UML Team Project Report

Team Members:

Andy Le

Patrick Flynn

Mauricio Barrera

Stephen Schmitz

1. **The Project description**

The Issue Description

Fighting robocallers is quickly becoming the Federal Communication Commission's (FCC) top priority, as more than 50 billion automatic calls reach U.S. residents' phones each year. (Robocall Lawyer)

Robocall scams are a profitable business, with over $10 billion lost in robocall-related frauds in 2019. The Federal Trade Commission (FTC), law enforcement agents, and telecommunications companies have joined forces to find, track down, and punish phone scammers around the country. (Robocall Lawyer)

The Goals in this project:

Our team created a system called Robocall Spam Prevention (RSP) to assist users in dealing with robocalls. The aim of this system is to deter and reduce the number of robocalls to RSP users. After a certain number of infractions, the spam call information is posted and flagged as spam to all other RSP users, and calls from these flagged users are prohibited.

2. **Outline the problem, what are we trying to solve**

Two technologies which have caused explosive occurrences have been VoIP dialling and spoofing. To state it simply for the purpose of this project, VoIP dialling allows spammers to program millions of phone calls with little overhead for each completed call. While “neighborhood spoofing” imitates zipcodes of a caller, making them believe it's a person from their community trying to contact them (Staff). Robocalls are a nuisance and can interrupt the daily lives of millions of cellphone users with spam recording that could leave (vulnerable) individuals targeted for their data or financial information. The US government can block most traditional telemarketers who make billions of robocalls but it's impossible to block every number. Google has an integrated AI application called Google Assistant on a variety of their Pixel phone models. Google Assistant screens phone calls by asking questions to inquiry the call and while displaying a transcript between the phone owner and the caller (Crothers). Our group wishes to implement a new program called Robocall Spam Prevention (RSP), the goal is to prevent and decrease the number of robocalls to RSP users. RSP will be a free application that will not collect or upload identifying user information onto RSP systems.

3. What is the Robocalls

A robocall is an automatic telephone call initiated by a computer program called an autodialer or predictive dialer. If a link has been created, the programming delivers a prerecorded message. Appointment alerts, public service announcements, and disaster response notifications are all popular uses for robocalls. (Wigmore)

The Federal Communications Commission (FCC) has banned robocalls until the receiver has granted their written consent because telemarketers have exploited the technology to send unwelcome and often misleading messages. Scammers spoof caller ID to avoid this rule, assuming the receiver will pick up because the phone number or area code seems similar.

In recent months, the FCC has taken steps to stop caller ID spoofing by going after those voice over IP (VoIP) services whose lax oversight has allowed scammers to make illegal robocalls. Last week, for example, the FCC sent the warning letters to nine service providers whose VoIP customers are alleged to have conducted illegal robocall campaigns pretending to be public service calls about COVID-19. (Waldman)

4. How to Recognize a Robocall?

Since there is no live human on the other end of the line, identifying a robocall is easy. Robocalls are stored texts, so it would be obvious that users are speaking with a phone.

The issue is that the user will not be able to identify a robocall until answering the phone. With the amount of unwelcome calls an ordinary American receives during the day, just picking up the phone and finding the user has been spammed is exhausting enough.

Most of us avoided answering calls from unwanted or blocked phones, but new technology encourages callers to use a few tricks that make judging the phone call by the number challenging. Robocallers are known to:

- They constantly change their phone number, even with any call, making it difficult to blacklist or memorize a bad number.
- Spoof the numbers, which involves hiding the true number behind a nearby, public, or familiar number so users are more likely to pick up the phone if users believe it is a friend or a local business calling.

5. Application Requirements

For the user interface:

- The user interface should be easy to follow and intuitive
- There should be a main screen that gives an overview of calls block, flagged, and allowed through
- The call log should have menu options to allow the user to manually flag and block calls, or manually unflag and unblock calls.

For the backend:

- This will be the main server for communicating with the app
- The server will contain a database for logging blocked numbers
- A backend application will check for patterns in the blocked numbers. Numbers that are blocked enough will be sent to the proper authorities.
- Another backend application will query the logs to create blacklists and whitelists that can be downloaded by the app

For the technical aspect:

- We will have separate iOS and Android apps that use the native SDKs of each. This does require a little more work than using a cross-platform framework, but it will probably be more stable (so less work in the long-run)
- Data will be sent to and from the server in JSON format
- No account will be required from the user. Robo-calls are usually a wide thing, rather than directed at a single person. Therefore, patterns from one phone can be used to optimize the experience for everyone
- No personally identifying data will be sent. Only phone numbers will be sent.

6. App Features

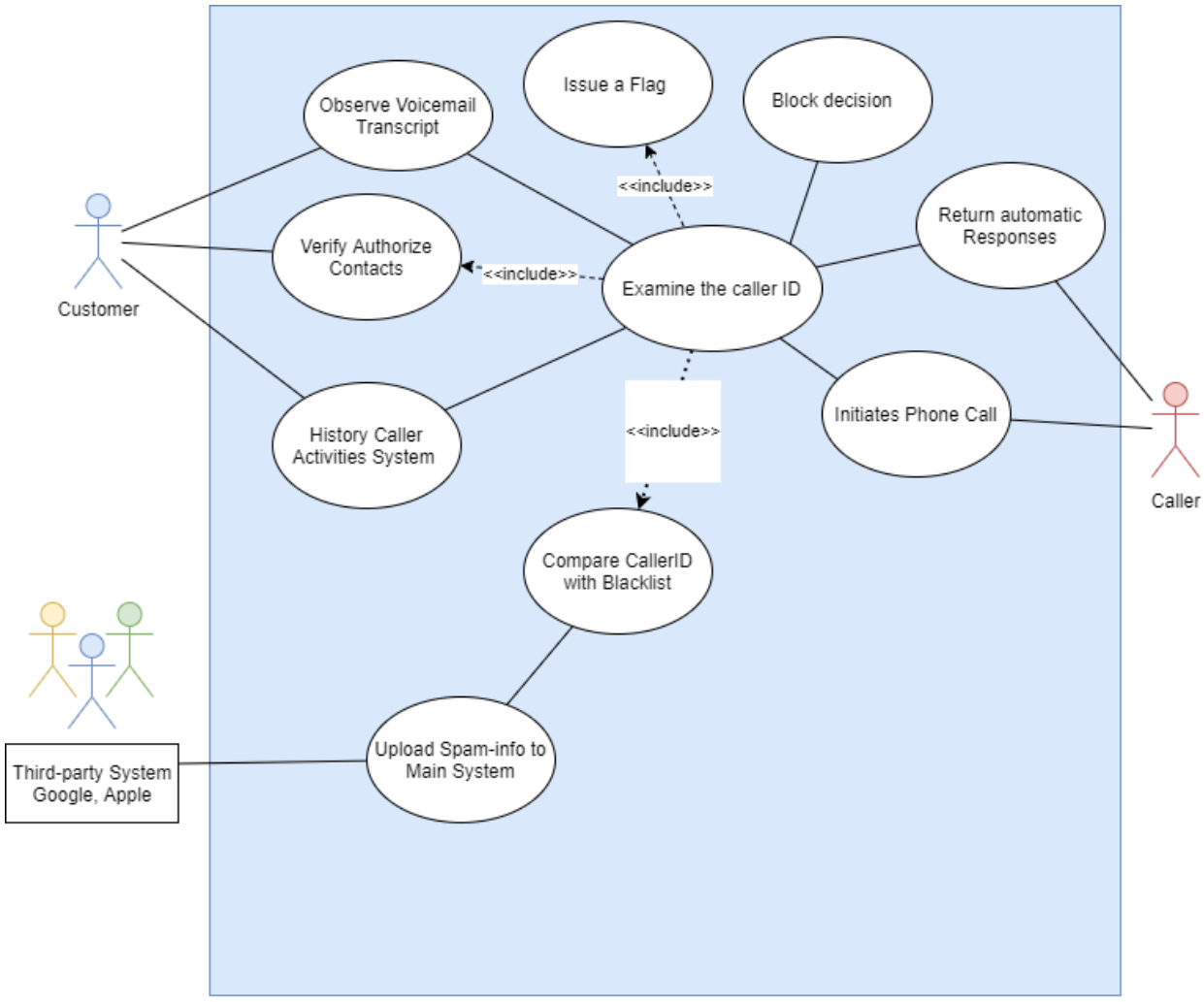
- Takes in Geoinformation from incoming calls to see if their Area Code and location match up
- Will initially take incoming caller ID and information and see if it is located anywhere on the device (contact list, messages, etc)

- If an incoming call leaves a voicemail, assuming it's not read as a robocall, voicemail can be manipulated to see if the message left is from an actual human or not. And the transcript saved can be further analyzed to see if there is any malintention or not.
- See's if the caller is calling from an actual phone or a computer device or some sort to further help indicate potential red flags
- Has the option to Whitelist any calls that the user deems to not be a robocall and also blacklist any calls that may have slipped by the systems filtration
- Free for all users and is a non-profit organization
- Does not save *any* user data for further use of any kind
- If a certain number of red flags are met the application will automatically filter the call and automate the reporting.
- Automation of reporting, if a call is verified as a robocall - either by the user or VIA the intended application - the number and information from the call will be automatically sent to proper authorities such as Google or Apple.

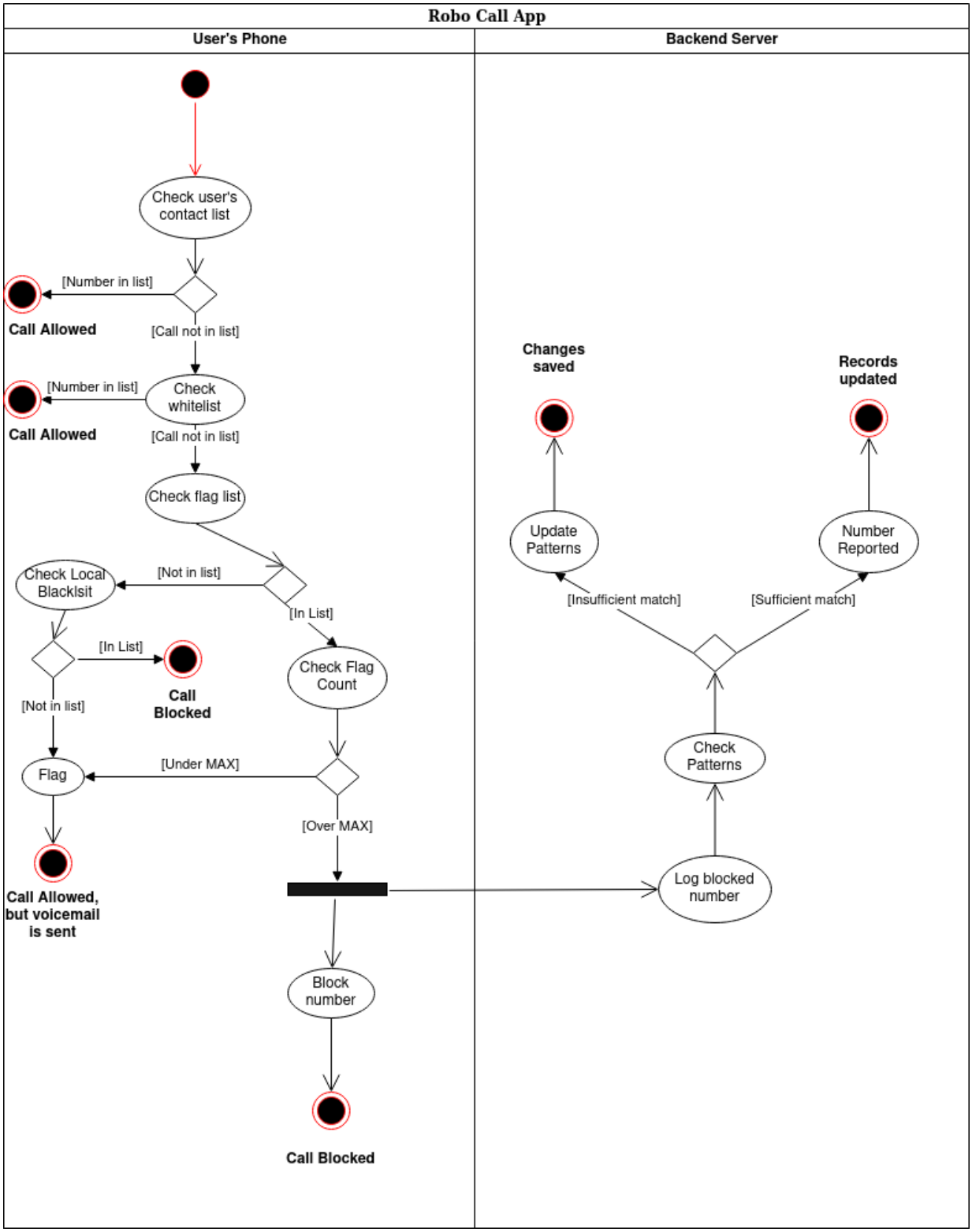
7. User Cases Diagram

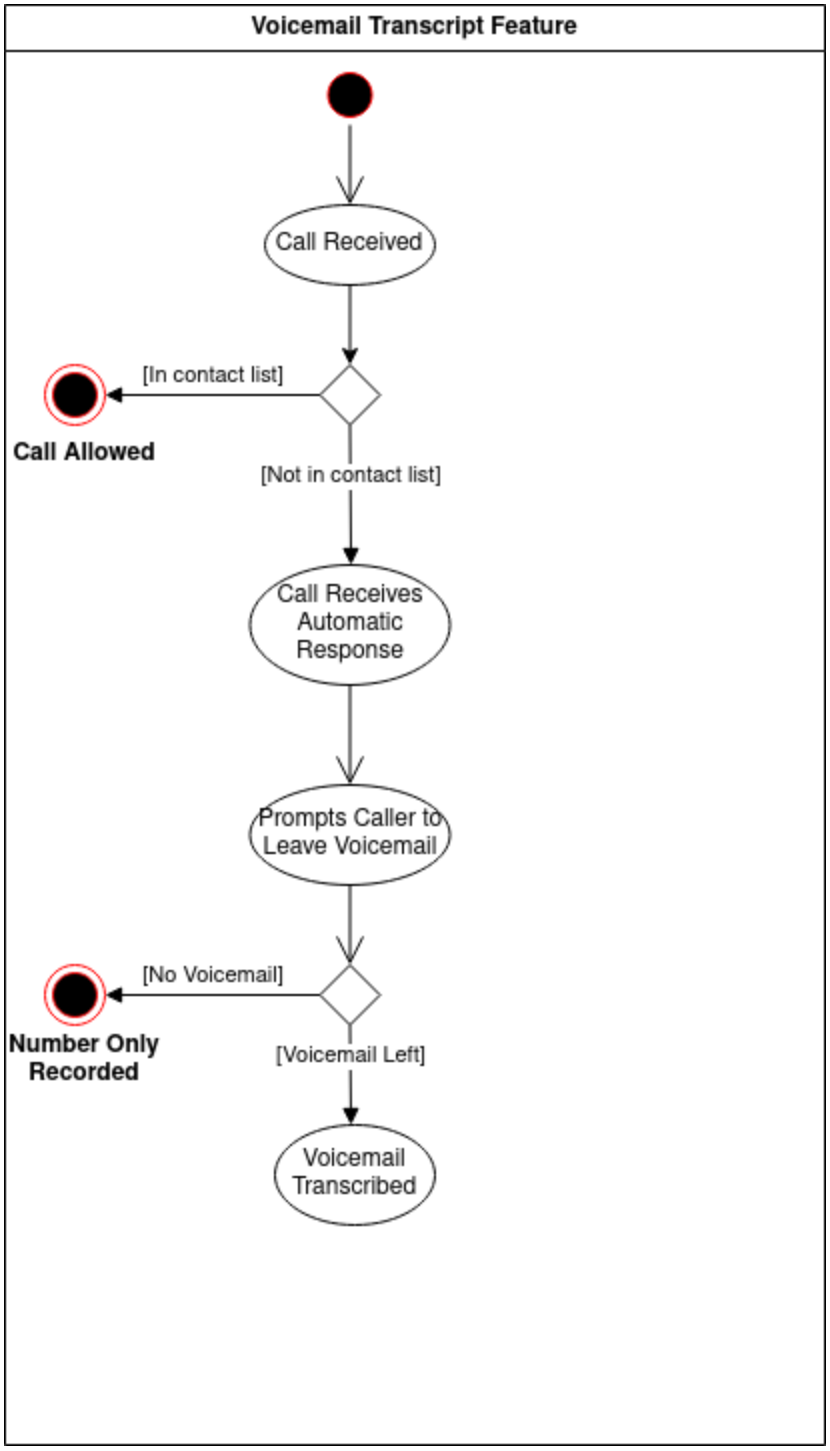
Description:

- If an RSP user is called by an individual who was not listed inside their contact list, the caller's number will be sent to voicemail stating their number has been flagged due to not being recorded inside the RSP user's contact list.
- After multiple attempts from the same caller ID have been made to call the RSP user's, calls are automatically blocked before connecting.
- After these attempts are made, the RSP system will upload the spam caller information to flag the caller ID from other users.
- A history function and voicemail transcripts will be made available to RSP user's to view call activities to verify the authentic callers.

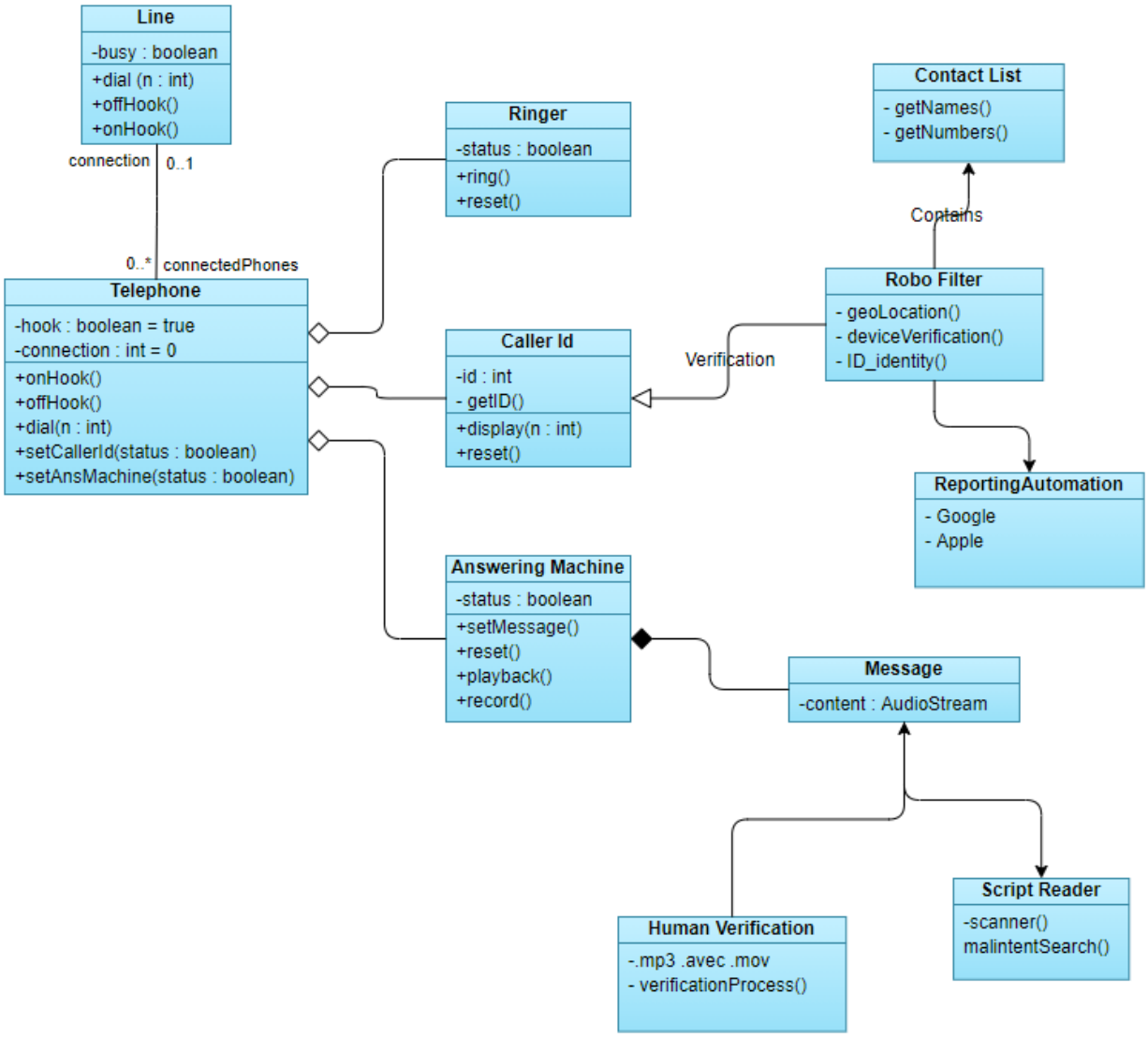

Issue a Flag
Block decision
Observe Voicemail Transcript
<<include>>
Return automatic Responses
Verify Authorize Contacts
<<include>>
Examine the caller ID
Customer
History Caller Activities System
<<include>>
Initiates Phone Call
Caller
Compare CallerID with Blacklist
Third-party System Google, Apple
Upload Spam-info to Main System

8. Activity Diagram



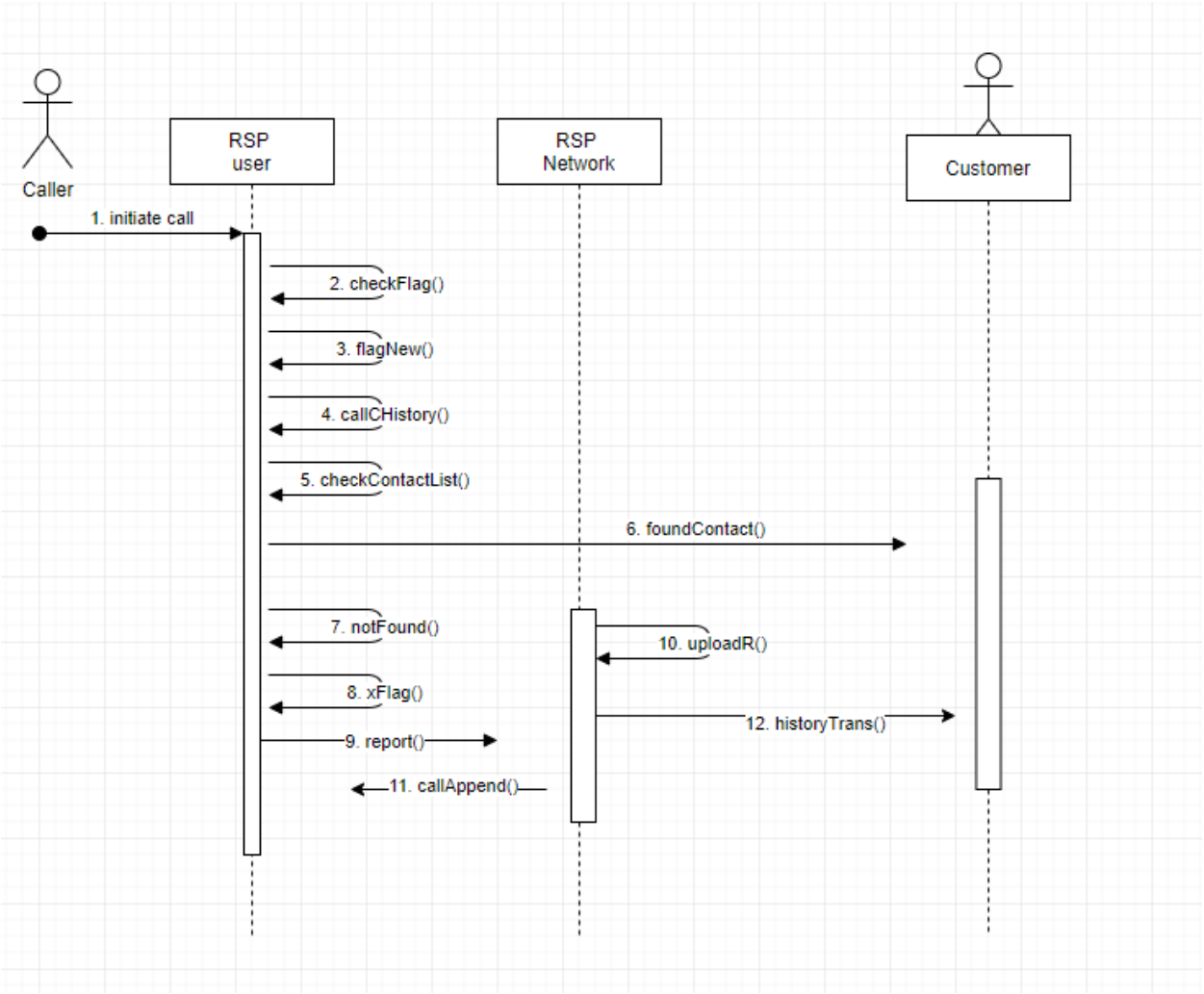

Voicemail Transcript Feature
Call Received
[In contact list]
Call Allowed
[Not in contact list]
Call Receives Automatic Response
Prompts Caller to Leave Voicemail
[No Voicemail]
Number Only Recorded
[Voicemail Left]
Voicemail Transcribed

9. Classes Diagram



10. Sequence Diagram (Optional)

This is not required in this project but we do it for extra credit, please accept it.



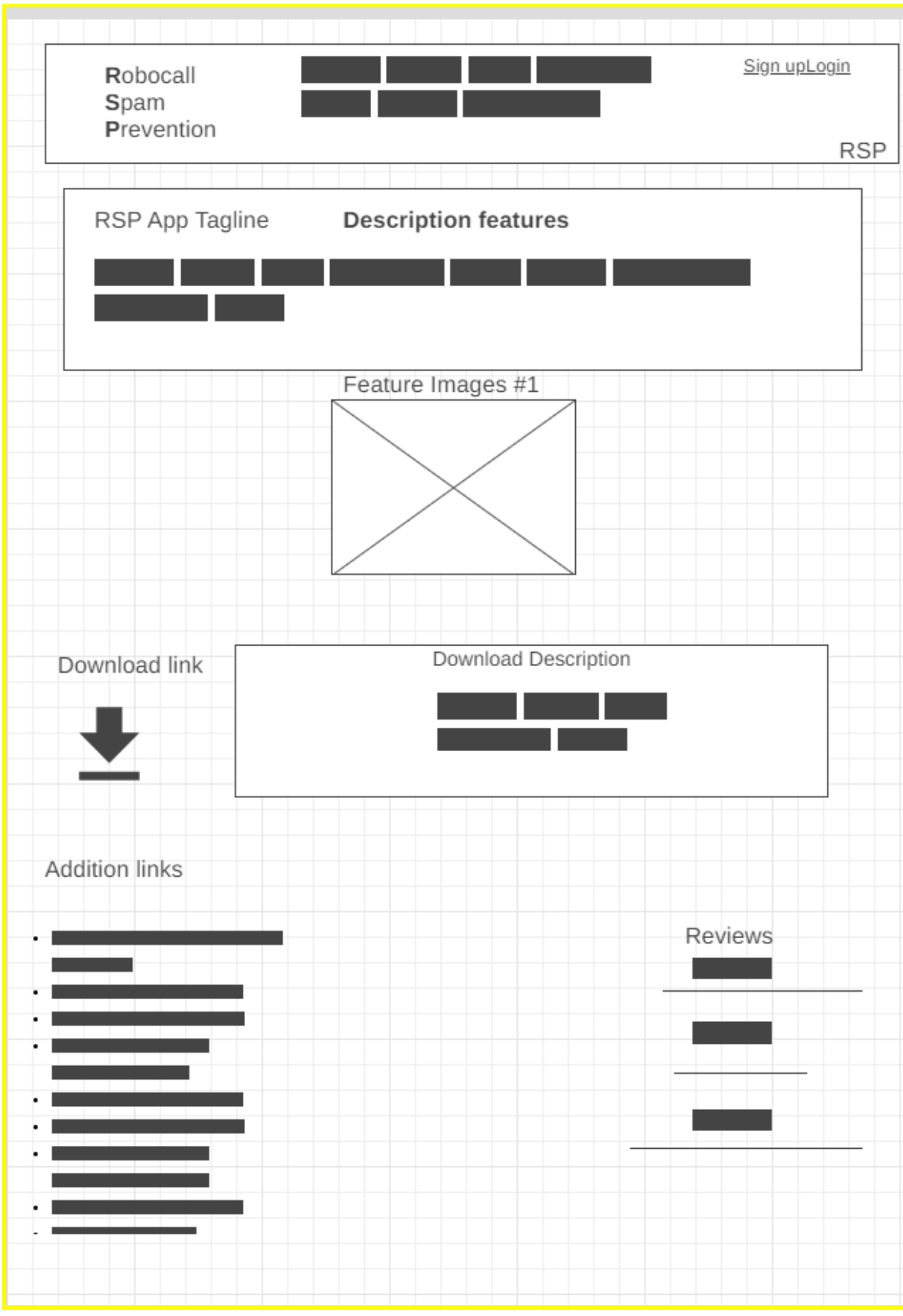
This is a sequence diagram between a caller and the customer who has an RSP application installed on their cell phone. The call will go through the RSP user program to verify the caller information, if it fails to verify its information, the call is blocked after multiple flagged attempts and reported using specific protocols. Else if the caller is verified as authentic, the call immediately connects with the customer's phone. The sequences are named using a camelcase naming convention to simplify reading each function in the diagram. Sequence diagram referenced information was found using Creately Blog (Athuraliya).

1) Initiate call, the call is initiated by the "caller". The caller is unknown and can either be a person who knows the RSP user or unidentified person.

2) checkFlag(), the RSP user checks itself to verify if the caller's number has been flagged in the past before proceeding to the next sequences.
3) flagNew(), the RSP user checks the caller's information to see if the caller has ever attempted to contact the RSP user before, if they have not called before, their number is flagged.
4) callChistory(), if the caller is new, a call history is created to begin logging the caller history for the purposes of History Caller Activities Systems.
5) checkContactList(), the RSP user checks the customer's contact list and searches to see if the caller's number is registered inside the list.
6) foundContact(), if the contact information is found and the call is put through to the customer without delays.
7) notFound(), caller is not found
8) xFlag(), if the caller's number has been flagged (x) amount of times, the number is blocked and information is send to 3rd party systems
9) report(), sends the caller information to RSP systems to be registered as spam and reported to 3rd parties.
10) uploadR(), Upload block list information to the RSP system network to block the caller's information across all RSP network users and reported to 3rd party.
11) callAppend(), call history is appended to the call history associated with the spammer for History Caller Activities Systems.
12) historyTrans(), call history is made available for the customer to look over as part of a transcript for various reasons.

11. Main wireframe for the system interface

The wireframe below is the main page of our RSP project which starts with a header that names the product. The App tagline holds a description of the product with descriptive phrases to capture the attention of the user. Additionally, the links in the middle of the page will hold portals to important information and FAQ. Image 1 will hold a chart comparing our product against other options. And finally on the bottom, it will hold links to additional information and review quotes of the user experiences concerning the product.


Robocall
Spam
Prevention
Sign upLogin
RSP
RSP App Tagline
Description features
Feature Images #1
Download link
Download Description
Addition links
Reviews

Work Cited

Athuraliya, Amanda. “UML Sequence Diagram Tutorial: Sequence Diagram Example.” *Creately Blog*, 22 Apr. 2021, creately.com/blog/diagrams/sequence-diagram-tutorial/.

Crothers, Brooke. “Google Expert Explains Why You Get So Many Robocalls -- And Future Tech To Stop Spam Calls.” *Forbes*, 25 Mar. 2019, www.forbes.com/sites/brookecrothers/2019/03/23/google-expert-explains-why-you-get-so-many-robocalls-spam-calls/?sh=14bfffa87401.

“Robocall Lawyer Teaches How to Report Robocalls.” *DoNotPay*, 6 Nov. 2020, donotpay.com/learn/robocall-lawyer.

Staff, The Week. “How Robocalls Became America's Most Prevalent Crime.” *The Week - All You Need to Know about Everything That Matters*, The Week, 7 Dec. 2019, theweek.com/articles/882482/how-robocalls-became-americas-most-prevalent-crime.

Waldman, Arielle. “FTC Calls out VoIP Providers over Coronavirus Robocalls.” *SearchSecurity*, 31 Mar. 2020, searchsecurity.techtarget.com/news/252480955/FTC-calls-out-VoIP-providers-over-coronavirus-robocalls.

Wigmore, Ivy. “Robocall.” *WhatIs.Com*, 20 Feb. 2014, whatis.techtarget.com/definition/robocall.