**Thesis Project Portfolio** 

## **Phone-to-Car FM Transmitter**

(Technical Report)

The Co-production of Society and Radio Technology as a Tool for Propaganda

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science University of Virginia • Charlottesville, Virginia

> In Fulfillment of the Requirements for the Degree Bachelor of Science, School of Engineering

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## **Sociotechnical Synthesis**

The invention of radio was one of the greatest developments in human history. The ability to wirelessly transmit information opened a gateway to thousands of new technologies such as WiFi, radar, and satellite communications. These technologies have impacted every part of daily life, and it is difficult to imagine what society would be like without radio. Radio frequency technology (RF) is a fundamental discipline within electrical engineering. Involving rigorous mathematical concepts, RF research is constantly leading to groundbreaking new discoveries. While looking to the future of radio technology is fascinating, exploring the past is equally thought provoking.

Before the advent of the internet and portable devices, people depended on FM/AM radio to bring them news and music. This technology is interesting from both a historical and scientific perspective. The ability to broadcast radio news has allowed governments to employ effective campaigns of propaganda. Consequently, these campaigns have shaped the outcomes of history, including World War II and the collapse of the Soviet Union. From a scientific perspective, this technology is fascinating because it is relatively simple to employ and improve upon. Due to physics, to produce a radio wave, all that is needed is a changing current. Antennas and digital technology can allow an engineer to customize a radio transmitter for any purpose. For these reasons, I decided to base my thesis portfolio on radio transmission technology.

During the Fall semester of this school year, I worked on my capstone project with three other teammates. We wanted to construct a device which would bridge the gap between antiquated analog radio receivers and music-playing capabilities of modern devices. Using a software defined radio, we assembled a transmitter which modulated music from an input aux port to an FM frequency. This signal could then be picked up by a car radio receiver and played over the speakers. Thus, our capstone device would allow a user to play music from their phone to an older car which lacks an aux port or Bluetooth.

As is apparent in my prospectus, this originally inspired me to write my research topic on radio piracy. While our capstone device transmits within the legal limits set by the Federal Communications Commission, it could easily be modified to broadcast to a much greater area, essentially becoming a tool for pirate radio. However, as I researched this topic, I was much more drawn to the way governments have historically used radio for purposes of propaganda. I was able to find a substantial amount of information related to this topic, so I felt it would make a stronger thesis than radio piracy.

In summary, I am satisfied with the outcome of both my technical project and research paper. I have learned a great deal from both in terms of engineering and socio-historical analysis. I would like to thank Travis Elliot, my STS research advisor, who has taught two semesters of fascinating lectures and discussions. In addition, I would like to thank my technical advisor Professor Harry C. Powell for his guidance and advice during my capstone project.