Title: Ambiguity Resolution in code-division multiplexing frequency modulation Continuous wave (CDM-FMCW) Radar

~~Multiple input multiple output (MIMO) radar with FMCW is the mainstream radar system adopted in automotive vehicles. One method to implement the FMCW MIMO radar is the CDM modulation in the slow time domain. As compared with time-division multiplexing (TDM) modulation, CDM modulation has better performance in terms of antenna array gain and clutter suppression. One problem about applying MIMO CDM-FMCW radar is that the maximum unambiguous velocity is reduced by the number of transmitters as compared to phased array radar with single transmitter. There are some existing technologies aiming to extend the maximum unambiguous velocity of MIMO TDM-FMCW radar. However, those methods in general requires specific hardware configuration and complex waveform design and signal processing methods that are not efficient for practical applications. This patent proposes an efficient method without special requirements on hardware configuration and complicated algorithms for the CDM-FMCW MIMO radar.~~

This invention generally relates to frequency modulated continuous wave (FMCW) radar systems, and more specifically, to new method and systems for efficient Doppler ambiguity resolution in code-division multiplexing (CDM) FMCW radar. This invention presents a high resolution FMCW MIMO radar system with improved maximum measurable velocity. The patent first designs an efficient waveform scheduling scheme according to the CDM modulation method and then develops an efficient Doppler ambiguity resolution method by exploiting the inherent property of the waveform designed and taking advantage of array signal processing.

The main problem solved in this invention is the resolution of velocity ambiguity in CDM FMCW MIMO radar. We solve this problem by co-designing the waveform scheduling scheme and the efficient Doppler ambiguity resolution algorithm.

The invention is intended for CDM FMCW MIMO radar used on automotive vehicles. It is possible to be applied to any CDM MIMO radar in other fields like airborne radar, spaceborne radar, sonar, and any kind of such active or passive sensors in any applications.

~~Figures included in the patent:~~

~~1) Figure-1: Radar system architecture~~
~~2) Figure-2: Transmitting and receiving antenna array~~
~~3) Figure-3: CDM FMCW waveform scheduling for Doppler ambiguity resolution~~
~~4) Figure-4: Overall processing flowchart~~
~~5) Figure-5: Doppler ambiguity resolution~~

No suitable figure