Faster Terahertz Gap Modulation for Higher Data Rates

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The terahertz (THz) gap is currently the least underutilized and explored portion of the electromagnetic spectrum. This frequency range is too high to generate with semiconductors but too low to generate with optical methods. The lack of accessible signal generation and sensing methods limits experimentation in the range. Stage 1 focused on proving the modulation method in the optical range, while future stages will implement this method on the THz gap. The transmitter used an LED to generate a wide beam of radiation, similar to that generated by black body radiators. Mechanical modulation uses a speaker to generate the desired information as an audio signal. A chopper attached to the speaker diaphragm moves up and down with the speaker filament, modulating the light or THz signal with the audio signal's amplitude. The receiver uses a resistive sensor to detect the radiation level. The data showed the method of modulation proposed in this project valid by reproducing input signals up tp 500 Hz, equating to a 330-fold data rate increase over the methods used in prior research. While the amplitude and fidelity of the signal fell significantly at the higher frequency, simple amplification can solve this. This system is roughly analogous to a THz gap communications system; a practical THz sensor remains the only development area to implement the method. This novel modulation method greatly increases the potential data rate on the THz gap.

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