

## **A Framework for Automated Customer Feedback Collection and Response**

### **Online Astroturfing against Sociotechnical Transitions**

A Thesis Prospectus  
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By

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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## Introduction

In 2017, discussion over a possible repeal of net neutrality resurfaced in the US. Despite popular bipartisan support for net neutrality among voters (Program for Public Consultation, 2017), the policy was repealed by the United States Federal Communications Commission (Ortutay & Arbel, 2017). During the public net neutrality debate, the incumbent regime of the broadband industry funded an astroturfing campaign that automated the creation of millions of fake comments on an FCC web application (Kelly, 2021). The facade of public consent was manufactured.

Two summers ago I was hired as an intern by a small startup. As an Intern I was tasked with creating two applications that scraped customer comments off social media platforms and sent automated contextual responses. This work is important to startup companies, as they can not afford to staff sizable marketing and customer service teams. Customer outreach had to be automated to save on cost.

I had just finished my second year of university before my internship. I did not know much about software development. However, over the course of just two months I was able to design and implement a social media framework that could have easily been repurposed for an astroturfing campaign. Social media platforms occupy an increasingly important role in political engagement today. This makes the low investment required to create and use such technology especially worrying. Regulating or preventing the development of social media bots is an arms race that social media companies cannot win. There are no convenient technical solutions that can solve this problem. Thus, I believe that examining the issue of social media astroturfing through a more sociotechnical lens is a worthwhile avenue of research. This prospectus

proposes an exploration into how incumbent regimes utilize online astroturfing campaigns to manufacture consent for unpopular policy, and how social media tactics employed by coalitions of grassroots movements and countervailing industries function in comparison.

## Technical Topic

Two summers ago a startup hired me as an intern. At the time of my internship this company was small - it lacked the funding to train and staff large customer service and marketing teams. As a result it was fiscally important for all customer service and marketing efforts to be as automated as possible. I was hired as part of the startup's push for increased customer outreach automation.

The startup lacked an automated solution for collating and responding to user feedback on social media platforms. I was tasked with designing and creating two frameworks that allowed the company to collect, archive, and respond to comments on Twitter and the Google Play Store. These programs were required to find and pull customer review data from their respective platforms, and to store said data in a standardized manner. The programs were also required to allow staff to easily automate the creation of customer feedback responses.

The first responsibility of my project was customer feedback data collation and storage. I designed my programs to use the Google Play Developer and Twitter application programming interfaces (APIs) to collect mentions and app reviews (Google, 2021; Twitter, 2021). Information from these two APIs were processed and stored into a database. The programs were designed to be run as services. The Google Play Developer and Twitter APIs were called on an hourly basis. Since the collected data was meant for statistical analysis, I implemented functionality to export the databases into a tabular format.

The project was also expected to automate customer feedback responses. This feature would be used to link users to specific customer service and technical help resources based on the content of the customer's feedback. Customer service and technical help resources change

over time. Thus, the program had to be designed with extensibility in mind. I created a templating feature to address this issue. The template format allowed developers to use regular expressions (regex) to define which pre-written responses should be applied to which types of customer feedback.

The final requirement for the project was maintainability. APIs are eventually deprecated. Without continuous developer care, the framework would eventually fall apart. Extensive design documentation was written in LaTeX to maximize the code base's comprehensibility. This measure would allow for more efficient developer onboarding and maintenance.

I implemented the requirements for the internship project in Python. The Python program made use of the tweepy third party library. The tweepy library is a python wrapper for the Twitter API. It greatly simplifies the process of calling the Twitter API by providing a more convenient, developer-friendly interface. Prior examples of the usage of the tweepy library can be found on the tweepy public repository (Roesslein, 2021). The project also utilized the "pathlib", "threading", "datetime", "sqlite3", "os", "time", "calendar", "re", "hashlib", "shutil", "urllib", and "random" modules from the official Python 3 standard library (Python Software Foundation, 2021).

This project was relatively straightforward. It was designed to be completable by an intern. However, I still learned quite a few applicable skills through working on the project. I taught myself how to use APIs. This led me to learn about authentication tokens and HyperText Transfer Protocol (HTTP) requests. As I skipped the introductory computer science (CS) class at UVA, I was never formally taught Python. The internship experience allowed me to gain fluency in the programming language.

The University of Virginia CS curriculum helped prepare me for this internship. In particular, the CS 4102 and CS 2150 courses were of great use to me during development. Knowledge of data structures and the ability to quantify the runtime and memory overhead of algorithms helped me design a program that consumed a reasonable amount of resources. An understanding of hashing allowed me to design efficient algorithms to detect changes in template file contents.

## STS Topic

In early 2021, the New York Attorney General Letitia James published a report detailing the broadband industry's astroturfed efforts to manufacture consent for the overturning of net neutrality. Millions of comments were manufactured by lead generating companies funded by the broadband industry's lobbying firm. These comments were crafted with the intent to provide the Federal Communications Commission's (FCC) chairman "intellectual cover" for the repeal of net neutrality (James, 2021). The comments were a form of manufactured public consent.

Such incidents of online astroturfing are significant, as such coordinated campaigns are capable of mobilizing against sociotechnical policy transitions. Online astroturfing campaigns also obscure actual public opinion and erode trust in strong democratic institutions (James, 2021). Thus, examining the phenomenon of online astroturfing through a sociotechnical lens is a worthwhile avenue of research.

It's important to note that astroturfing is a phenomenon that predates the popularization of the internet. In 1994, in response to government proposals for regulation of indoor smoking, the R.J. Reynolds Tobacco Company created the Get Government Off Our Back (GGOOB) coalition. GGOOB organized astroturfing campaigns like the "Regulatory Revolt Month" that drew genuine support from the public and the press for the cause of deregulating tobacco (Apollonio & Bero, 2007).

Online astroturfing can be viewed as a continuation of the astroturfing phenomenon. However, unlike offline astroturfing, online astroturfing is capable of manufacturing public consent with less capital and labor. Writing a program to leave ten million comments on a website is far cheaper than handwriting ten hundred letters. Since the cost efficiency and tactics

of online astroturfing campaigns differ from their offline counterparts, online astroturfing should be viewed as a distinct phenomenon with different capabilities and objectives.

*Online Astroturfing: A Theoretical Perspective* defines online astroturfing as “the dissemination of deceptive opinions by imposters posing as autonomous individuals on the internet with the intent of promoting a specific agenda” (Zhang et al., 2013). This study is useful to the research proposed by this prospectus, as it establishes a singular definition for the term “online astroturfing” from which further research can be conducted. *Online Astroturfing: A Theoretical Perspective* also provides an overview of the differing levels of automation employed by online astroturfing campaigns, and proposes four factors that predict the effective influence that these campaigns are able to exert on individuals.

*Sustainability Transitions: A political coalition perspective* establishes a framework of sociotechnical transitions. It details how coalitions between grassroots movements and countervailing industries form and mobilize against incumbent regimes to push for sociotechnical change (Hess, 2014). Since social media campaigns are a tool used by not only incumbent industries, but also coalitions of grassroots and countervailing industry organizations, the framework provided by *Sustainability Transitions: A political coalition perspective* is helpful for analyzing the phenomenon of online astroturfing. This paper will use the sociotechnical transitions framework to explore how incumbent regimes utilize online astroturfing campaigns to manufacture consent for unpopular policy, and how social media tactics employed by coalitions of grassroots movements and countervailing industries function in comparison.

The example of the incumbent broadband industry’s FCC comment campaign is an interesting one. It does not fit the established definition of online astroturfing in an orthodox



manner. While the broadband industry's campaign did disseminate opinions online through imposters posing as autonomous individuals, the campaign did not disseminate traditionally *deceptive* opinions. The FCC comments were not manufactured with the intent to change public opinion against net neutrality. Instead, the campaign was a gift to the FCC - a convenient *casus belli* against policy regulating the incumbent regime. Broadband's astroturfing campaign was designed not to garner public support, but rather to provide policy makers with the illusion of public support.

Coalitions of countervailing industries and grassroots movements also created a social media campaign to submit FCC comments. The Electronic Frontier Foundation (EFF), a non-profit, grassroots organization, developed a web application to simplify the process of submitting personalized comments to the FCC. A similar tool developed by the EFF during the 2014 net neutrality repeal discussions helped crowdsource over 1 million comments (Reitman, 2017).

Companies that host internet applications benefit from net neutrality, as they are not forced into negotiations with broadband companies over content delivery speed. These companies represent the countervailing industry against the incumbent regime. Netflix, Vimeo, and Kickstarter (among many other companies) participated in the *Internet Slowdown* social media campaign on their web pages and social media accounts (Fight for the Future, 2014; Netflix, 2014). The *Internet Slowdown* campaign featured web applications that connected website users to the offices of their senators through phone (Fight for the Future, 2014).

This technique employed by the coalition was different from that of the incumbent broadband industry. The social media campaigns promoted by the coalition were designed to

rally public support for the cause of net neutrality. In comparison, the online astroturfing campaign funded by the broadband industry was markedly less concerned with genuine public engagement. Fluent, a lead-generating company hired by the broadband industry, fraudulently used the identities of visitors to their websites to submit comments to the FCC. Another advertising company copied identities from online data breaches in their comment submissions to the FCC. (James, 2021).

Unlike the grassroots backed social media movements and the offline astroturfing campaigns of old, online astroturfing campaigns do not need to be concerned with securing public support. Incumbent regimes no longer require public consent to push against sociotechnical regulation and reform.

## Next Steps

- Technical Report
  - I will recover and re-read the documentation and code I developed while working on the internship project. In particular I wish to find written justifications for any design decisions I made.
  - I will reflect on how the UVA BSCS curriculum could have better prepared me for my internship experience.
- STS Topic
  - This paper would benefit from analysis of different astroturfing campaigns outside the domain of net neutrality. I intend to research the online astroturfing campaigns related to climate change and the tobacco industry.
    - Twitter bots have reportedly been used to spread climate change disinformation (Hiar, 2021).
    - The tobacco industry has used Facebook's targeted advertising platform to gather petition signatures against tax increases (Baker, 2019).
  - I want to explore how different astroturfing campaigns rely on different levels of automation. I intend to research online astroturfing incidents that implement a mixture of automation and human operation. These examples will be used to contrast the broadband industry's fully-automated net neutrality campaign.
  - I wish to identify specific problems that online astroturfing poses to the democratic process. To do this I will research in greater detail the effects of online astroturfing campaigns on the public perception of democratic institutions.
  - Tinder bots were used to convince some UK voters to vote labour (Gorwa & Guilbeault, 2017). I plan to explore this story further, as it demonstrates just how far subtle astroturfing campaigns can intrude on our personal lives.

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