

Filter banks and methods for operating filter banks

Reference No: B75223

CHALLENGE

The two central functionalities of filter banks are; the **decomposition of a signal into frequency sub-bands** (analysis); and the **reconstruction of the individual sub-bands into a complete signal** (synthesis). These functionalities enable a plethora of applications within digital signal processing. Starting from medical applications, such as digital hearing aids/cochlear implants and the processing of electrocardiograms; moving to radar applications, such as advanced driver assistance systems, intruder detection, and automated lighting; and finally, within wired and wireless communication systems. Many of these applications require a **large number of dedicated, often battery-operated, devices**. Thus, making low power consumption and low material costs crucial factors when considering different implementations. Modulated filter banks (MFBs) are among the most popular types of filter banks, due to their **low computational complexity**. Lower computational complexity means lower power consumption and lower use of resources, i.e. **less space used on the chip and longer battery lifetime**. A specific subset of MFBs, known as discrete Fourier transform based MFBs, are very popular.

INNOVATION

The invention consists of a novel implementation structure for discrete Fourier transform based MFBs leading to **savings of up to approximately 50% in computational complexity¹**, in their filtering part.

COMMERCIAL OPPORTUNITIES

Suggested use cases include:

- Automotive radar
- Radar intruder alert and automated lighting
- QRS detection in wearable electrocardiogram devices
- Digital hearing aids and cochlear implants
- Wired and wireless communication systems

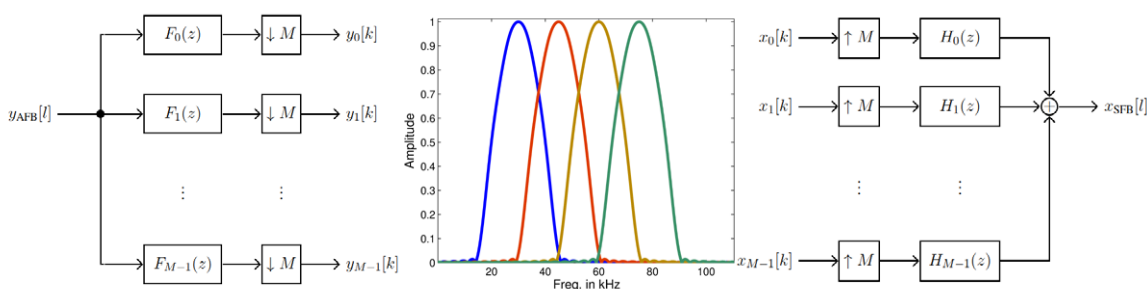


Figure: Introduction to the concepts. (Left) A uniform critically sampled analysis filter bank decomposes the incoming signal into frequency sub-bands. (Middle) Illustration showing four frequency sub-bands. (Right) A uniform critically sampled synthesis filter bank reconstructs the individual sub-bands into a complete signal.

DEVELOPMENT STATUS

Conceptual

REFERENCE:

- 1 L. G. Baltar, I. Slim and J. A. Nossek, (WO2017137126) FILTER BANKS AND METHODS FOR OPERATING FILTER BANKS, (2017)