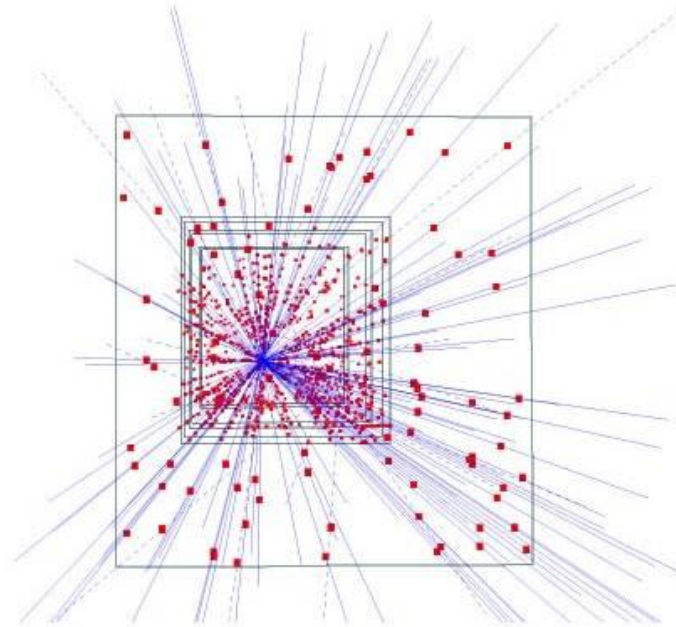


ESR 12 - ARDENT 4th workshop



Vijayaragavan VISWANATHAN

Content

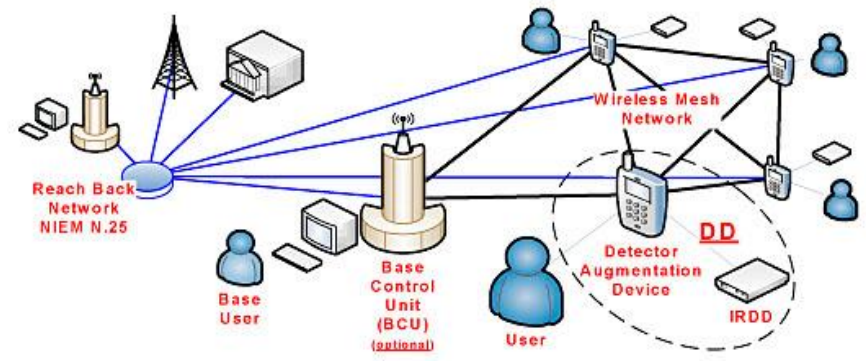
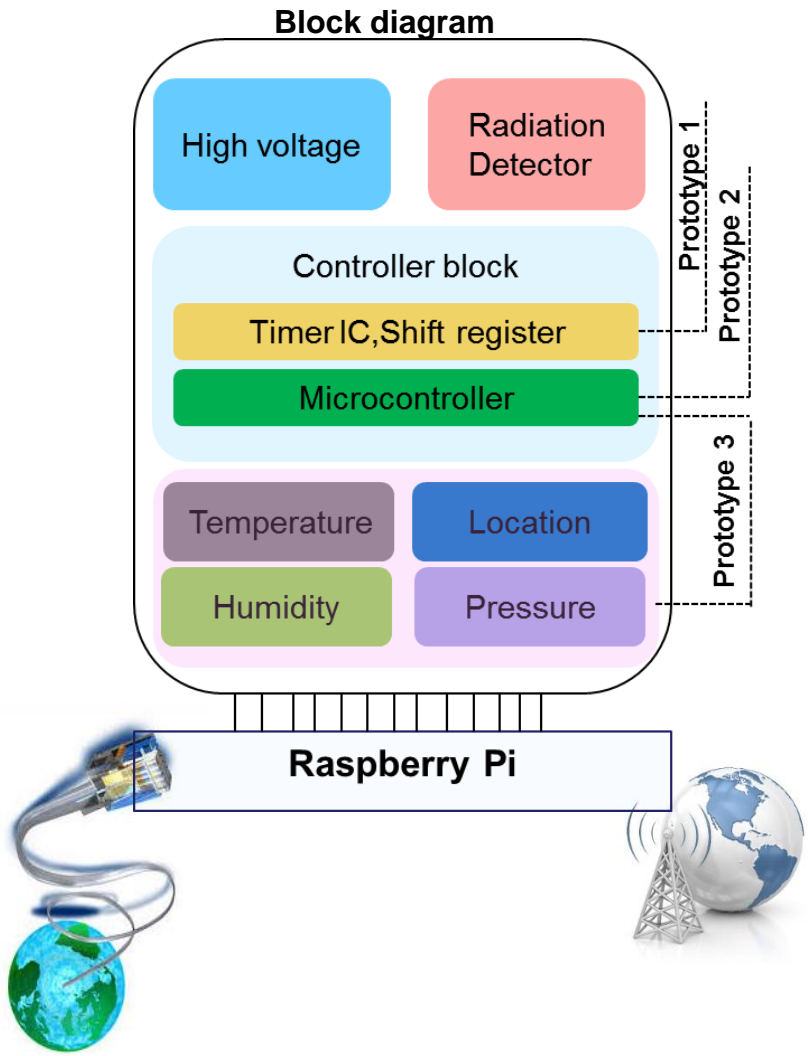


- Scientific activity
- Training
- Outreach & dissemination
- Awards & Achievements
- Conclusion

- Research Objective
 - Development of low cost radiation indicator
 - Development of Medipix/timepix based educational device

Introduction

- SURO proposal & requirement
 - Mass proliferation of detecting device
 - Low cost device
 - Remote monitoring



Devices connected to the cloud

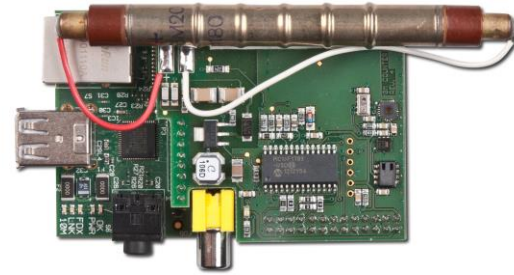
System design



Proof of concept



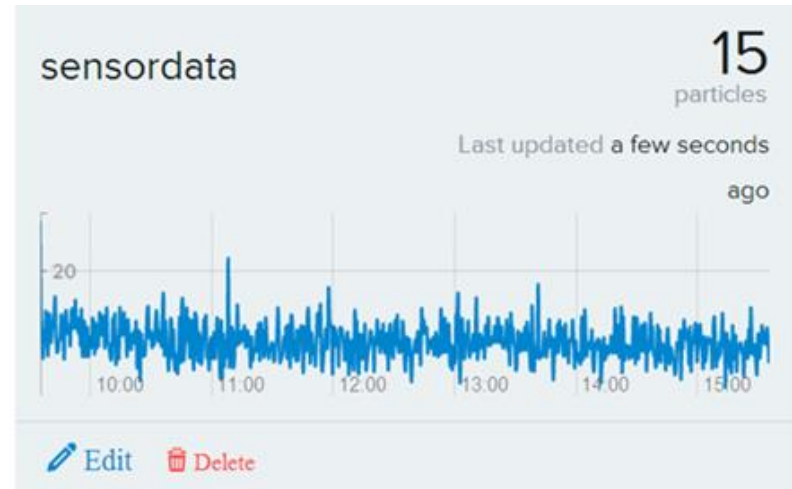
Microcontroller based



Environment sensors

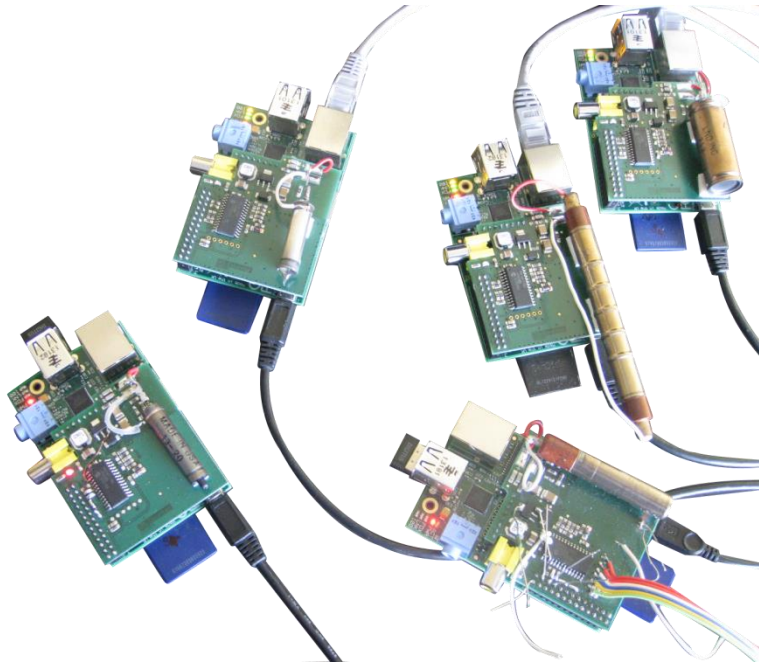


Integrated solution



Remote monitoring

Cloud connectivity



GX-10 connected to cloud

Channels Last updated in a few seconds 📊 Graphs

S1_Totalparticles	281
S1_sensordata	5
S2_Totalparticles	588
S2_sensordata	4
S3_Totalparticles	594
S3_sensordata	4
S4_Totalparticles	205
S4_sensordata	1
S5_Totalparticles	292
S5_sensordata	1

Request Log ⏸ Pause

200	PUT	channel S4_Totalparticles	16:00:38 +0200
200	PUT	channel S4_sensordata	16:00:37 +0200
200	PUT	channel S3_Totalparticles	16:00:35 +0200
200	PUT	channel S3_sensordata	16:00:35 +0200
200	PUT	channel S1_Totalparticles	16:00:33 +0200

API Keys

Auto-generated Cloud devices device key for feed 1749342200

alux4Zk5yb4rhbMG1quUf1xAdTFYUrznygppxEhmVFrThT

permissions READ,UPDATE,CREATE,DELETE

private access

+ Add Key

Triggers

Triggers provide 'push' capabilities by sending HTTP POST requests to a URL of your choice when a condition has been satisfied.

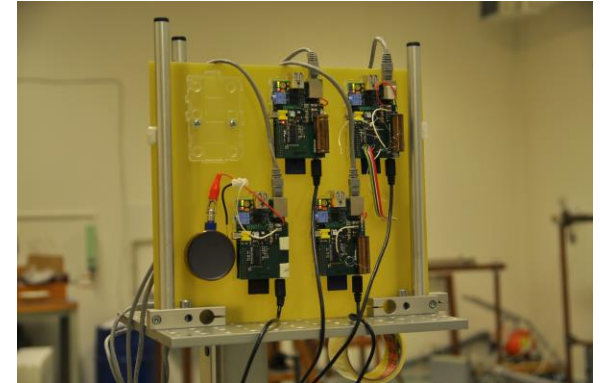
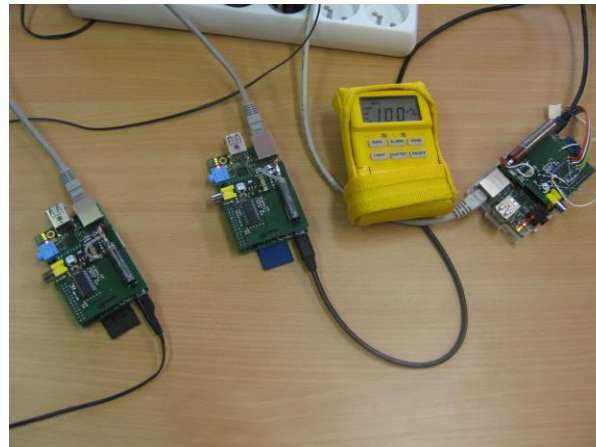
+ Add Trigger

Help

Real time sensor data

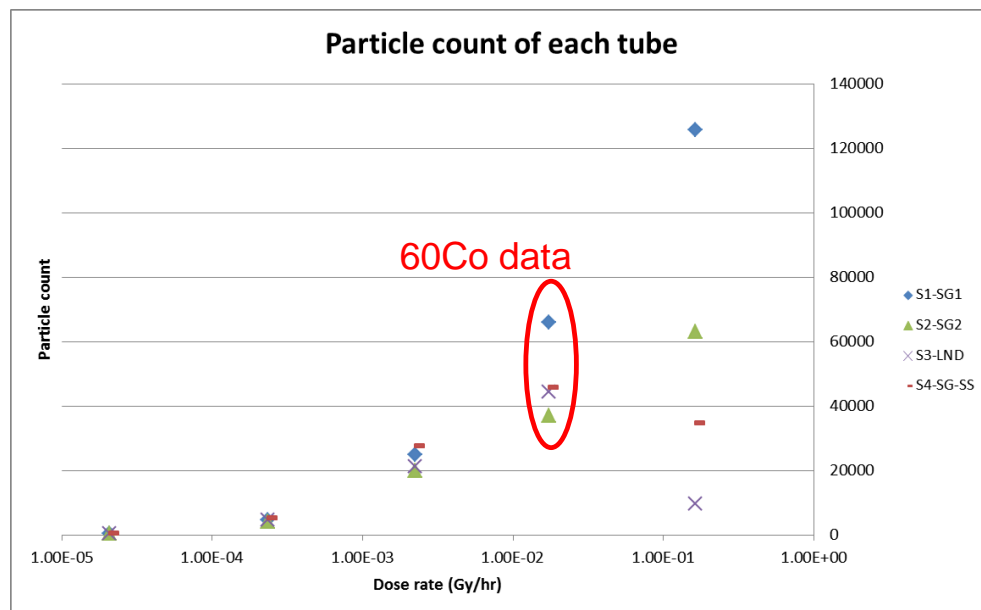
Experiments at SURO

- Experiments –
 - To select the appropriate GM tube
 - Calibrated radiation source (Cesium- 661keV, Cobalt – 1.25MeV)
 - X-Ray tube for varied energies (33keV to 300keV)
 - Back ground experiments



Linearity

- Experiment with
 - Detector at ~1m
 - To identify performance of detector
- Inference
 - Saint gobain tubes (S1, S2, S4) performances (smoothness of curve) are similar to LND
 - SS window & LND tubes saturates before mica window tubes – Saturation performance upto 2.5mGy/hr is OK for our application

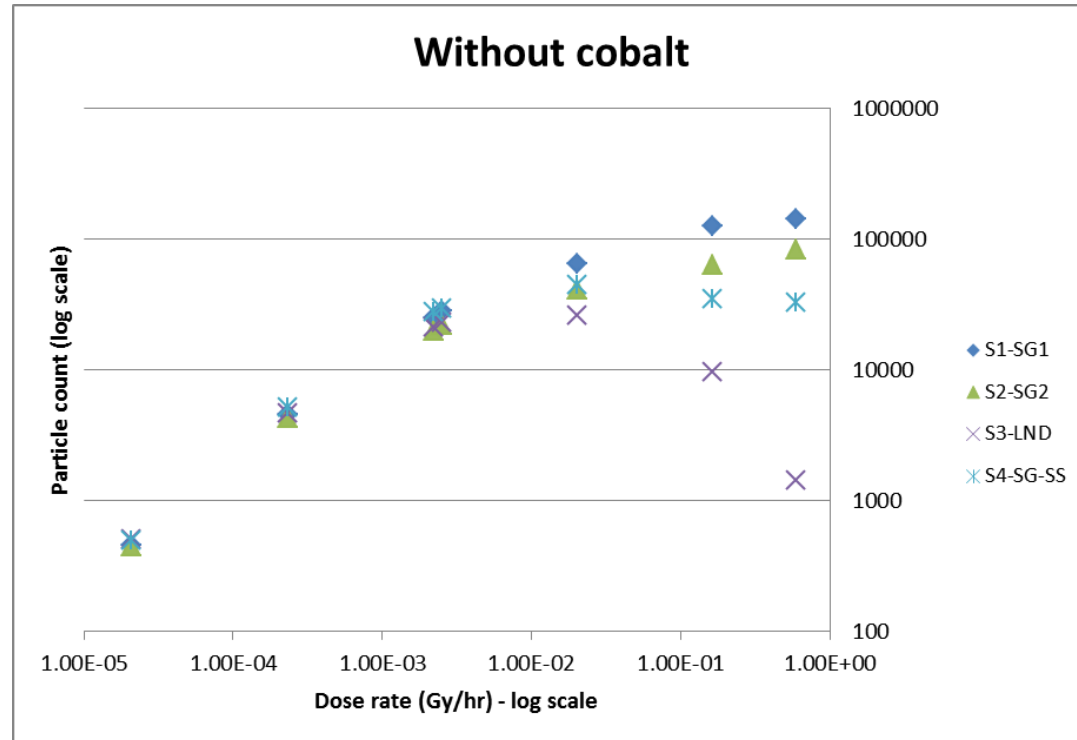


S1 & S2 – Samples with mica window
 S3 – LND tube
 S4- Sample with stainless steel window

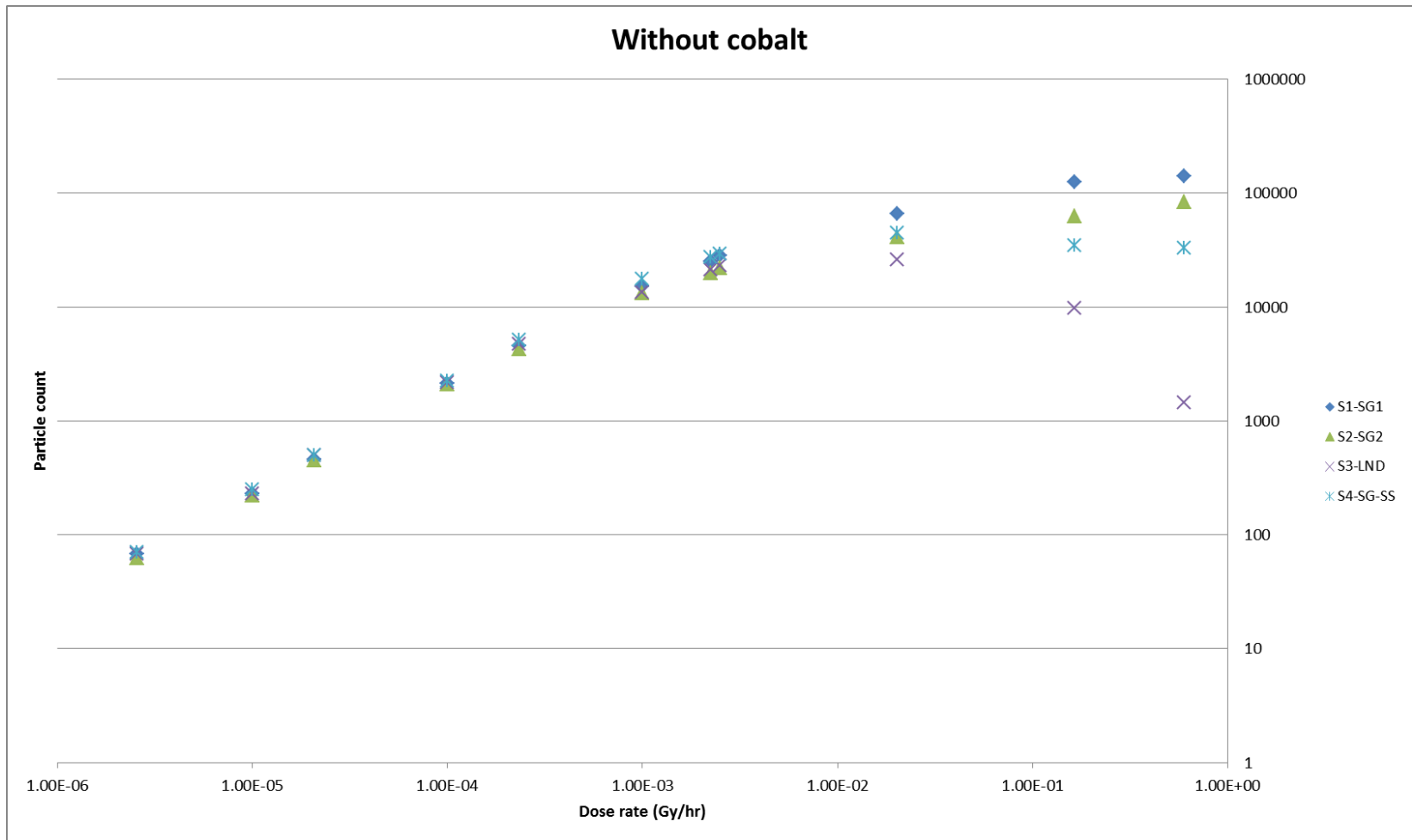
Note: Data collected in 10second interval

Saturation performance

- Experiment with
 - Detector at 352mm from source
 - To identify saturation point of each detector
 - All detector experimented with ^{137}Cs source to have common reference
- Inference
 - S1 & S2 outperforms S3 & S4



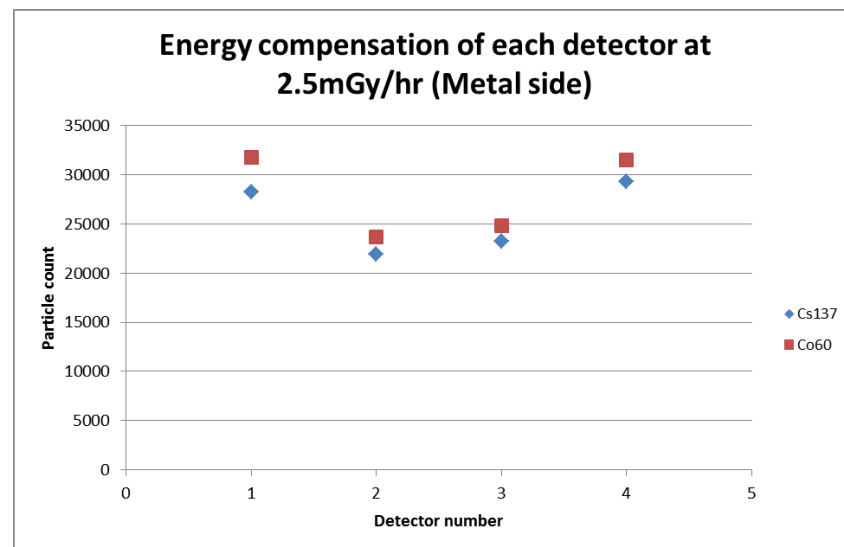
Background to nuclear fall out



Energy compensation

- Experiment
 - At fixed dose rate of 2.5mGy/hr
 - Experiment to analyze whether the tubes are energy compensated for ¹³⁷Cs and ⁶⁰Co

- Inference
 - All the detectors compensated well for Cs and Co source



- 1 – S1 - SG
- 2 - S2 - SG
- 3 – S3 - LND
- 4 – S4 –SG-SS

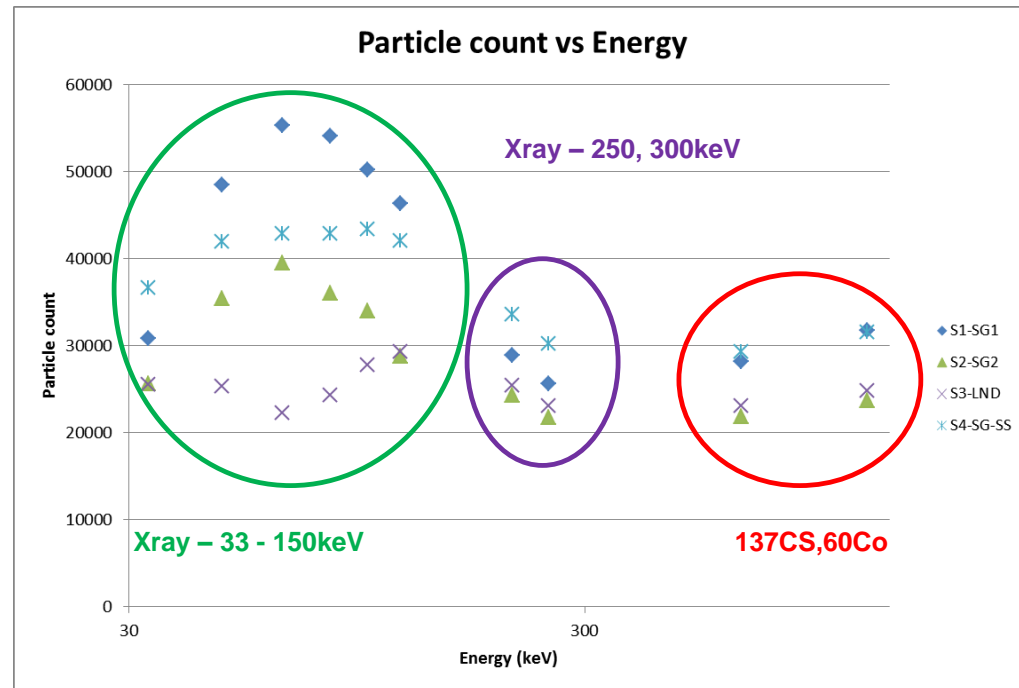
Energy compensation

➤ Experiment

- At fixed dose rate of 2.5mGy/hr
- With ¹³⁷Cs, ⁶⁰Co and X-ray tube to see whether devices are energy compensated

➤ Inference

- S2-LND712 has better compensation at all energies
- S1, S2, S3 has over estimation in low energies
- S2 has under estimation of particle count at higher energies

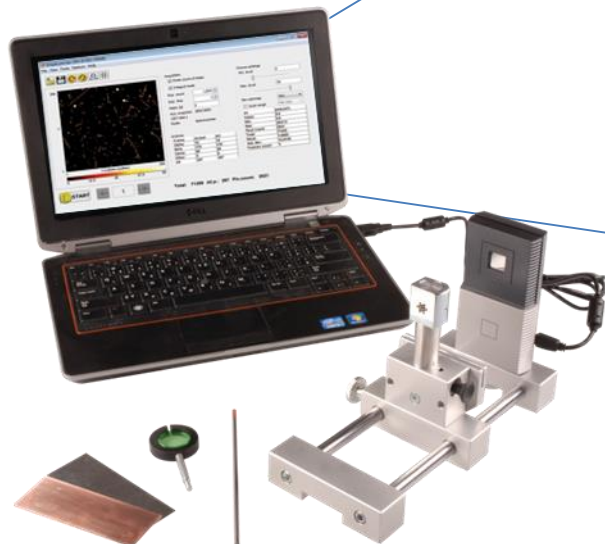


MX-10

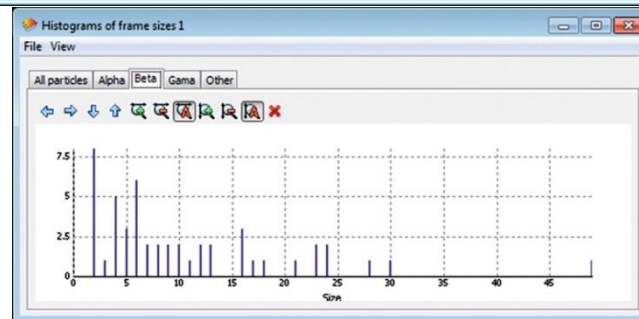
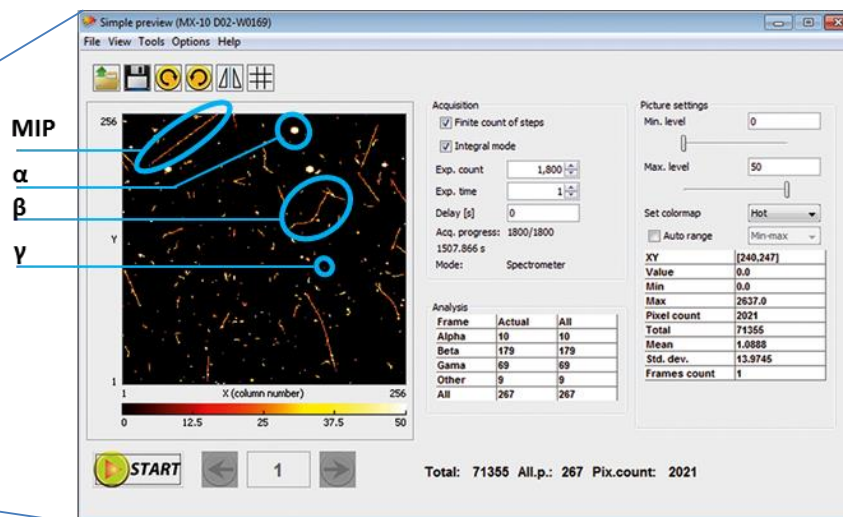
Digital Particle Camera

Educational kit setup

- MX-10 – digital particle camera
- Test bench with source
- Pixelman software



See a different world ..



Pixelman software output

Trainings

2014-2015

External trainings (>12)

- Academia Industry training
- Management/entrepreneurship/Pitching
- IP issues/proposal writing
- Internet of things

Internal trainings (>8)

- IT admin training
- Wireless design
- Protocol design
- Negotiation/Supplier identification

External visits (>20)

- Industries (Viessmann, Logitech etc)
- Saint-Gobain, India

2012-2015

- >40 trainings



Outreach

Universities & colleges (>15 institutes ~2000 students)

India

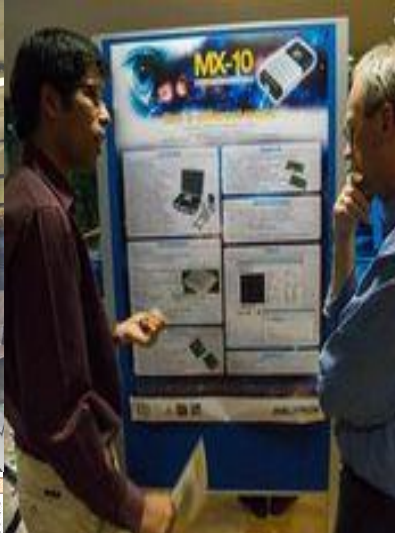
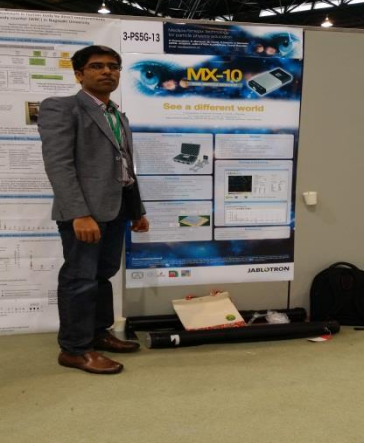
- Sona college
- Srishti school of design
- Amrita University
- PSG college of Engineering
- Shakthi Engineering college
- Ministries (S&T, Education)

Other

- ETH, Switzerland
- EPFL, Switzerland
- ICCCI, India
- ICRR, Japan
- IEEE-NSS, Seattle, USA



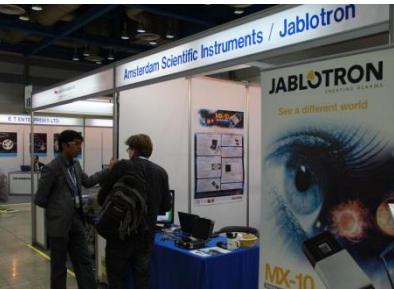
Secondment:
 CERN- Knowledge Transfer
 - 2months (Sept to Nov 2014)



3 years
~45 Institutes
~8K students
~8 conferences
~4 ministries
~3 media



► மாண்புமிகு அமைச்சர்
 இந்நிகழ்வில் தலைவர் தலைமையில் கலந்துகொண்டிருக்கிறார். இந்நிகழ்வில் கலந்துகொண்டிருக்கிறார். இந்நிகழ்வில் கலந்துகொண்டிருக்கிறார். இந்நிகழ்வில் கலந்துகொண்டிருக்கிறார்.



**விவகார உதவித் தொகையுடன்
 வரலாற்றுக்காலத்தில் படிப்பது எப்படி?**

விவகார உதவித் தொகையுடன் வரலாற்றுக்காலத்தில் படிப்பது எப்படி? விவகார உதவித் தொகையுடன் வரலாற்றுக்காலத்தில் படிப்பது எப்படி? விவகார உதவித் தொகையுடன் வரலாற்றுக்காலத்தில் படிப்பது எப்படி?



விவகார உதவித் தொகையுடன் வரலாற்றுக்காலத்தில் படிப்பது எப்படி? விவகார உதவித் தொகையுடன் வரலாற்றுக்காலத்தில் படிப்பது எப்படி? விவகார உதவித் தொகையுடன் வரலாற்றுக்காலத்தில் படிப்பது எப்படி?



Awards & Achievements

Awards (~ 40,000 euros)

- Irish presidency bursary award
- One month “The journey”
- Greenhouse funding
- AEA, Japan
- Swissnex – top10 idea
- AIT program
- I4C (ongoing)
- Launchpad – Swiss national winner (1st prize)
- Adjunct professorship @ 2 universities



swissnex
India



Conclusion

Until June 2015

Activity	Number	Performance
Training	~42	1.27/month
Outreach	~45	1.36/month
Awards	~10	0.30/month
Articles	~2	0.06/month
External	~8	0.24/month

	Professional	Personal
A	Adaptability	Awareness
R	Research	Reach
D	Design	Destiny
E	Engineering	Explore
N	Network	Nurture
T	Testing/Training	Thought

Thank you – small word - memories & experiences!

Acknowledgement

- Jablotron Alarms
 - Vladimir, Pavel, Martin, Stepan, Stefan
 - CEO - Mr.Dedek
 - Colleagues and friends
- CERN
 - Dr. Marco Silari
 - Blandine, Ornella, Isabella
- SURO
- IEAP
- ARDENT colleagues, friends
- Wife, baby & parents

