ITSP summer project
Abstract

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Project name-Sense Through Wall Human Detection

IIT Bombay, 2015

Motivation

First Doppler Weather Radar Is Installed In Nagpur at Maharashtra

http://jwcn.eurasipjournals.com

First RADAR Contact With Moon

BROAD VISION

- Detection of human target through wall is of interest for many applications. Military industry could use it for hostage rescue situations. In such scenarios, detection and location of humans inside a room is very critical as unknown building layout together with presence of armed persons can be dangerous for the rescuers.

Main Principal

- Detection of human beings with radars is based on movement detection (e.g., walking human), chest movements due to breathing or heartbeat. Heart beat and respiratory motions cause changes in frequency, phase, amplitude, and arrival time of reflected signal from a human being. In case of through wall human target detection, these changes can be very small, especially for a brick or concrete walls.

- An effective human detection method requires a model of UWB radar waveform propagation and scattering, e.g., interaction with the human body. A perfectly reflecting target e.g. a metal plate with an infinite area returns the incident UWB pulse along a single-path. However, for a target such as human body, which has complex shape and whose spatial extent is larger than the transmitted UWB signal pulse width, the returned UWB radar signal consists of multipath components, as the incident UWB pulse scatters independently from different human body parts at different times with different amplitudes (depending on the distance to the body part and the size, shape, and composition of the scattering part).

Data Collection

- For each measurement set, scans were acquired for duration of around 1 min. The number of scans acquired depends on the scan rate which in turn depends on the waveform scan resolution, the window size, and the Integration size. Also scans were taken once with human target and once without human target.

Instruments and Total Cost

- In this project we are using following instruments-

* Microcontroller
* Microservo
* Ultrasonic ranging module HC-SR04
* wires, bread board .. Etc

- Total cost

* Total cost is between 8000-10,000

TIMELINE

- week 1-2:-evalutation,purchasing the components,study about servos,microcontroller and scanners.
- week 3-4:-making of the basic model & report for midway evaluation.
- week 5-6:-testing & trying to make it more usefull &more accessible.

ACKNOWLEDGEMENT

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- Skolnik, M. I., Introduction to Radar Systems, 3rd ed., McGraw-Hill, New York, NY, 2001