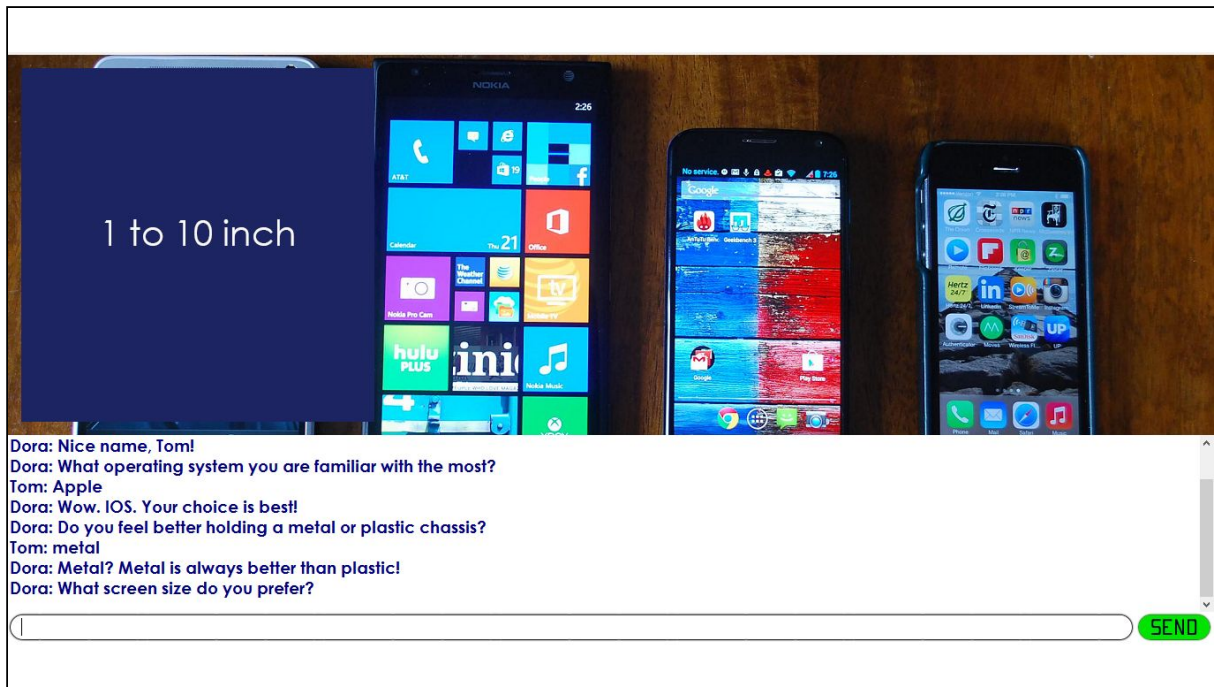


Figure 5.3: The Geek Adviser gives a choice to user (Tom).

### 5.1.2 Auto Currency Converter: USD to Ringgit

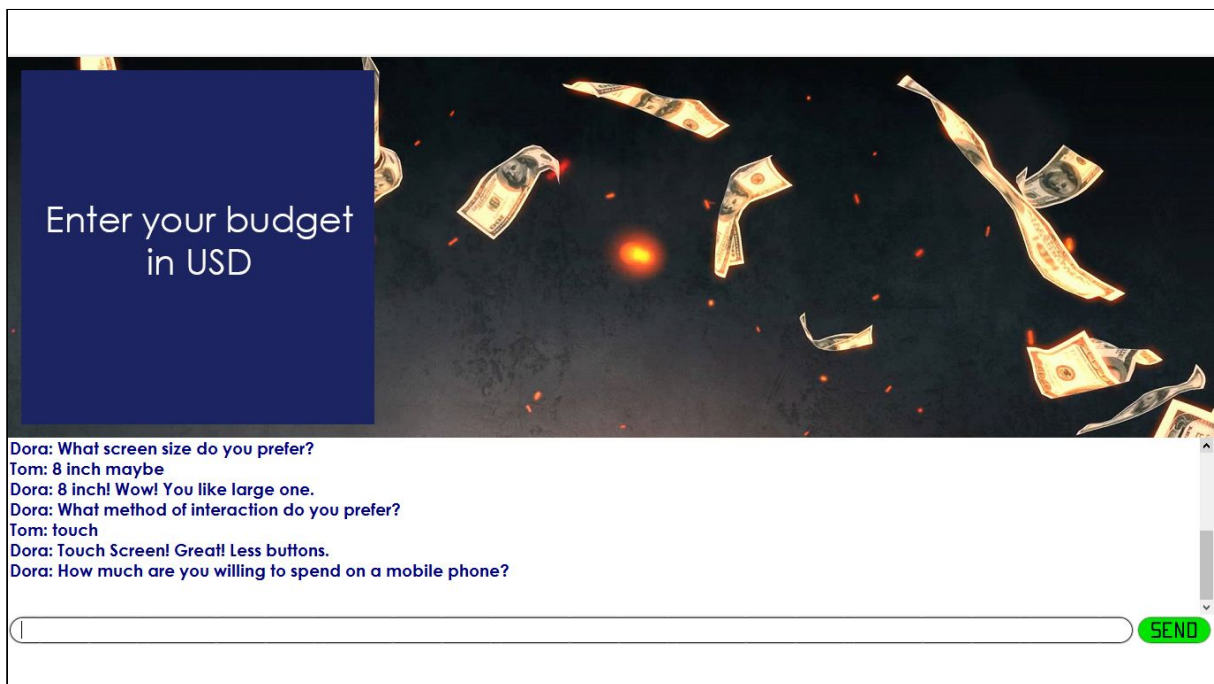


Figure 5.4: The Geek Adviser asks question about customer budget in USD.



Figure 5.5: The Geek Adviser converted USD currency to RM currency.

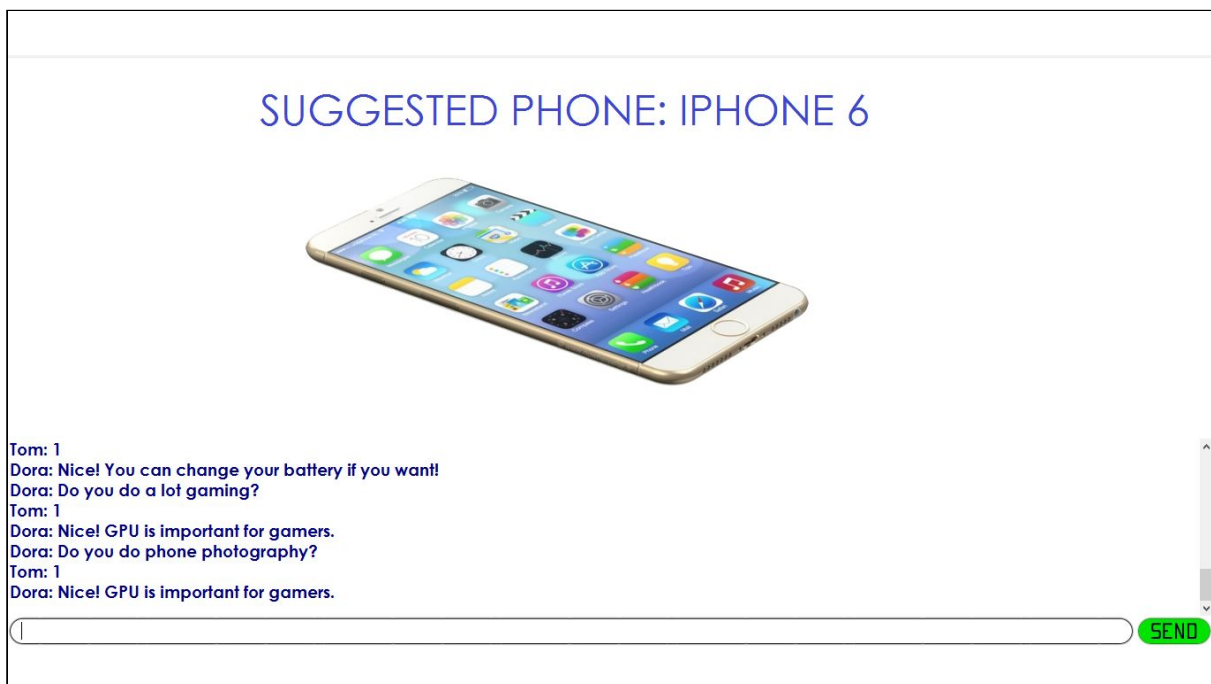


Figure 5.5: The Geek Adviser suggests to user iPhone 6.

## 5.2 Test Plan

**Project:** Virtual Geek Mobile Adviser

**Date:** 4/8/2017



### 5.2.1 Introduction

The following test plan has been created to communicate the test approach to team members. And this plan includes team members list and role of them, test environment, test process and deliverables. This report will clearly identify the difference between expected results and real results.

### 5.2.2 Team Members

MEMBERS	ROLE
MUSTAFA AHMED ABDULJABBAR	Project Manager, Knowledge Engineer
BAHY MOATAMER ELSLAM	Knowledge Engineer
MUKABAK ORAZBEK	Programmer

*Table 5.1: Team members name and role*

### 5.2.3 Test Environment

- A computer required.
- Framework 4.5.
- Apache Server
- MySQL Database
- Verbot SDK 5

### 5.2.4 Testing Process

ACTIONS	EXPECTED RESULTS
In this action, tester person entered his name. Input name was: = "Tom"	The Geek Adviser need to catch entered name and displays it.

### ACTUAL RESULT

**Dora: Let me know your name please?**

**User: Tom**

**Dora: Nice name, Tom!**

**Dora: What operating system you are familiar with the most?**

*Figure 5.6: Output screenshot*

In this action, testers tried to enter incorrect inputs.

Input name was: = “dsdsldsdldsd”

Expected results is Geek Adviser have to generate feedback from knowledge base, then need to ask this question again.

### ACTUAL RESULT

**Dora: Let me know your name please?**

**User: Tom**

**Dora: Nice name, Tom!**

**Dora: What operating system you are familiar with the most?**

**Dora: I wasn't programmed to talk about that.**

**Dora: What operating system you are familiar with the most?**

*Figure 5.7: Output screenshot*

In this step, testers tried to enter screen size in informal way, with many strings.

The Geek Adviser need to identify entered screen size, then have to display it.

### ACTUAL RESULT

**Dora: What screen size do you prefer?**


**Tom: I wanna buy 7 inch phone, bro.**

**Dora: 7 inch! Wow! You like large one.**

**Dora: What method of interaction do you prefer?**

*Figure 5.8: Output screenshot*

In this action, testers tried to enter their budget in USD currency.	Expected result is Geek Adviser have to convert it from USD currency to RM currency.
<p><b>ACTUAL RESULT</b></p> <p><b>Dora: How much are you willing to spend on a mobile phone?</b></p> <p><b>Tom: 99</b></p> <p><b>Dora: 99 USD! Wow! It is more than 425.7 Malaysian Ringgit!</b></p> <p><b>Dora: What storage capacity do you think you need?</b></p>  <p><i>Figure 5.9: Output screenshot</i></p>	

#### 5.2.5 Deliverables

DELIVERABLE	FOR
Test Plan	Programmer, Project Manager
Test Status report	Project Manager
Test Results	All team members

*Table 5.2: Deliverable table*

## **6.0 CONCLUSION**

In conclusion, Verbot covers the conversational aspect very well yet it misses key important segment which is processing power, Thus to overcome such a limitation we used Verbot SDK along with premade VKB to create the chat flow and we gather the inputs from our custom interface made with C# to query the resulted input to MySQL relational database and thus the result displayed to the user.

This approach is much more dynamic than depending only on VKB file and context updates.

## **7.0 ABBRIVATION**

- \* UI/UX: User interface and User experience Designer
- \* SDK: Software Development Kit
- \* VKB: Verbot Knowledge Base
- \* MySQL: My Structured Query Language

## 8.0 REFERENCES

Pew Research Center: Internet, Science & Tech. (2017). *Mobile Fact Sheet*. [online] Available at: <http://www.pewinternet.org/fact-sheet/mobile/> [Accessed 1 Aug. 2017].

Sourceforge.net. (2017). *Verbot Engine SDK / Wiki / Home*. [online] Available at: <https://sourceforge.net/p/verbots/wiki/Home/> [Accessed 4 Aug. 2017].

Quittner, Joshua (2007). *What's Hot in Bots*. Time Magazine.

## 9.0 APPENDICES

### 9.1 Source Code

### 9.2 ERD Diagram for the Relational Database

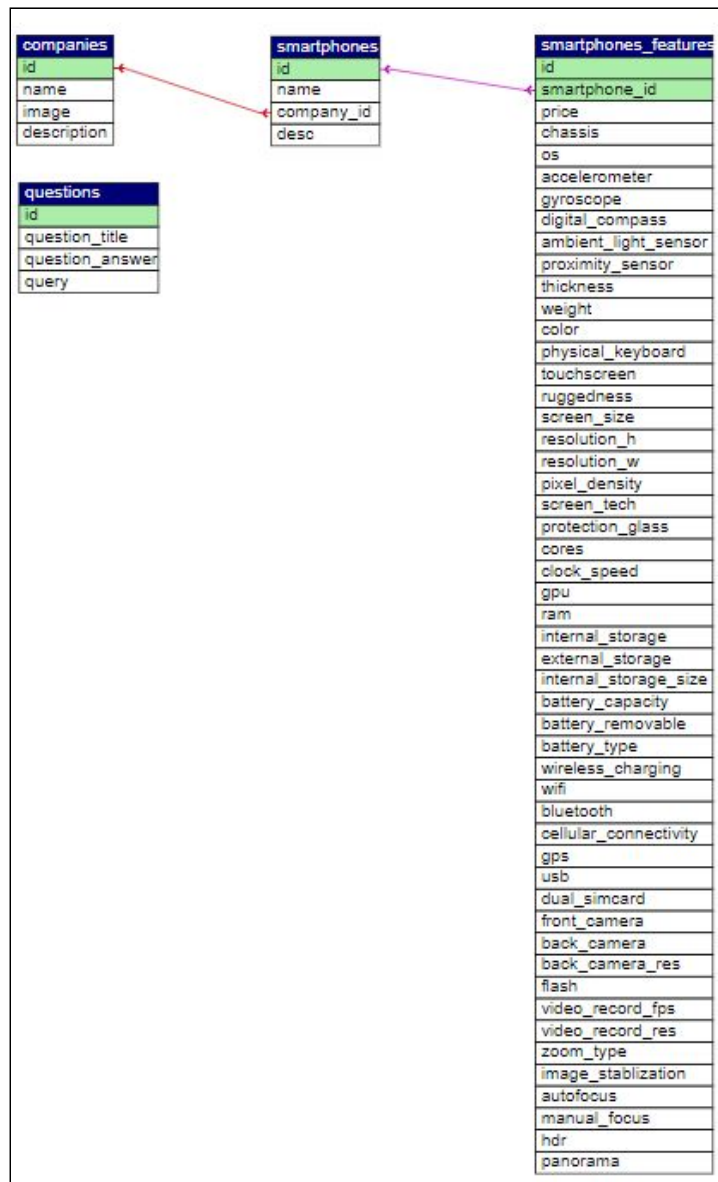


Figure 9.1: ERD Diagram

### 9.3 Matrix Workload

Tasks	Group Members		
	Mustafa Ahmed (TP043972)	Bahy Moatamer (TP043114)	Orazbek Mukabak (TP040205)
<b>Virtual Assistant Geek Development</b>			
Knowledge Gathering	50%	25%	25%
Expert Interview	25%	50%	25%
Programming	10%	10%	80%
Testing	33.3%	33.3%	33.4%
Expert Opinion	33.4%	33.3%	33.3%
<b>Documentation</b>			
Proposal	80%	10%	10%
Identification	50%	25%	25%
Problem Specification	50%	25%	25%
Analysis of Problem Domain	33.33%	33.33%	33.34%
Knowledge Representation	50%	25%	25%
Knowledge Acquisition	25%	50%	25%
Evaluation of The Prototype	25%	25%	50%
Conclusion	100%	0%	0%