Technical Article

Accelerating into the Future: Detecting Velocity to Help mmWave Sensors Understand Their Environment

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In the previous installment of this four-part series, I discussed how range helps millimeter wave (mmWave) radar sensors define their environment.

The second key measurement is velocity, which I previously described as “the speed at which an object is moving toward or away from the mmWave radar sensor … Because velocity enables the sensor to process whether a detected object is moving or stationary, this measurement helps the system calculate how much time it has to make a decision about an approaching object.”

By measuring the vibrations given off (or not) by the landing surface over which a drone hovers, an mmWave sensor can accurately detect whether the drone is over land or water and determine whether it is safe to land. Beyond drones, integrating this technology into the undercarriage or door of a car could prevent drivers or passengers from stepping out of the car and into a puddle. Or a vehicle could use this capability to detect and avoid dangerous road conditions such as black ice.

By watching plots 3 and 5 in this video, you can see how velocity information can determine the relative positions of objects. Importantly, combining velocity information with range information helps distinguish objects, particularly instances where one object crosses in front of another, such as when a pedestrian moves in front of a moving or parked car.

Velocity is an important measurement that helps mmWave radar sensors better understand and react to their environment, whether that’s preventing a drone from landing in a lake or helping identify a pedestrian in the crosswalk. Combining this information with information about an object’s range and angle enables the depiction of environments with enhanced accuracy.

In the final installment of this three-part series, I’ll discuss the acquisition of angle information. In the meantime, check out the “The fundamentals of millimeter wave sensors” white paper for more information on how mmWave sensors use these measurements to see and understand their environment.

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