**AUTOCORRELATION-BASED SPECTRUM SENSING**

**OF FBMC SIGNAL**

**ABSTRACT:**

In cognitive radio, the focus of this paper is on a feature detector for filter bank multicarrier (FBMC) signals. The first proof in this work is that the FBMC signal samples are uncorrelated. The autocorrelation function (ACF) of the FBMC signal becomes non-zero at the latency equal to the number of subcarriers if the FBMC signal is processed using our proposed technique. However, with the same proposed processing, additive white Gaussian noise (AWGN) samples remain uncorrelated. An autocorrelation-based feature detector is presented to detect FBMC signal in noise using this feature. The suggested detector's key advantage is that, unlike blind detectors, it can distinguish between FBMC signal and noise (or interference). The distribution of the proposed detector's test statistic is then calculated under a noise-only scenario so that the Neyman-Pearson detector's threshold can be designed to maintain a constant false alarm rate while maximising the chance of detection. The suggested detector's efficacy is demonstrated by simulation results.

**EXISTING SYSTEM:**

**Energy detection:**

Although blind detection techniques such as energy detection, can be used to detect any waveform, they cannot distinguish between noise and interfering signal. If no enough information is available about the primary user signal, which is usually the case in a CR environment, energy detection can be used. This can be done simply by band-pass filtering the required bandwidth, then squaring and integrating the output over the observation interval, and then the result is compared with a certain threshold to decide whether a primary user is present or not .

**DISADVANTAGES:**

1.Noise and ACI affect the performance of the energy detector, a very poor performance at low SNR was observed.

2.The energy detector cannot differentiate signal types but can only determine the presence of the signal. Thus, the energy detector cannot differentiate between primary and secondary user signals. This makes it prone to false alarm when another secondary user attempts to access the same channel.

**PROPOSED METHOD:**

Proposed Autocorrelation Detector:

Moreover, the use of new waveforms in 5G PHY will necessitate design of the spectrum sensing algorithms for the new candidate waveforms. Proposed autocorrelation detector was proposed based on the induced repeating patterns in the transmitted FBMC signal., a feature detector is proposed in this paper which can distinguish between FBMC-plus-noise and noise-only scenarios. Also unlike no attempt is being made to induce patterns in the basic FBMC transmission. The specific contributions of this paper are: It is shown that the autocorrelation function (ACF) of the FBMC signal is zero for non-zero lags. After proper study of FBMC signal generation, a method is proposed to process the FBMC signal at the receiver so that the processed FBMC signal has non-zero ACF value at a certain lag value other than zero. On the other hand, if the same processing is applied to AWGN samples, the processed noise samples remain uncorrelated. A spectrum sensing scheme is proposed to detect the differences in ACF behavior of the processed (or modified) data in the two scenarios of FBMC-plus-noise and noise only. The conditional distribution of the proposed test statistic, conditioned on the received signal being only noise, is derived so that the threshold for Neyman-Pearson detector can be evaluated analytically.

**Advantages:**

1. A Proposed autocorrelation detector which is the proposed method can distinguish between FBMC-plus-noise and noise-only scenarios.

2. Proposed autocorrelation detector has good performance when compared to existing method.

**Applications:**

* 1.Spectrumsensing ,
* 2. Resource allocation and scheduling.
* 3.Powersystem line outage detection
* 4.Bioinformatics
* 5. Quality control

**Software & Hardware Requirements:**

**Software:** Matlab R2018a.

**Hardware:**

**Operating Systems:**

• Windows 10

• Windows 7 Service Pack 1

• Windows Server 2019

• Windows Server 2016

**Processors:**

Minimum: Any Intel or AMD x86-64 processor

Recommended: Any Intel or AMD x86-64 processor with four logical cores and AVX2 instruction set support

**Disk:**

Minimum: 2.9 GB of HDD space for MATLAB only, 5-8 GB for a typical installation

Recommended: An SSD is recommended a full installation of all Math Works products may take up to 29 GB of disk space

**RAM:**

Minimum: 4 GB

Recommended: 8