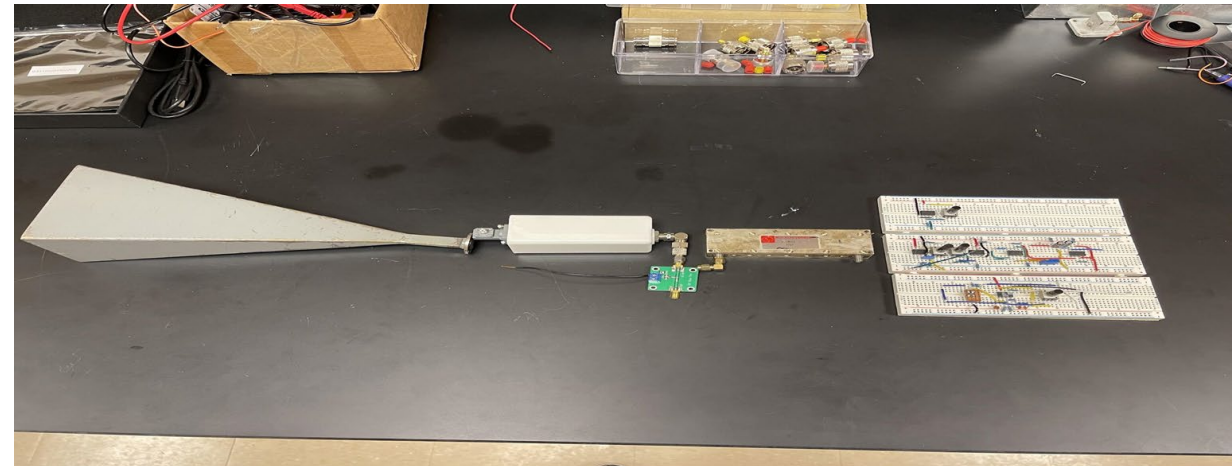
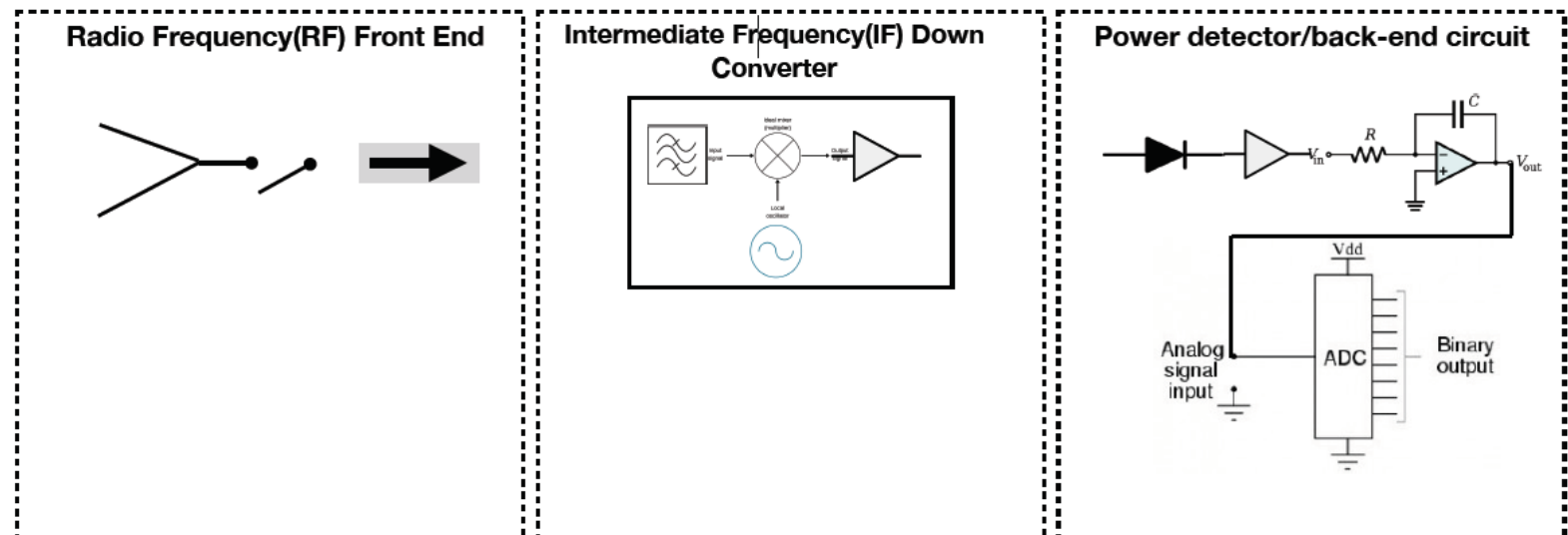


Microwave Radiometer (MWR)



- MWR has three sections of components
 - Radio frequency front end
 - Intermediate frequency converter
 - Back-end circuit
- Our project was to build prototypes of the back-end circuits on breadboards.



Microwave Radiometer – Power Detector (P.D.)

Samantha Smith

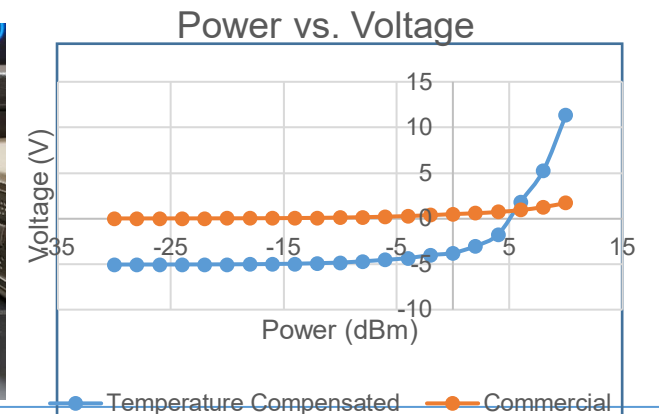
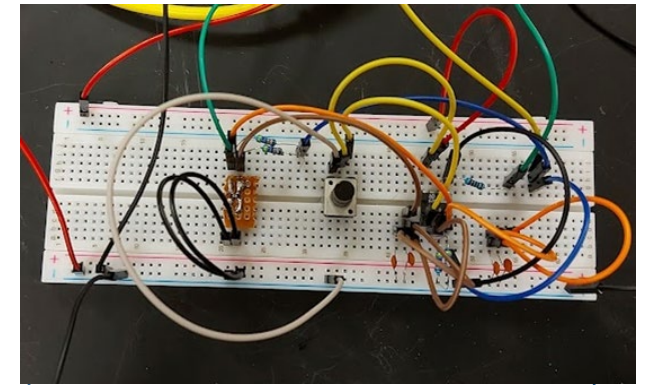
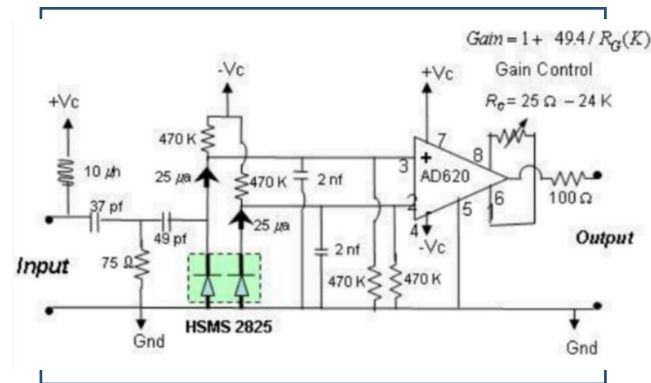
Objectives

- Build on breadboard
- Testing the circuit
- Compare to commercial power detector

Results

Temperature compensated P.D. is more sensitive

- Commercial: 0.1319 [V/mW]
- Temperature Compensated: 1.75 [V/mW]



Microwave Radiometer - AC Amplifier

Feng Pei Zhang

Objectives

- My work focus on the AC amplifier
- Learn radiometer working principle
- Build a radiometer circuit on breadboard for demonstration purpose
- Testing the circuit
- Integrate the AC amplifier to the final radiometer model

Results

- Design the circuit in KiCAD (Figure 1)
- Built the circuit on breadboard (Figure 2)
- AC amplifier works as expected (Figure 3)
- The gain of AC Amplifier was set up to 4 times in the final integrated circuit
- Future improvements
 - Displaying waveforms in monitors
 - Test other gains or noise with advanced designs

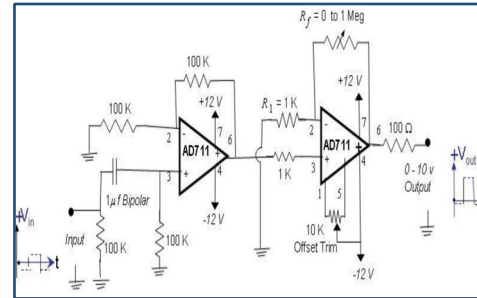


Figure 1: Diagram of AC Amplifier in KiCAD

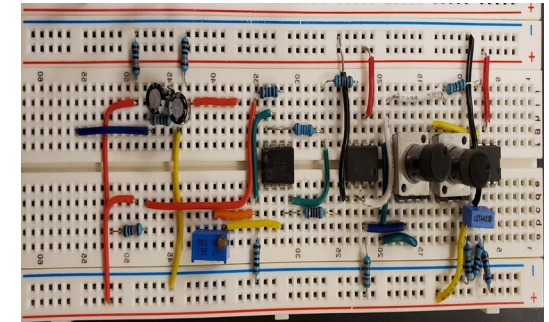


Figure 2: AC Amplifier on breadboard

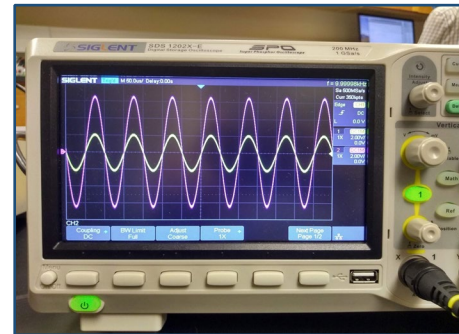


Figure 3: Test result on oscilloscope

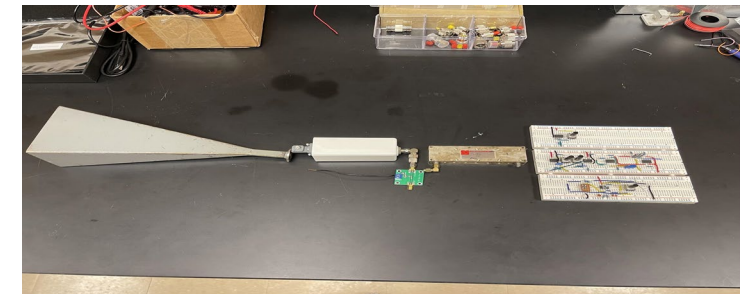


Figure 4: Expected model of final integrated radiometer

Objectives

- Build on breadboard
- Testing the circuit
- Check the amplification
- Integrate the DC amplifier to the final radiometer

Results

- Design of circuit on KiCAD (Figure 1)
- DC Amplifier/ADC works as intended(Figure 2 & 3)
- DC Amplifier was able to amplify the original signal up to 5 times.
- The data will be transferred to the computer through arduino which display the data through a graph based on arduino code
- Eventually this would become a Printed Circuit Board(PCB)
- Future improvements:
 - Test with actual signal using antenna
 - Sophisticated design on PCB board

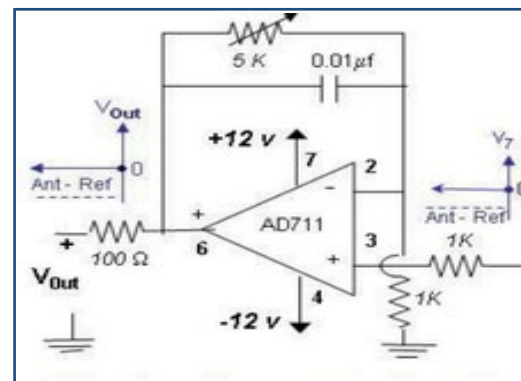


Figure 1: Diagram of DC Amplifier

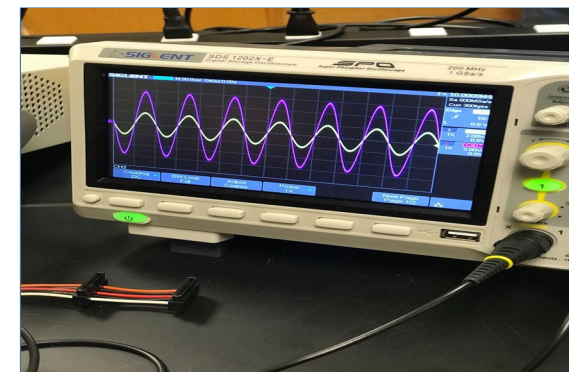


Figure 2: Test Result

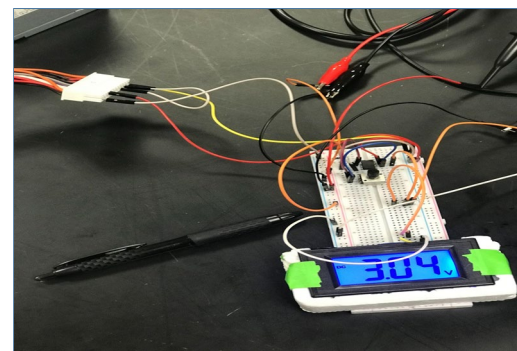


Figure 3: DC Amp / ADC

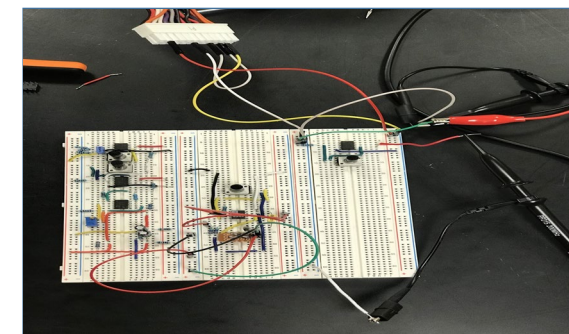


Figure 4: Integrated radiometer