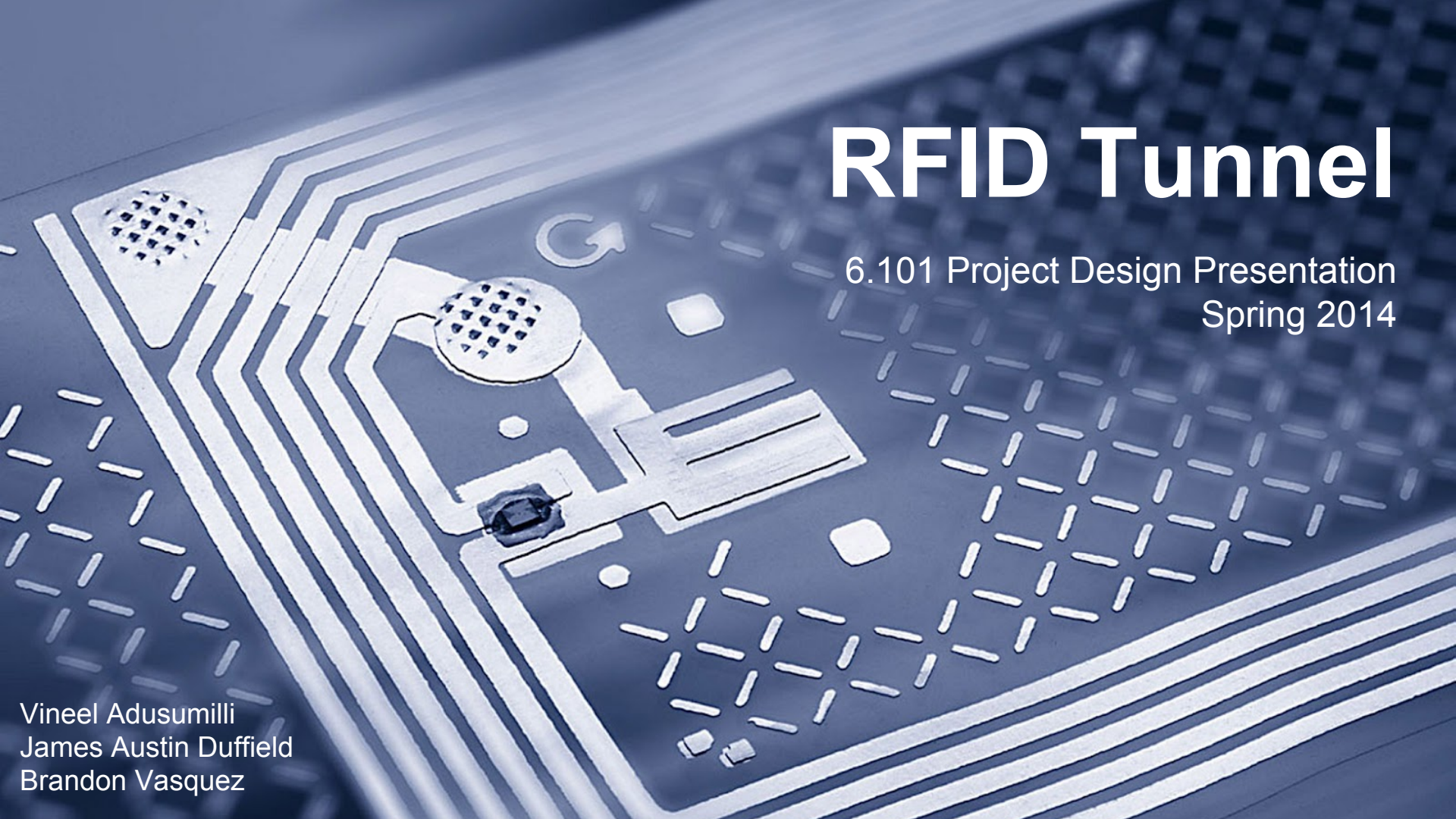

# RFID Tunnel

6.101 Project Design Presentation
Spring 2014

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James Austin Duffield
Brandon Vasquez

# Overview

RFID is fundamentally flawed

RFID card is assumed to be in close proximity for passive systems

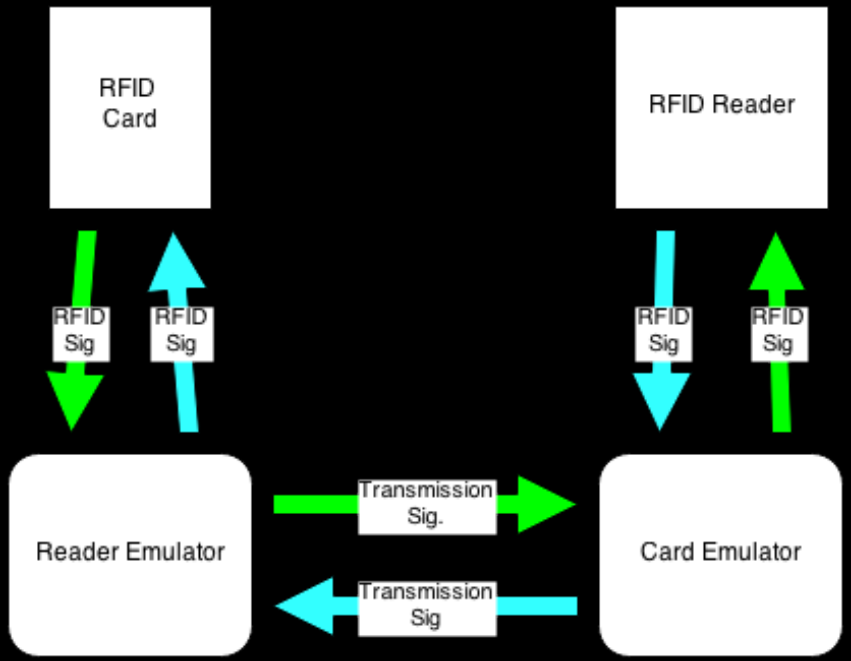
How practical is a system that extends RFID communication for passive systems?

# Subsystems

Reader Emulation

Card Emulation

Communication



# RFID Overview

"Radio Frequency Identification"

Modern technique invented by Mario Cardullo in 1973

Originally used for keeping track of materials and property

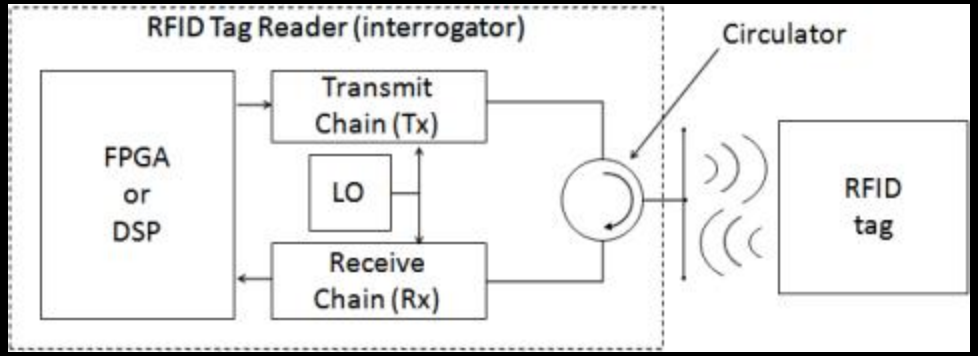
Near Field Communication built on top of RFID

# RFID Overview

Passive tags require no battery but lack range and computational power.

Active tags are powered, but are more expensive and tend to be much larger.

# RFID Overview




Source: National Instruments

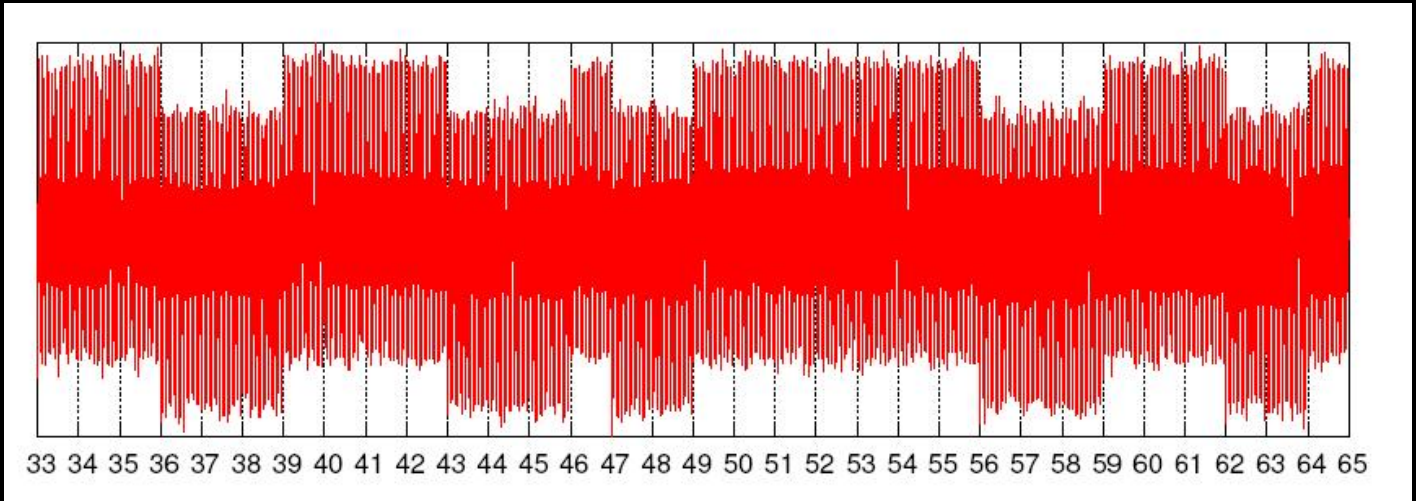
# MIT ID Cards

125KHz RFID

According to 2004 Paper: Spits out a constant bitstream while it's activated

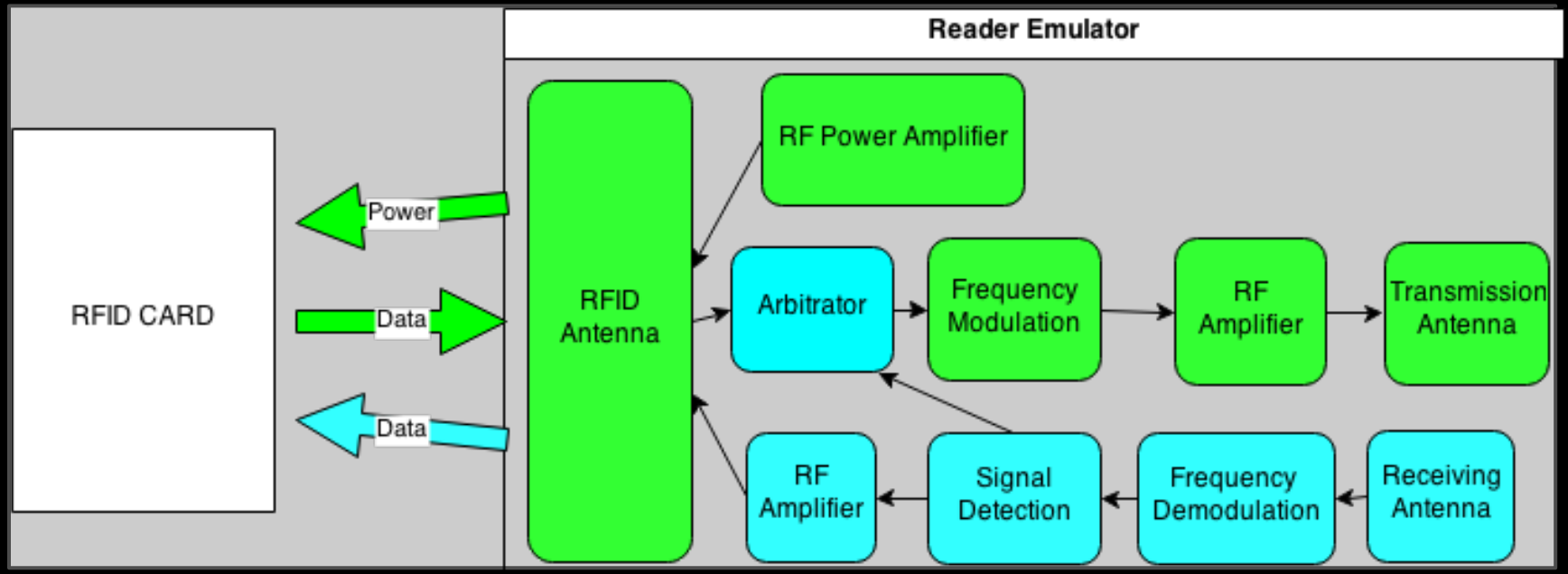
Might not still be the same system

# MIT ID Cards




Source: Mandel, Roach, Winstein 2004

# Reader Emulation



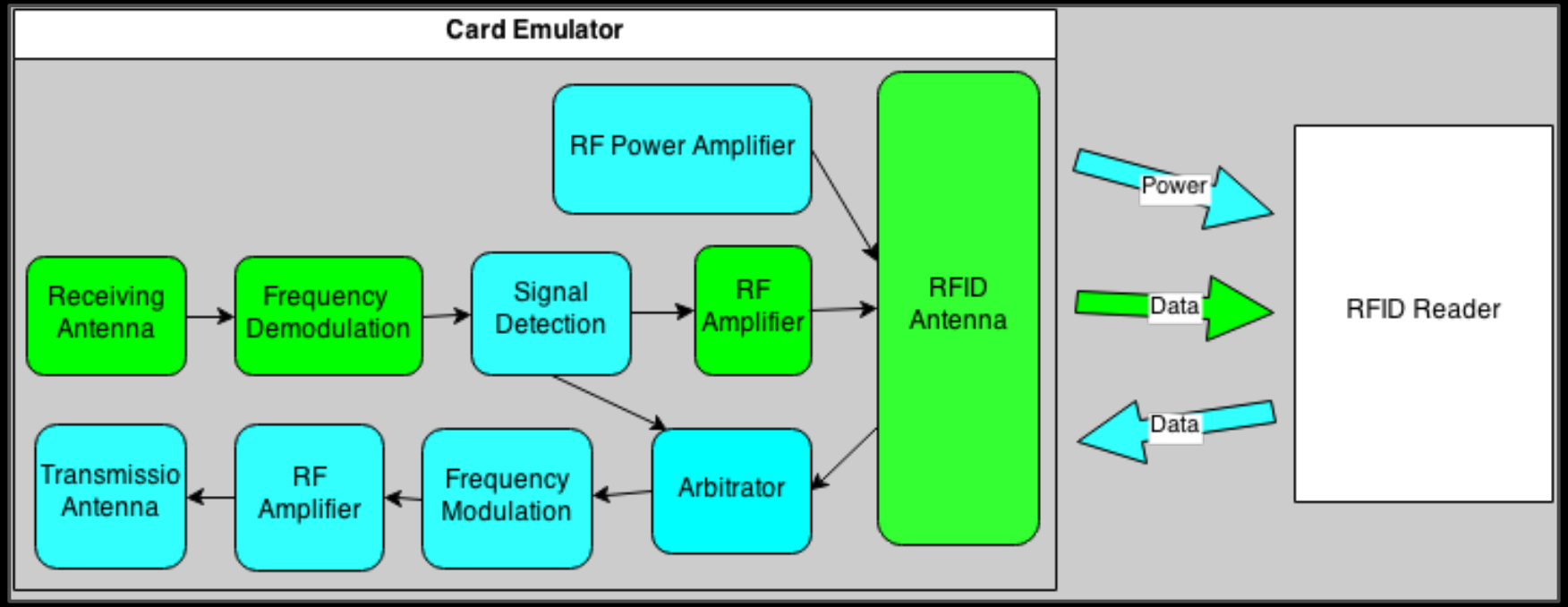
# Reader Emulation

Provide power to the RFID card with 125KHz signal

Detect attenuation of signal

Filter, compare with transmission frequency and convert to TTL levels for transmission

# Card Emulation

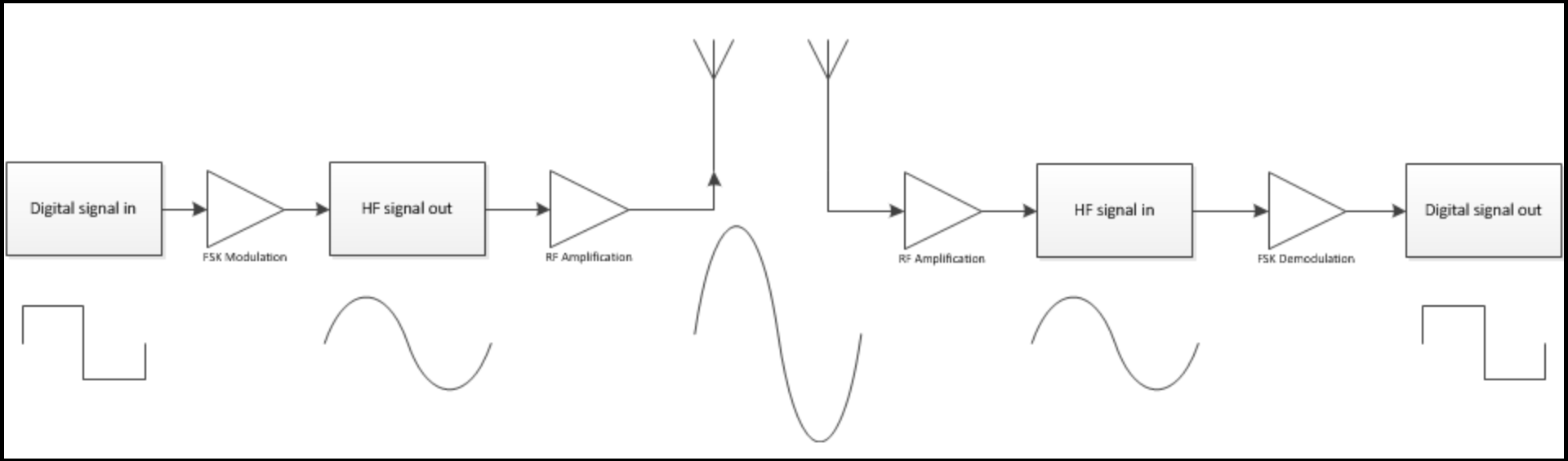


# Card Emulation

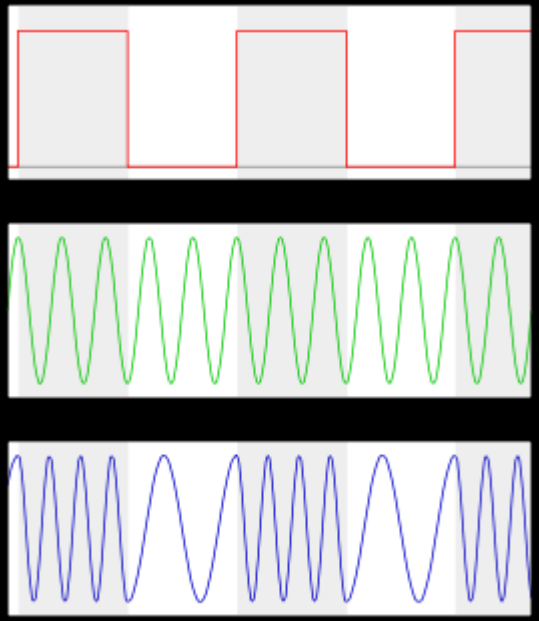
Attenuates RF signal from actual RFID reader

Must synchronize input from Reader Emulator with output to actual reader

# Long-Range Transmission



# FSK (Frequency Shift Keying)



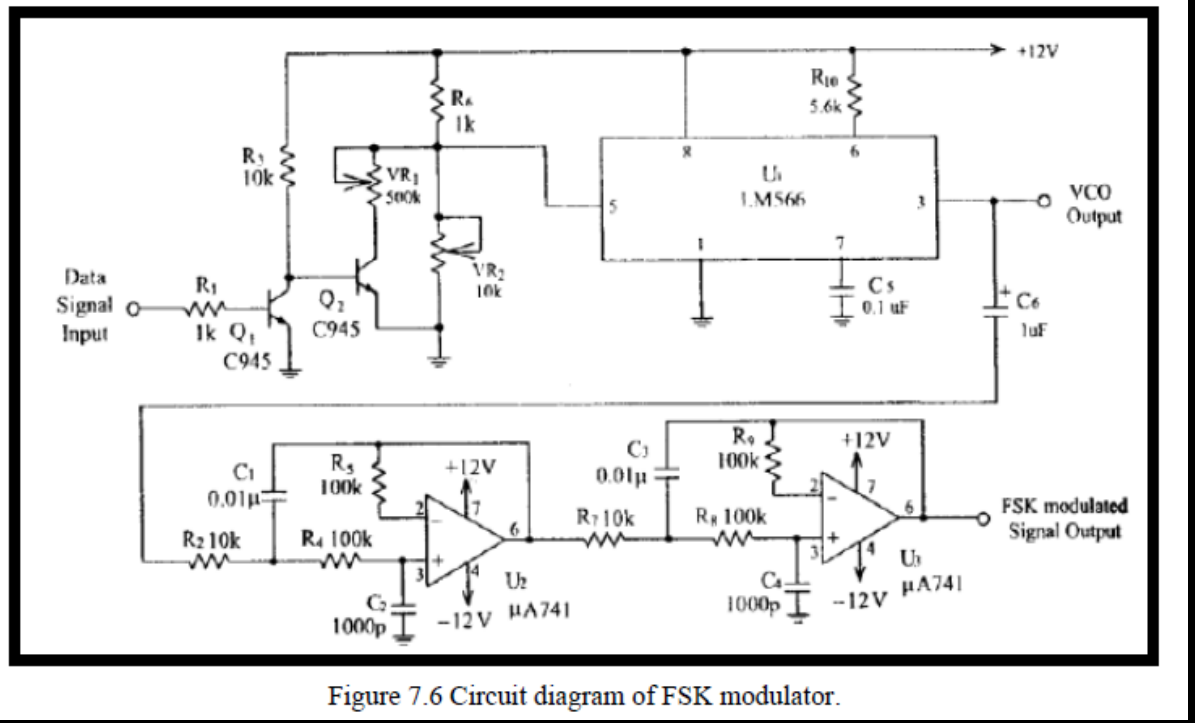



Figure 7.6 Circuit diagram of FSK modulator.

# Extensions

Two-way communication
- Symmetric systems on each end
- Method of switching Rx/Tx

Repeater station for greater range

# Timeline

Week of 4/13:

- Complete design of card emulator and reader emulator

Week of 4/20:

- Construction

Week of 2/27:

- Debugging / Extension

# Recap

Goal: Create a system that allows "tunneling" of MIT ID Cards.

Challenges: Transmitting RFID information using analog components. Synchronizing various systems.

# Questions?

# Back-up Slides