**Customer Installation Report**

To: Professor Pisano

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Team: 24

Date: 04/28/2017

Subject: Customer Installation Report

1. ***Details of Customer Installation***
   1. **Date and Location**

Our customer installation took place on Wednesday, April 26, 2017 in Photonics. The meeting was held at 6pm. We corresponded with Eugene over email to set up the meeting and he responded that this was the time that worked best for him. We demoed the full functionality of the toy in room 201, which we picked because it was quiet enough to hear the facts clearly since the room was empty.

* 1. **Members Present**

The members present to meet up was our customer, Eugene Kolodenker, was Christine Low and Urvashi Mohnani. Since this was the time that worked best for Eugene, Jacob and Charles were not able to make the meeting due to it conflicting with class. Initially the meeting was supposed to be held at 5:30 pm with Neil present as well but Eugene notified us that he would be late and Neil had to leave for class.

***2.0 Requirements***

**Original:**

The system designed by the team must fulfill the following high level objectives.

1. When triggered, the toy must say a unique fun fact in an engaging manner.
2. The algorithm must intelligently identify and categorize trivia from a predefined source(Wikipedia).

**Final Product:**

1. The toy is successfully triggered when thrown or shaken and a fact is retrieved and vocalized.
2. **Modified** - We did not parse Wikipedia, instead we scraped websites that give fun facts and stored this in our database.

**Hardware requirements**

**Original requirements:**

1. **Size and Shape:**
   1. The toy must withstand motion: Since the toy is triggered by throwing/shaking it, it must be designed in a manner that the components do not move from their original position.
   2. The toy must be comfortable to hold: The device is coated with stress ball material or a substitute.
   3. The toy must be designed for single hand use: The target size range of the toy is between the size of a baseball and football.
   4. The toy should have the capability to translate to different encasings, such as a stuffed animal, besides a ball, to appeal to different demographics.
2. **Speech**:
   1. The speech must be audible : Controls on the device will allow the volume to be changed from 30-80 decibels. The default will be 60 dB(volume of an average human conversation).
   2. The speech must be clear: An average speed of 140 words per minute must be targeted by the text to speech module on the device.
3. **Battery**
   1. Rechargeable: The batteries on the toy must support charging from any standard 120V and 60Hz AC electricity power outlet.
   2. Battery life: The device must support at least 3 hours of continuous usage and indicate to the user when the battery life is under 20%. The toy must automatically shut down when battery <5%.
   3. The toy will be turned on with a switch to preserve battery life when it is not being used. Once the device is charged to >5% battery, it will be able to switch on to be fully functional.
4. **Motion activation**:
   1. The toy must be able to detect motion as it is the only way of triggering the toy to say a fact. It must also be able to differentiate between a throw/shake and simply being moved from one position to another.
5. **Connectivity**
6. WiFi: The toy must be able to connect to all public and protected WiFi (802.11a/b/g/n/ac) networks. The wifi module must be able to emit a signal of its own so that the smartphone can connect to the wifi module initially to set up a connection between the toy and the app. Emitting a signal of its own will take away the need of a bluetooth module, reducing the number of modules and the overall cost of the product.

**Final Product:**

1. **Size and Shape:**
   1. The toy withstands motion. The PCB is permanently fixed on a plate inside the shell of the toy and all other components are glued on. The toy is sturdy and robust.
   2. The toy has an outer layer made from eva foam. Eva foam is a soft spongy material that is mainly used in yoga mats. This gives the toy a soft feel.
   3. **Modified** - The toy is the size of a small beach ball. Thus, two hands are required to play with it. This design choice was made due to the size of the PCB and the fact that users will be less likely to throw it against the wall.
   4. The hardware of the toy can be easily transferred to other encasings such as a stuffed animal for younger kids.
2. **Speech:**
   1. The speech is audible: It can be easily heard in a semi-noisy room. There are volume controls on the toy. The user can increase or decrease the volume by pressing the two buttons on the toy. When a volume is changed, the toy announces either “Volume Up” or “Volume Down.”
   2. The speech is clear and about 150 words are spoken per minute, which is close to the target we initially had.
3. **Battery:**
   1. The battery is a Samsung Lipo battery, which is rechargeable. This toy can be used anywhere in the world as it supports both 240V AC and 120V AC.
   2. The battery life of the toy is in the range of 7 hours of continuous usage. The LED on the toy turns red when the battery level is less than or equal to 15%.

**Discarded** - The toy shuts down when battery is less than 5%.

* 1. The toy has a switch that allows the user to power the toy on and off.
  2. Micro USB charging port is used on the toy. While charging the battery, red light near charging port indicates that battery is still charging; the green light near charging port indicates that the battery is fully charged.

1. **Motion Activation:** 
   1. The toy is able to detect a throw or shake. The settings of the trigger is set such that a basic movement will not trigger it to say a fact. The toy really has to be shaken or thrown for a fact to be heard.
2. **Connectivity:**
   1. WiFi: The toy successfully connects to basic WiFi routers, but cannot connect to 802.11 networks such as the BU WiFi. The WiFi module emits a signal of its own so that the mobile application can connect to it and the user can send his/her Internet enabled WiFi credentials to the toy. Once the toy connects to the internet, the LED turns green and it remembers the credentials sent to it.

**Software requirements**

**Original:**

1. **Fact Retrieval:** 
   1. Instantaneous: The time between the device being triggered and the speech module reading a fact must be less than ½ second.
   2. Minimal reliance on WiFi speed: While internet connectivity is essential to retrieve facts from the server, by caching facts locally on the toy at any given time fact retrieval can be made almost independent of the WiFi speed.
2. **Ability to Work Offline:** 
   1. Even without a connection to the server the toy must be useful for at least a small duration of time. At any given time at least 50 facts must be stored locally on the device.
3. **Algorithmic Requirements**
   1. Wikipedia crawler: A web crawler must be implemented which is able to extract text from a particular Wikipedia page and automatically identify the Wikipedia page it must parse next.
   2. NLP algorithm: The algorithm must be able to differentiate fun facts from regular sentences and store the facts in a database. It must also be able to restructure sentences so that they are understandable outside the context of that particular Wikipedia page.
4. **Mobile Application:**
   1. An android application must help the user connect the toy to a particular WiFi network. It should also allow users to select categories for the trivia.
5. **Non Repetition of Facts:**
   1. At no point should a user hear the same trivia again. If all the facts in the database are exhausted the user must be intimated.
6. **Database Size:**
   1. The initial dataset must contain at least 1000 unique facts. Every time, the algorithm is run it must add new facts to the database, not exceeding 50,000.
7. **Status Messages:** The toy must indicate to the user when certain situations occur. This may done using the text to speech module or LEDs. These situations are:
   1. No WiFi connectivity and facts from cache have been exhausted
   2. All facts from database have been exhausted.
   3. Battery critically low (<5%)
   4. Unable to pair with smartphone after searching for >2 minutes.

**Final Product:**

1. **Fact Retrieval:**
   1. Facts are retrieved almost immediately when the toy is thrown or shaken. The retrieval time is well below the ½ second requirement.
   2. About 500 facts are pulled from the database and stored on the toy locally. This ensures that the facts are retrieved instantaneously and there is no dependency on the internet connection.
2. **Ability to Work Offline:**
   1. There is a cache of 500 facts stored locally on the toy. Therefore, the toy does not rely on WiFi connection to get a fact. The toy can be used outdoors as well where there is no internet connection.
3. **Algorithmic Requirements:**
   1. **Modified** - Made a web crawler that goes to websites with facts and extracts those facts. The facts are then stored on our database. The facts chosen are set to a limit of 140 characters max.
   2. **Discarded** - NLP algorithm: Did not scrape Wikipedia for facts, so did not implement the NLP algorithm.
4. **Mobile Application:**
   1. An android and iOS application helps the user create an account, manage WiFi, select categories, and view their history. The user can also give a fact they have heard a rating - thumbs up or thumbs down.
5. **Non Repetition of Facts:**
   1. The user will never hear the same fact twice. The server keeps track of the facts downloaded by each user. The toy keeps track of the facts played that are stored locally on the toy. Thus, this ensures that a fact is never repeated for the user.
6. **Database Size:**
   1. The database currently has about 3000 facts. Facts will be added to the database periodically.
7. **Status Messages:** The toy indicates the user of the different statuses by changing the LED colours.
   1. Connected to internet - Green
   2. Not connected to internet - Purple
   3. Updating from server - Blue
   4. Attempting to connect to WiFi - Pink
   5. Startup - Yellow
   6. Battery less than or equal to 15% - Red
   7. WiFi setup mode - White
   8. Battery is fully charged - Green on the charging module
   9. Battery is charging - Red on the charging module

**3.0 Overall Assessment**

**3.1 Demoing the Requirements**

We demoed the full functionality of the toy and how it met the overall requirements of what was asked. Since a requirement of the toy was that it had to connect to internet, we showed how to set it up with the phone by creating an account and entering the wifi credentials to be passed to the toy. Then we showed the main requirement of the toy which was the playing of facts once it had been thrown or shaken. We explained how the LED color will notify the user that it was fetching a fact from the server using the internet connection. We also opened up the shell of the toy so that Eugene could look at how the hardware components inside. He inquired about the each of the modules on the PCB and how they worked with the arduino and was satisfied by how we had a prototype that was basically ready to be manufactured if needed. A major requirement of the toy was that it had to have a rechargeable battery and we exhibited how we had a charging module that connected with a Samsung battery. Our toy was also low on battery when we demoed it to him so we were able to show how the LED status would blink red if the battery was low. We also charged it in front of him until the battery was no longer low and the LED would no longer display red.

**3.2 Follow Up Plans**

Overall, Eugene was satisfied with the product. His only suggestion was to take the week to fully test for bugs and all edge cases that might occur from the user playing around with it. He also requested that we make an admin page to easily look at the database and view the total user votes on the facts that have been played.

**4.0 Customer Acceptance Email**