

Since our aim is to detect the motion of human beings, it is necessary to have very low RCS detection capability. Here we believe that 10 cm^2 is a good lower bound for the RCS and 10cm for range resolution.

↑ Cite a source?

$7\frac{1}{2}/10$

Range:

The wall through imaging mainly is used in situations such as urban warfare where it is required to track the movement of the humans inside a building while the radar is placed just outside the building using a mobile van. Hence the range of the radar need not be too high. We can assume that we can place the van around 60m from the building and entire building floor size is not more than 30-40m. Hence a total range of 100m seems to be a good range that needs to be covered by the radar.

Transmit Power:

Since these walls through radars are mounted on wheels, they need to be small and light enough so that can be easily mounted on vehicles and movement of these radar systems does not pose any hindrance. Hence the power source to such systems is also limited. Hence we use low transmit power of approximately, 100W.

Characteristics of Antenna:

Another important factor that we need to consider in the detection of the target is how fast the movement of the target needs to be tracked. Since it is critical to continuously keep track of the movement of target in an application such as warfare the rate at which we require a continuous detection of the target. Hence we plan to use a phase array antenna that has an appropriate azimuth and elevation beam width so as to cover the entire building range in context. This depends on the building width and height. For all practical purposes we choose beamwidth and antenna parameters such that it can suffice a building of height and width of around 50 X 100 m.

↙ Also movement will help separate target from stationary clutter

Data Processing:

The primary objective of the through the wall radar technology is detection of any human movement. Our main Intension will be to eliminate the heavy clutter that is caused by the echo from the exterior, interior walls and any other non-target clutter. Given that we are using the phased array antenna, we can assume that the reflections from the wall remain same for the entire array element, because the extent of the wall is much greater than the antenna array beamwidth. On other hand, returns from the target, vary. The dc component corresponding to the constant-type return, which is typical of walls, can be significantly reduced by applying clutter filter operation like MTI system.

will it be, at what distance?

Some ranging here =

Not sure

Conclusion:

In this report we present the basic considerations for a TWI radar system. We enlist the required characteristics of the system and provide a basic specification requirements to meet the given system characteristics. Our design will be limited to a moderate sized single storied building and also we assume

how it relates to SA

All reasonable things to consider but relate to a definite scenario