Project summery
Measuring vital signs using mmWave radar

Common widespread methods of measuring heart rate are intrusive and can often be uncomfortable for the user and many of the new emerging methods of measuring heart rate are camera based. These camera based alternatives are not as accurate as established methods and often raise privacy concerns with patients. mmWave radar has proven its ability to take accurate non-intrusive measurements whilst maintaining privacy. Previous works use often use a computer in order to process the data in order to extract vital sign information, my project will focus on creating a standalone system that will run on the DSP subsystem (see figure 1) present on the EVM to measure heart rate without the need of a computer.

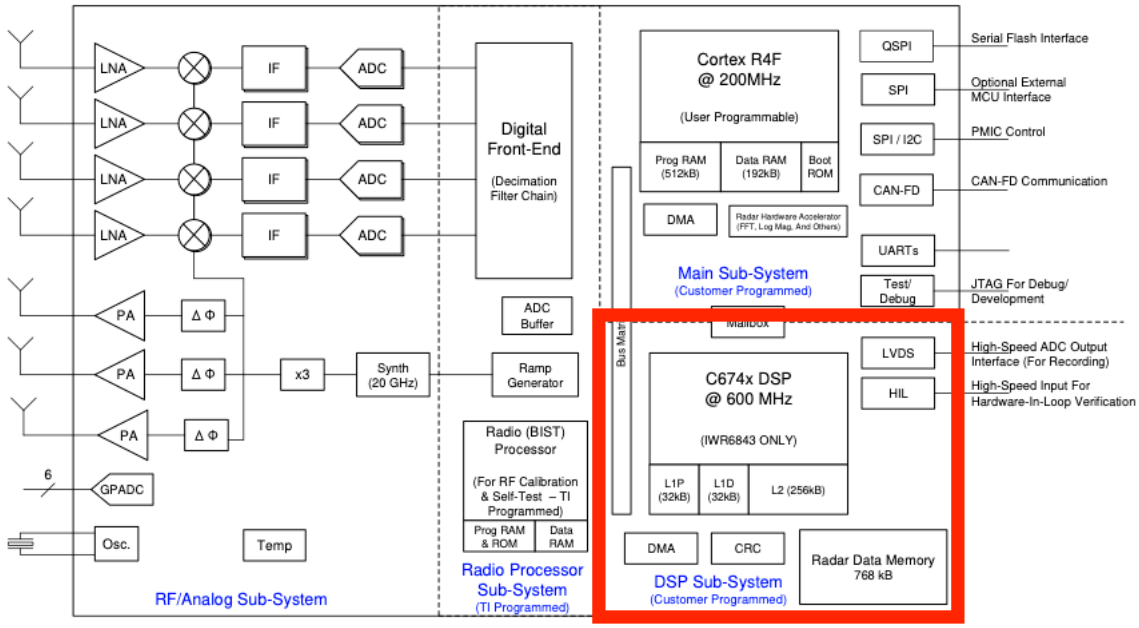


*Figure 1 - Block diagram of IWR6843*

A standalone computer independent system has the advantages of lower overall system cost, smaller device size, lower system power consumption, increased processing speed as it doesn't need to communicate with a PC.

Heart rate measurement using mmWave radar centres on the principle that minuscule displacement of an observed object results in a sizable change in the phase of the received signal, this phase difference can be observed over time in order to determine the rate of vibration of the object or in our case the heart rate of a person. The phase difference and displacement are related by the equation.

$$\Delta\phi = 4\pi\Delta d/\lambda$$

This equation can also be written as

$$\Delta d = \lambda\,\Delta\phi/4\pi$$

The project can be divided up into the steps below.

Get the mmWave vital signs lab running on my computer
Looking at how to directly access the board using code composer studio(CCS)
Accessing the DSP subsystem on the IWR6843
Get code running on the DSP subsystem
Make data from the radar accessible from the DSP sub system
Start implementing my own code to measure the heart rate on the subsystem
Get the system to communicate the heart rate data to a PC