

**Low Power, Long Range, IoT Product Development for Alarm.com**  
(Technical Paper)

**How Do Facebook and YouTube Exacerbate the Spread of Misinformation?**  
(STS Paper)

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*On my honor as a University Student, I have neither given nor received  
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## **Introduction**

### *STS Research*

Within the past two decades, social media platforms such as Facebook and YouTube have become powerful tools to influence public opinion on a global scale. With over 3.5 billion combined users on these platforms, people are receiving their news from online resources to a greater extent than ever before. According to a recent study conducted by Pew Research Center, approximately two thirds of American adults have stated that they receive their news from social media platforms (Shearer & Matza 2018). Furthermore, in a survey conducted by Forbes magazine, fifty percent of those surveyed stated that they learned about a current event through social media before traditional news outlets posted their own report (Kang 2019). While social media has become a convenient outlet for rapid news updates and commentary on current events, little global effort has been put forward to prevent the dissemination of misinformation on social media platforms. As a result, organized social media manipulation by state actors has become a legitimate threat to the veracity of information on Facebook and YouTube. An excellent example of this phenomenon was demonstrated prior to the 2016 presidential election. Using false accounts and bots on a variety of social media sites, the Internet Research Agency, an organization sponsored by the Russian government, was able to successfully disseminate false narratives and divisive messages across the platform in an attempt to shift American election results (Ortutay, Barbara 2019). The proposed STS research hopes to illuminate avenues through which false narratives and misinformation can proliferate on social media, particularly on Facebook and YouTube, and the methods through which these issues can be addressed by global participation of both government agencies and social media platforms.

## *Technical Research*

An up and coming innovation within the technological sphere is the evolution of the Internet of Things (IoT) technologies. Also known as smart devices, IoT is the umbrella term for all technology that enables everyday objects, such as watches, refrigerators, and speakers to be interactive and connected to a communication network of other devices. These devices typically contain a variety of sensors and are able to transmit, store, and even make decisions based on the data they collect. As a company specializing in internet-enabled security devices and cloud-based security management platforms, our client Alarm.com, sees the growing potential of implementing low power wide-area network technology in their suite of IoT products. The technical research portion of this paper will summarize a project intended to assist Alarm.com in exploring feasible applications of this emerging technology.

### **Technical Topic**

Currently, the main network technologies commonly associated with IoT are Bluetooth, Z-Wave/ZigBee, and Wi-Fi. Each of these protocols have a relatively short range and/or a higher power requirement when being utilized by battery powered devices. In an attempt to address some of the disadvantages of these existing technologies, a new set of IoT protocols have been developed. The protocols gaining the most traction in IoT are Narrowband-IoT (NB-IoT), Long Range Wide Area (LoRA), and Category M (CAT-M) LTE protocols. These low-power, wide-area network (LPWAN) protocols promise low-cost hardware, ubiquitous coverage, and years of battery life.

Through the use of the traditional IoT protocols, our client, Alarm.com, has established itself as a dominant player in the IoT home automation market space. Specializing in providing

cloud-based platforms to manage home and business security systems, Alarm.com has yet to integrate LPWAN protocols in their portfolio of devices. As LPWAN protocols become more prominent in the IoT sphere, it will be advantageous for Alarm.com to incorporate these technologies into its current portfolio of products. For this reason, our team has been asked to work with Alarm.com's research and development team, the Creation Lab, to determine how these LPWAN protocols can be incorporated into their business. In particular, our team has been asked to explore a variety of market verticals outside of Alarm.com's current business to determine potential applications for these protocols. These market verticals must be in areas that cannot be solved through traditional IoT protocols, particularly in areas where there is no easy access to power or internet. Furthermore, our project will focus on developing use cases of possible LPWAN applications that best suit Alarm.com's business objectives and add value to the company by the beginning of the Spring semester. We will work with Alarm.com's Creation Lab to develop a working prototype that addresses a particular use case in a new market for a LPWAN device. In order to demonstrate the potential for this technology, our team will present our functioning prototype to set of executives at Alarm.com.

### **STS Research Topic**

Unlike traditional news outlets, social media platforms lack many of the editorial standards and practices that guarantee the legitimacy of information that is shared to the public (Ordway 2017). Although Facebook and YouTube pride themselves on being a platform that embraces the right to freedom of speech and expression, both platforms have received heavy criticism for their lack of unified effort to curb the spread of misinformation. Among one of the more controversial cases that reflects Facebook's challenges of fighting misinformation can be

seen through Elizabeth Warren's intentionally false Facebook ad campaign (Kaplan & Kang 2019). This online campaign involved a variety of false advertisements claiming that Facebook supports the Republican party. While the advertisements were certainly misleading, Facebook took a rather controversial stance on the issue by allowing the advertisement to remain on its platform – an action that is in direct violation of Facebook's existing policies on misleading advertisements. In a similar case, YouTube has also faced considerable criticism for its lack of effort put into the policing of misleading and manipulative information posted on the platform. An example highlighting this concern is YouTube's failure to catch several automated misinformation campaigns in 2017 (Albright 2017). These campaigns were aimed to amplify the discussion of highly divisive political issues by posting thousands of AI generated news clips per day. Using highly advanced methods to avoid detection, these channels were able to gain considerable popularity on the platform.

While the above cases are unique in their own right, they demonstrate the universal need for social media companies and government agencies to take a proactive stance on controlling the avenues through which misinformation can spread. Considering the size of social media platforms today, the actions taken to address this issue will have far reaching impacts that will not only change the dynamic of political conversation, but the perception of trust that users share towards these platforms. In the context of this issue, the relevant stakeholders are broken down into four groups: the content producers, the content consumers (or audience), the social media platforms, and government agencies. Each group can be interconnected through their respective spheres of influence.

The STS framework most applicable to analyzing the spread of misinformation across social media is Actor Network Theory (ANT). Originally developed by sociologists Bruno

Latour, Michel Callon, and John Law, ANT involves the concept of an actor-network composed of people, objects, or organizations, otherwise known as actants. Within this actor-network, all actants are treated as equivalents, regardless of they are human or non-human, implying that objects, ideas, processes, or any other factors that are relevant to influencing social relationships are viewed with equal importance. Put into the context of the issue of misinformation on social media, ANT is used to explain how people, technology (i.e. social media), political policy, and any other relevant human or non-human factors are capable of bringing about change within a society. The primary criticisms of ANT is that it fails to easily lend itself to “dialectical sociotechnical interpretations” (Cressman 2009). Put more simply, ANT is primarily criticized for its inability to provide accurate descriptions for the social processes that take place within a network. This research strives to demonstrate how social processes can be an integral part of actor network theory that results from the regulatory actions of social media companies and government entities alike.

### **Research Question and Methods**

As social media companies continue to expand their global influence, policymakers and social media executives will be pressed to answer increasingly difficult and potentially consequential questions. These questions can only be addressed with a deeper understanding of the issues concerning misinformation faced social by media companies today. The proposed STS research will strive to answer the ultimate question: How do Facebook and YouTube exacerbate the spread of misinformation? Answering this question will require an understanding of how content gains popularity on both platforms through their respective newsfeeds and recommendation engines, in addition to understanding the type of content that is more likely to be shared. To gain a more holistic understanding of this technical characteristic of social media

platforms, I plan to investigate researching tools that Facebook and YouTube use to promote content and the ethical factors that play into how they are used. To gain a better understanding of the varying perspectives on the societal impact of this issue, I plan to conduct discourse analysis using existing academic literature and news stories that discuss both the challenges and proposed solutions to the issue at hand. Furthermore, I will use Actor Network Theory to discuss how relevant actants (including the audience, social media platforms, and content creators) play a role in the overall problem and how the decisions made by each relevant actor affects the network as a whole.

## **Conclusion**

The STS portion of this proposal seeks to address the avenues through which misinformation spreads on both YouTube and Facebook. This research is significant because the regulatory decisions made by social media platforms have the ability to greatly affect the legitimacy of information posted on these sites as a whole and the dynamic of political conversation between users.

The Technical portion of this proposal aims to explore the potential applications of low power wide area network protocols for Alarm.com's suite of products. By conducting extensive market research and developing a simple prototype utilizing LPWAN technology, our team hopes to assist Alarm.com in capturing the market potential for this evolving technology within the scope of their existing product line.

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