



Radiation Response System for Emergency Responders

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<http://gammawatch.com>

Different Paradigm



U Mine, NPP, Lab:

You know you will be in a Rad Area

- Gear up
- Get trained
- End of Story!

First Responder, Homeland Security:

May be in a Rad Area

- How much gear do you carry for a remote possibility?
- Are you going to turn every First Responder into a Rad Expert?
- ... much more open ended.



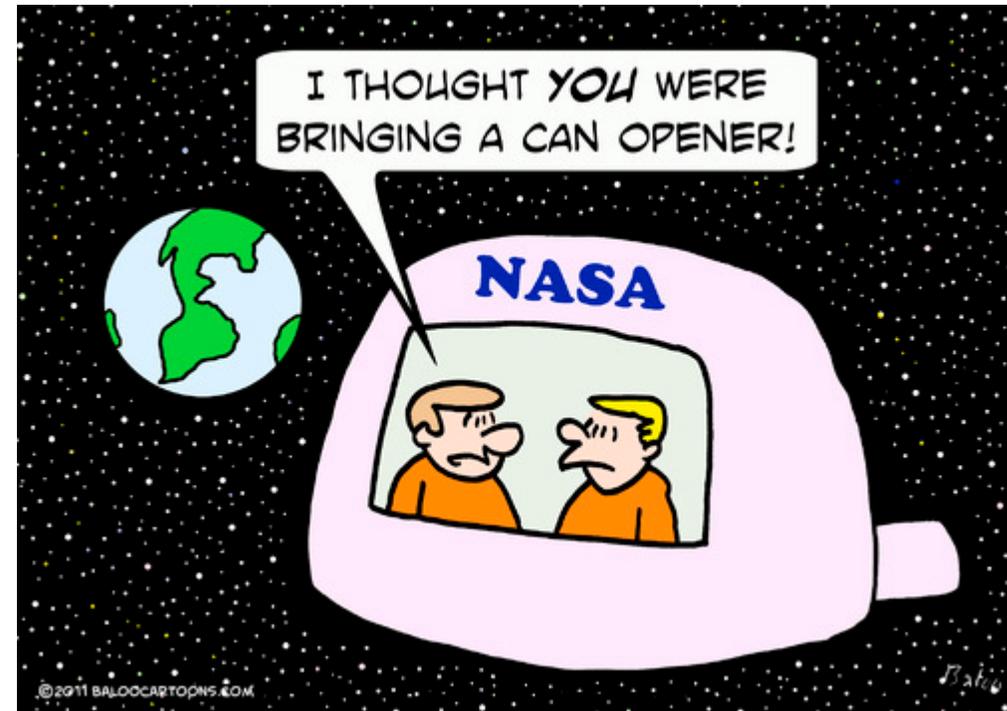


Truism

If equipment isn't user friendly, ergonomic and economic enough to be available when and where it is needed, all other metrics are irrelevant.



"How many times did I say it, Harold? 'Make sure that bomb shelter's got a can opener--ain't much good without a can opener,' I said."



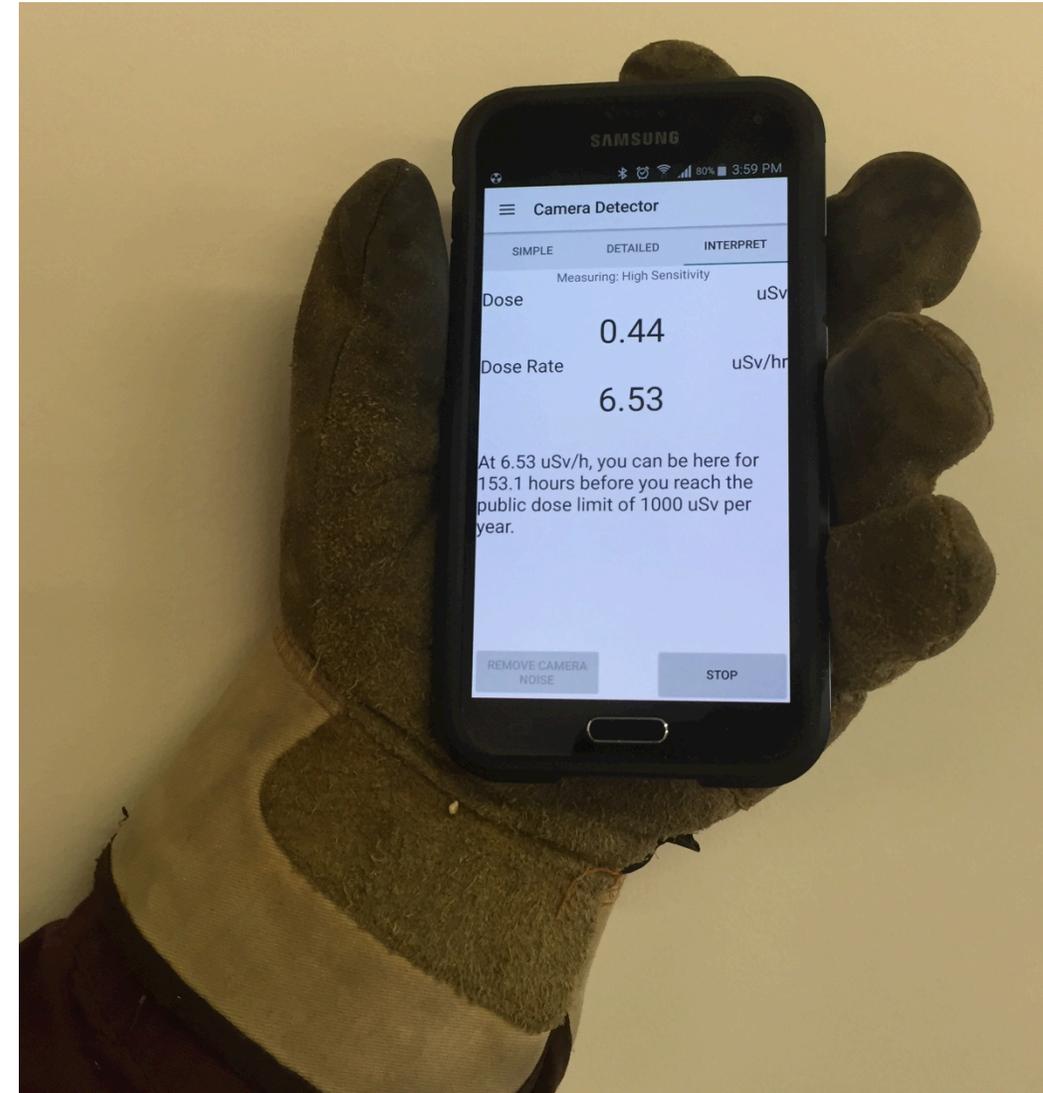
First Radiation Detector on Scene Came 1000 km



What is GammaGuard?



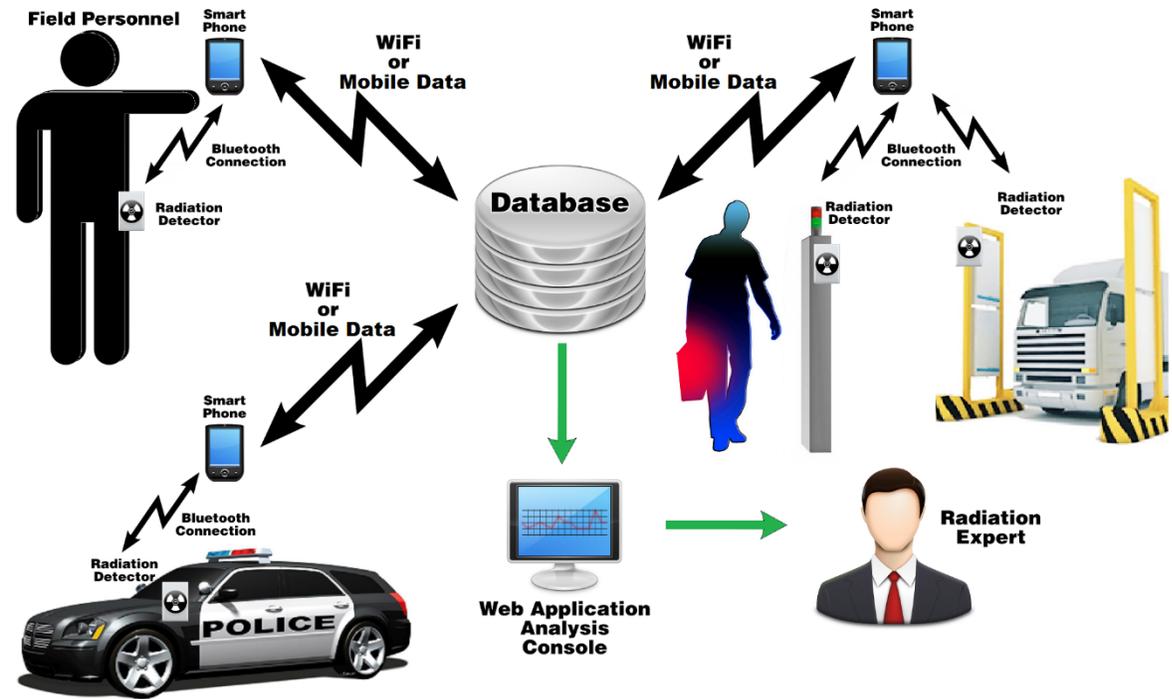
- Smartphone App that uses phone's camera as radiation sensor.
- Can connect to more sophisticated sensors by Bluetooth.



Imagine the Possibilities!



- No extra equipment to carry
- No or low cost
- Rapid mass deployment
- Rich, meaningful display [‘Dose Rate = 5 mSv/h, it takes 12 minutes to reach public dose limit and 100 hours to reach emergency limit.’]
- Connectivity (RadResponder)
- Will not saturate



Prior State of the Art



- Found some apps on Google Play
- Put electrical tape over the camera to keep the light out
- Count 'bright' pixels
- Works OK at high dose rates
- Random number generator at low dose rates
- Can not run in the background (i.e can't use the phone for anything else)
- Can not run continually (i.e. be used as dosimeter)

Status



- ✓ Patent received for using mechanical shutter instead of tape
- ✓ Technical issues solved:
 - ✓ Almost eliminated thermal noise events
 - ✓ App runs in background
 - ✓ Power save mode implemented
- ✓ Can connect to more sensitive and specialized detectors via Bluetooth



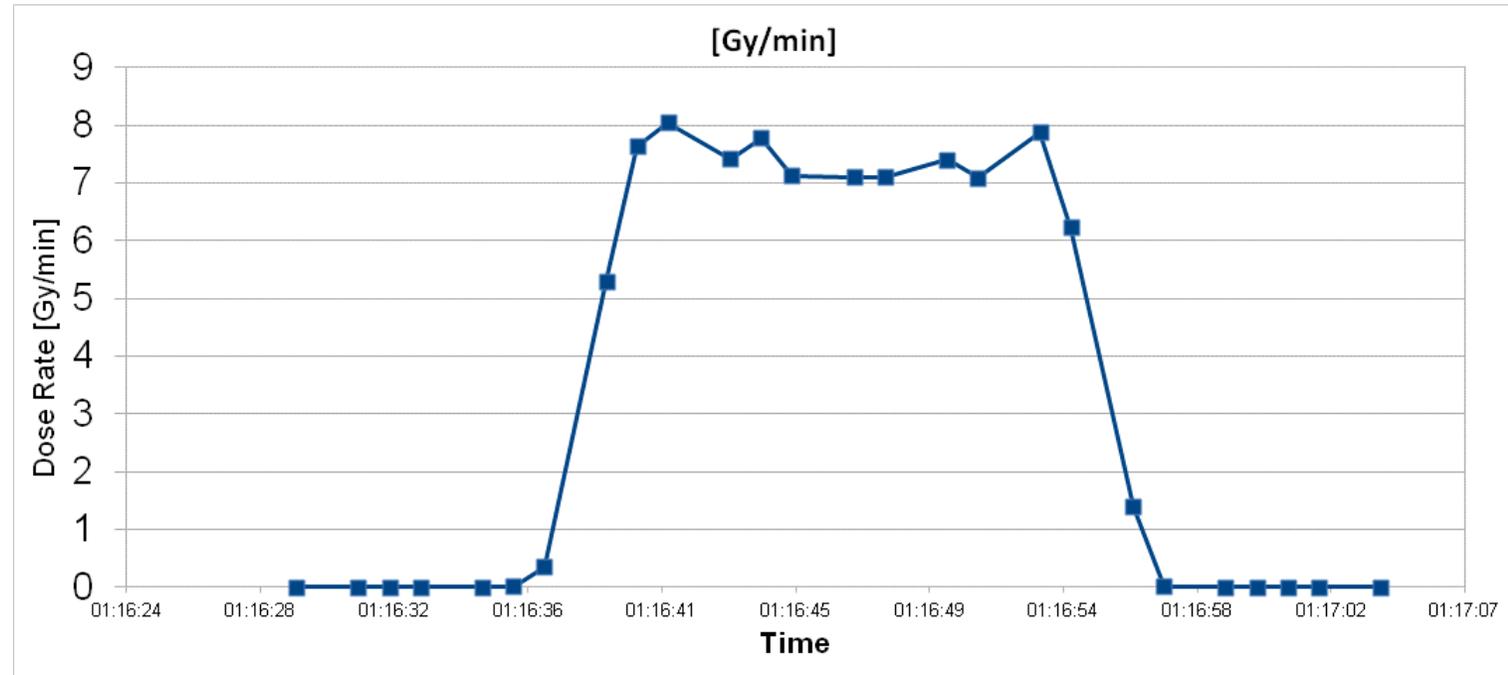
Kits Issued





Tests

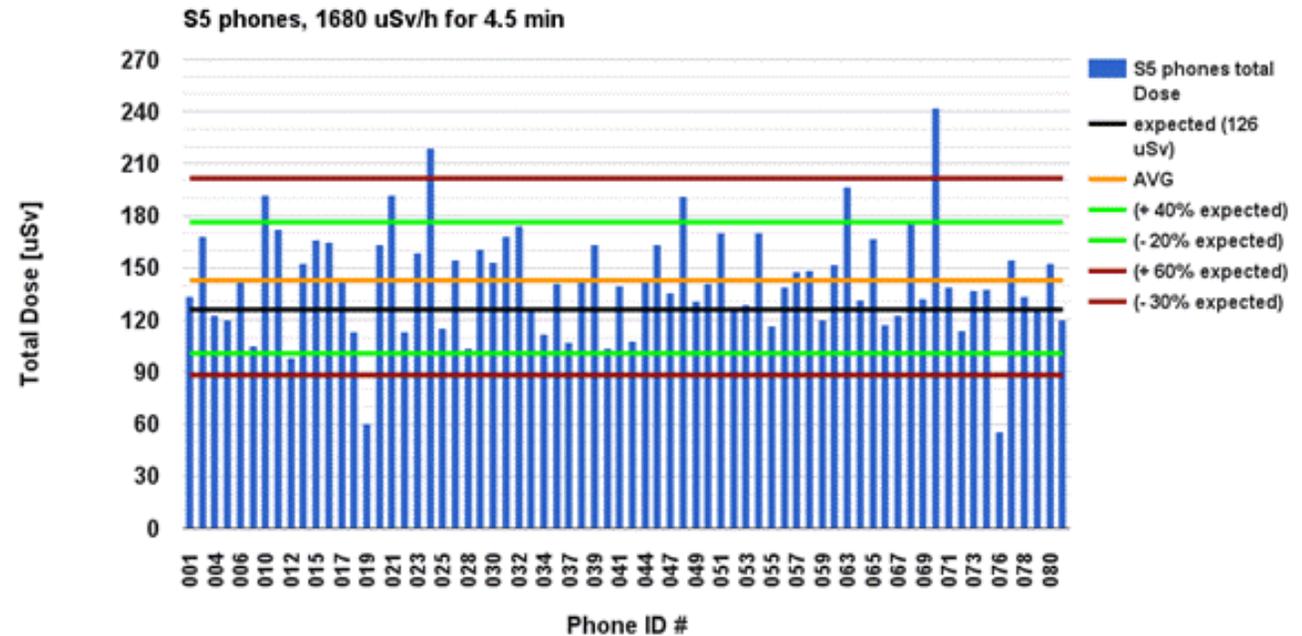
- Type testing
 - In-house
 - Acision Industries Inc.
 - Spencer Manufacturing
- Field testing
 - CNSC
 - 30 Inspectors
 - 5 First Response Training Group
 - 3 RSO
 - Fire Departments



Type Test Results



- Using phone's camera
 - Very low background
 - Does not saturate (tested to 300 Gy/h)
 - Reproducible results
- Using external detectors
 - Performance as expected from sensor (GM tubes, NaI(Tl)...)
 - Typical 'new product' issues (e.g. replaced tubes in the Energy Compensated detectors.)



CNSC Results (Preliminary)



- Overall satisfied, very likely to recommend
- Many good improvement suggestions
- We were able to incorporate suggestions quickly
- Without external detector, GammaGuard provides a go/no-go indication and good response in high dose rates.

Fire Dept Results (Preliminary)



- Responded to 20+ 'white powder' calls
 - Radiation is checked first
 - Use camera based mode as initial go/no-go indication
 - Use pancake to see if there is any radiation
- Very receptive to Smartphone technology
 - Like the interpretation capability
 - Calculate stay time
 - Green, red yellow indicators
 - Make it even easier (e.g. recorded verbal instructions)
- Invited 5 rural Fire Departments to participate in the project

Conclusions



- Camera based radiation detection system good for go/no-go decision
- Not intended as replacement for professional instrumentation



Conclusions



- Provide simple redundant external detectors (2 pancakes in a kit).
- One detector does multiple tasks (gamma and contamination measurements).
- Cross check readings.



Our Technology Focus



- Develop new small, rugged, cost effective radiation detectors that connect to GammaGuard.



Discussion: What qualities should a radiation detector have?



Lab , Mine, NPP:

- Very sensitive
- Very accurate
- Specialized instruments for each situation
- Calibrations

First Responder, Homeland Security:

- Large measurement range
- Very reliable
- Instruments that can handle a range of situations
- Source check
- Ergonomic
- Redundancy
- Easy to use
- Cost effective
- Rugged
- Must be available when needed