AM Jamming USRP-2901

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Abstract – This system is a SDR system that surpasses the traditional hardware implementation using software program. AM signal will be jammed as white noise interferes with the signal.

PROPOSED PROBLEM

Required to jam AM transmission using USRP.

METHODOLOGY

USRP-2901 is used to transmit white noise to interfere and resultantly block/jam the AM signal. We need the frequency of the carrier signal of the targeted wave to successfully produce interference. If we know about the amplitude of the targeted wave, it will help us jam as all we need is noise of higher amplitude. In signal processing, white noise is a random signal having equal intensity at different frequencies, giving it a constant power spectral density AM signals. Transmitter end transmits the AM signal continuously and the receiving antenna receive signal simultaneously. When we turn on the AM-Jammer, what is does to the receiving end, the receiving antenna will not be able to catch the original transmitted signal as it has been jammed by the other same frequency high gain noise signal.

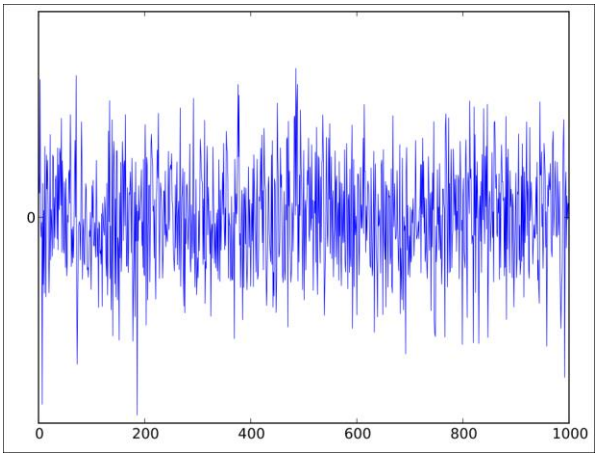


Fig: 1 White noise AM Signal

EXPECTED OUTCOME

By using the above approach, we can easily jam any type of AM communication. Even if we are not sure about the amplitude of the targeted signal, we can just create noise of a very large amplitude that is approximately higher than the targeted signal to jam it.

PAST WORK

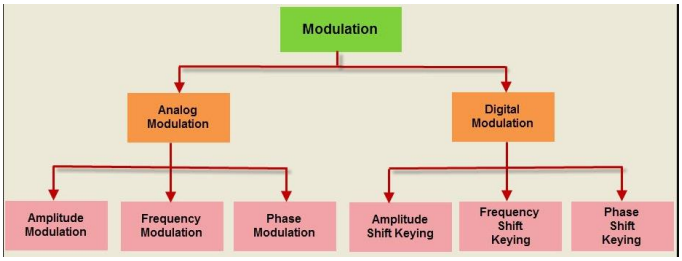
Radar jamming and deception is a form of electronic countermeasures that intentionally sends out radio frequency signals to interfere with the operation of radar by saturating its receiver with noise or false information. Concepts that blanket the radar with signals so its display cannot be read are normally known as jamming, while systems that produce confusing or contradictory signals are known as deception, but it is also common for all such systems to be referred to as jamming. Electronic jamming is a form of electronic warfare where jammers radiate interfering signals toward an enemy's radar, blocking the receiver with highly concentrated energy signals. The two main technique styles are noise techniques and repeater techniques.

DIFFERENT APPROACHES

The signal modifies the amplitude, frequency, or phase of carrier.

$$s(t) = A(t)\cos\left(2\pi f_c(t)t + \phi(t)\right)$$

- Amplitude Modulation: A(t) ∝ m(t)
- Frequency Modulation: f_c(t) ∝ m(t)
- Phase Modulation: ϕ(t) ∝ m(t)



AMPLITUDE MODULATION:

In AM, the voltage or power level of the information signal changes the amplitude of the carrier in proportion. With no modulation, the AM carrier is transmitted by itself. When the modulating information signal (a sine wave) is applied, the carrier amplitude rises and falls in accordance. The carrier frequency remains constant during AM.

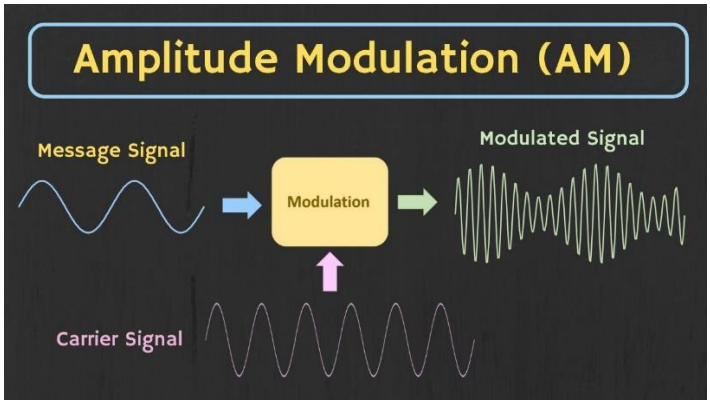


Fig: 2 Amplitude Modulation

Advantages of using AM:

- is a low cost.
- It requires a lower carrier frequency.
- It is easily available.
- Require a simple and cheaper transmitter and receiver.
- An easier method for transmitting and receiving an audio signal
- It is simple with proven reliability.
- It can be demodulated using a circuit consisting of very few components
- AM receivers being very cheap as no specialized components are needed.

FREQUENCY MODULATION:

Frequency modulation uses the information signal, $V_m(t)$ to vary the carrier frequency within some small range about its original value. Here are the three signals in mathematical form:

- Information: $V_m(t)$
- Carrier: $V_c(t) = V_{co} \sin (2 \pi f_c t + \phi)$
- FM: $V_{FM}(t) = V_{co} \sin (2 \pi [f_c + (\Delta f/V_{mo}) V_m(t)] t + \phi)$

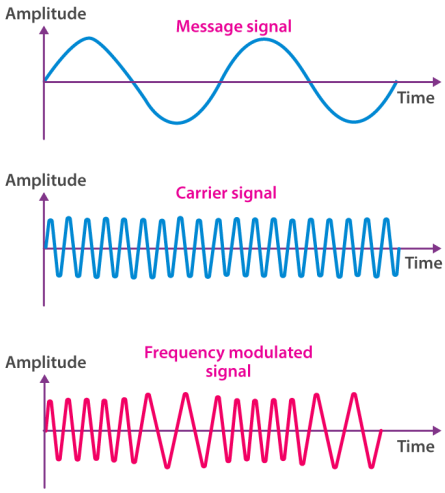


Fig: 3 Frequency Modulation

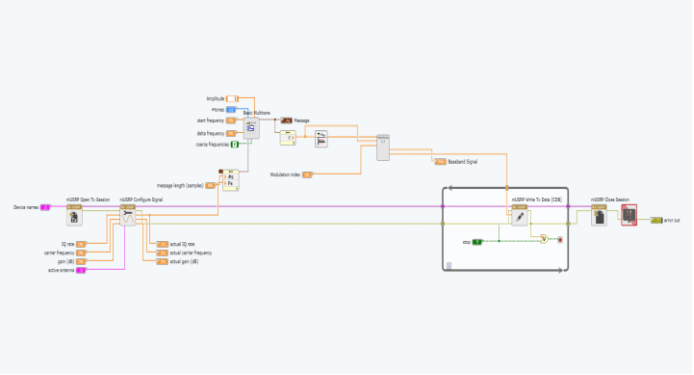


Fig: 4 AM-Transmitter (Block Diagram)

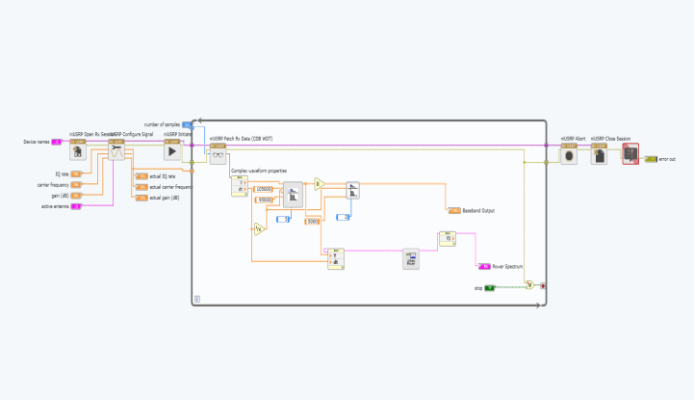


Fig: 5 AM-Receiver (Block Diagram)

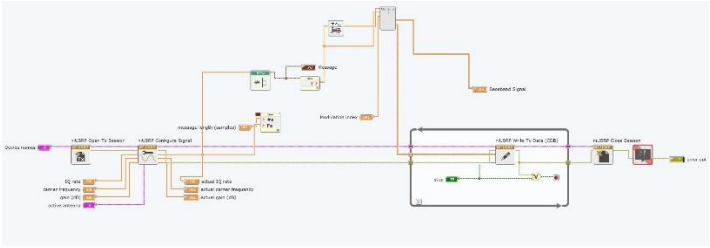


Fig: 6 AM-Jammer (Block Diagram)

JAMMER

Radio jamming is the deliberate jamming, blocking or **interference** with wireless communications. In some cases, jammers work by the transmission of radio signals that disrupt communications by decreasing the signal-to-noise ratio. The concept can be used in wireless data networks to disrupt information flow.

AM JAMMER

An AM Jammer transmits black---noise having carrier frequency of the targeted AM signal. The transmitted signal has high amplitude for effective interference the block diagram of which is shown in figure 6

RESULTS

Our method was able to successfully jam AM signal of any specified frequency with high accuracy without wasting much power.

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