***Wi-Fi Aided Detection and Ranging (WADAR)***

*for indoor tracking*

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*Abstract*—To make use of the stray wifi signals for indoor tracking and creating a useful applications out of it. (*Abstract*)

Keywords—Wi-fi, Triangulation, Noise Correction

# Introduction (*Heading 1*)

On an average three to four Wi-Fi signals are detected in any building with reasonable strength. In this paper we discuss the possibilities of using the above mentioned technology along with detailed survey of various metrics as well as the associated errors. We wish to create an open source package which can in turn be used to create various soft wares which could benefit and improve the standard of living. The concept is pretty much similar to that of GPS which makes use of signals from satellites orbiting the earth and making use of geometrical triangulation to pin point a particular location. Since the Wi-Fi signals captured with reasonable strength are originating close-by the attenuation is minimal and the estimated error of estimation is within few centimeters. This can easily used for mapping around the house. We discuss several use cases for the above which we have implemented. Since we aim to be open source it can be used by anyone for developing as well as commercial purposes without any problems.

# Mathematics Involved

K = 32.44

FSPL = Ptx - CLtx + AGtx + AGrx - CLrx - Prx - FM

d = 10 ^ (( FSPL - K - 20 log10( f )) / 20 )

Here:

* K - constant (32.44, when f in MHz and d in km, change to -27.55 when f in MHz and din m)
* FSPL - Free Space Path Loss
* Ptx - transmitter power, dBm ( up to 20 dBm (100mW) )
* CLtx, CLrx - cable loss at transmitter and receiver, dB ( 0, if no cables )
* AGtx, AGrx - antenna gain at transmitter and receiver, dBi
* Prx - receiver sensitivity, dBm ( down to -100 dBm (0.1pW) )
* FM - fade margin, dB ( more than 14 dB (normal) or more than 22 dB (good))
* f - signal frequency, MHz
* d - distance, m or km (depends on value of K)