

Physicists might be useful !

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DETECT Australia, Pty. Ltd.



THE UNIVERSITY OF

MELBOURNE

detect
australia

Caveat
emptor

The credibility of references in this talks is about the level of Wikipedia...
...and there is no disclosure of privileged or confidential information..

What do we do..



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Research

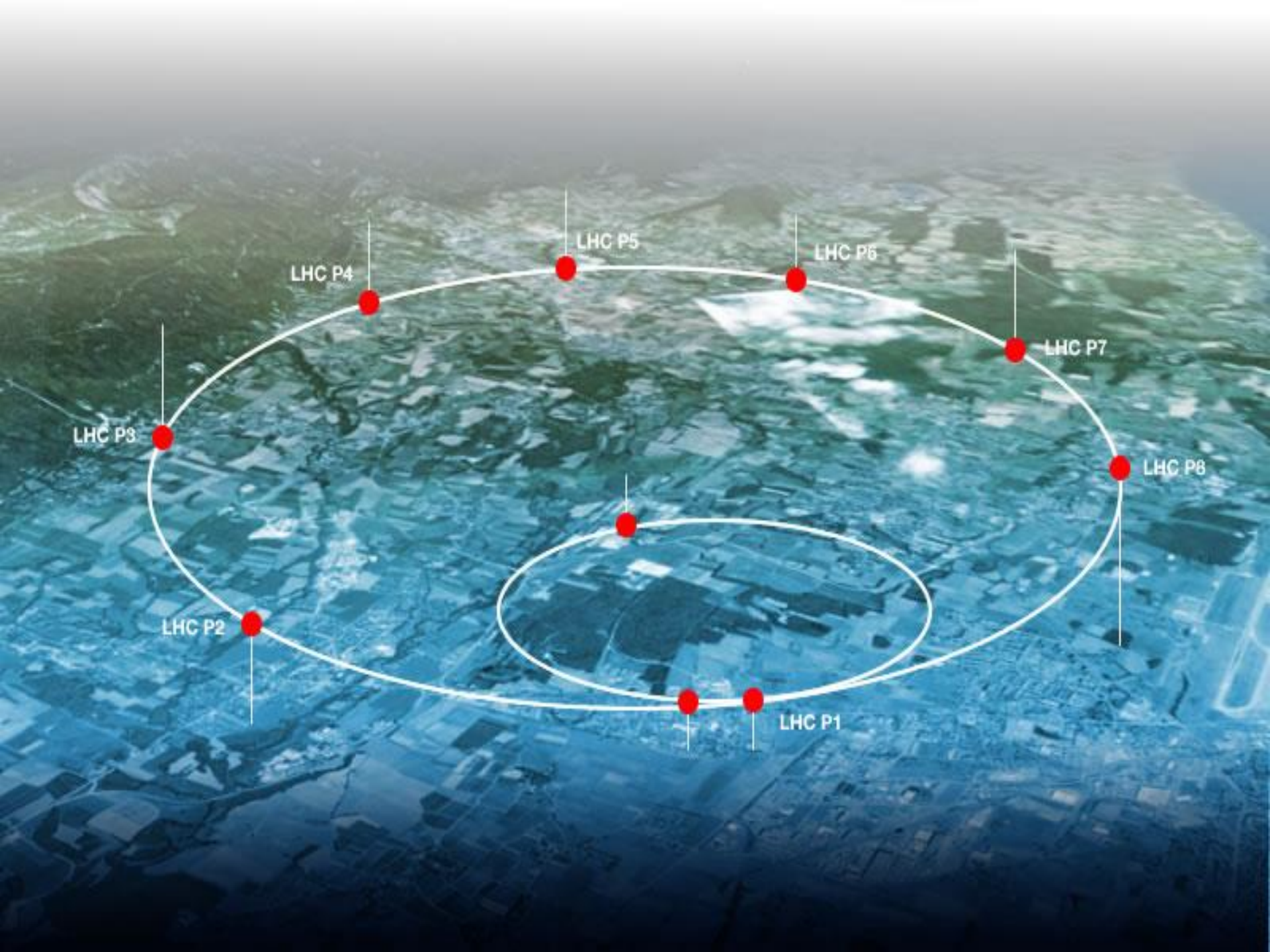
arch

Research

search

Research





LHC P5

LHC P6

LHC P4

LHC P7

LHC P3

LHC P8

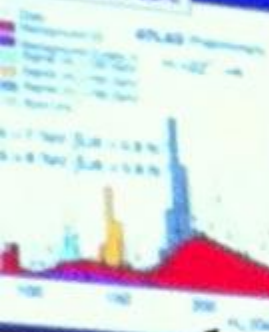
LHC P2

LHC P1

ATLAS Preliminary
 13 TeV
 36.1 fb⁻¹
 130 GeV
 130 GeV

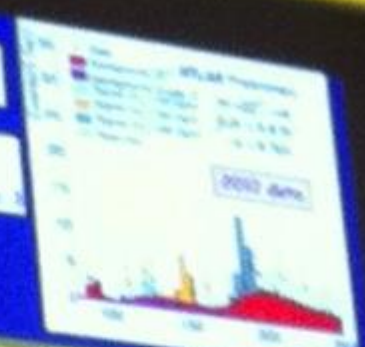


2013-2012 data



The low-mass region

130 GeV
 Observed: 39
 Expected: 34 ± 1



In the region 125 ± 3 GeV

Dataset	2011	2012	2011-2012
Expected B only	2±1	3±1	5.3±0.8
Expected S/B	2±1	3±1	5.3±0.8
Observed in the data	4	9	13

2011-2012	4e	2e2e	4e
Data	6	5	2
Expected S/B	1.6	1	0.5
Reducible/total background	5%	45%	55%

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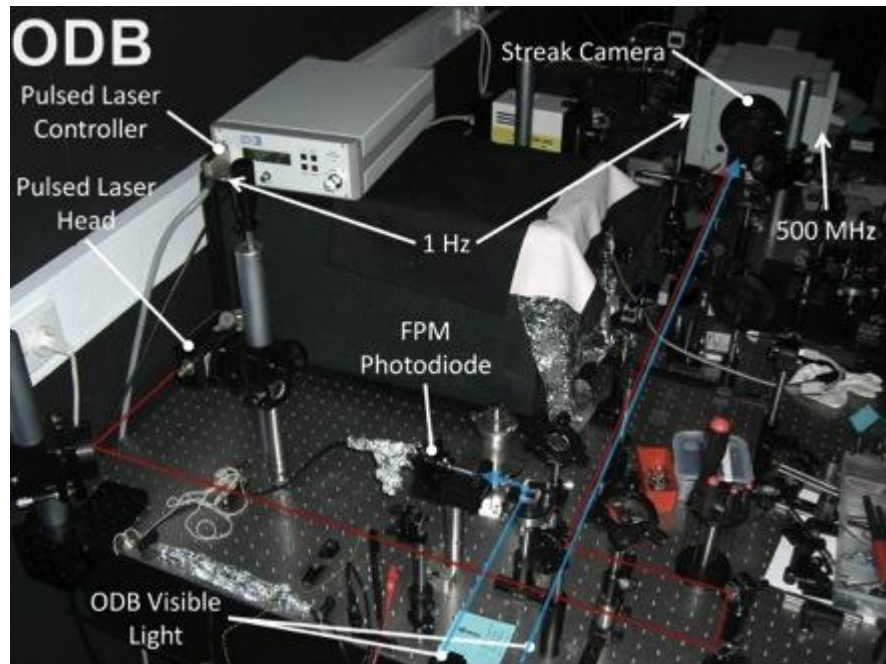




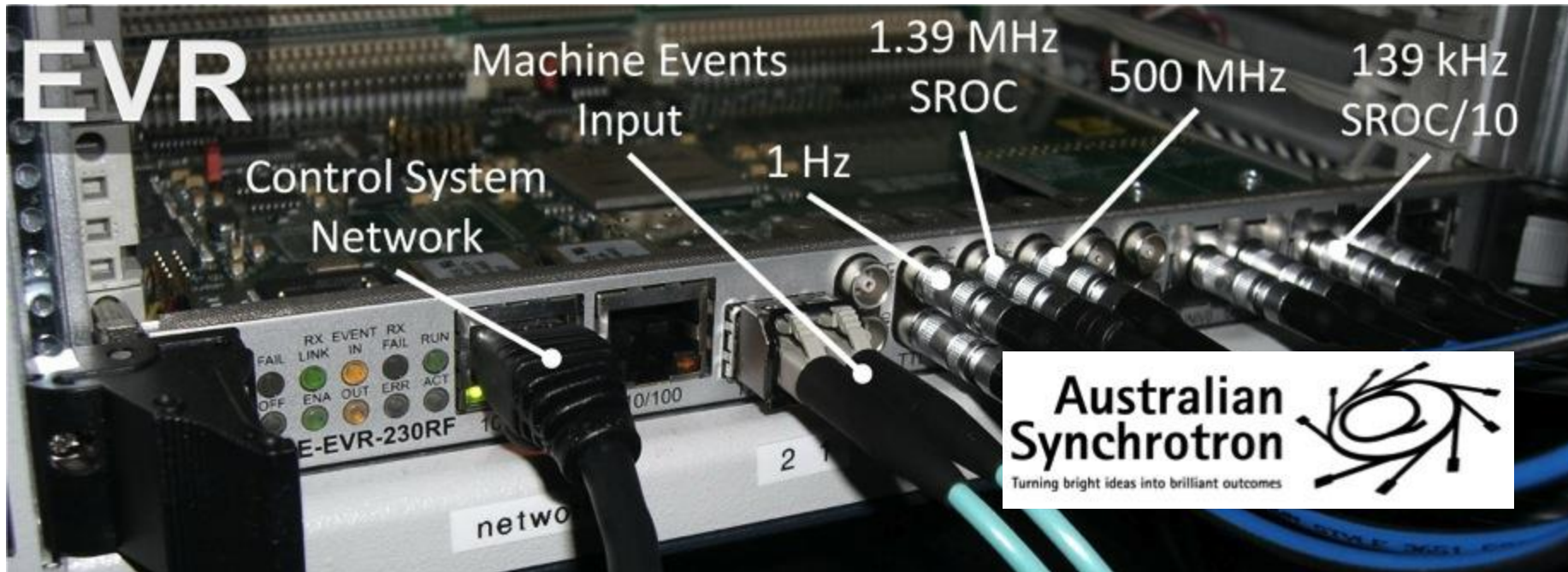
PILATUS - SAX/WAX



ODB



EVR





Ra

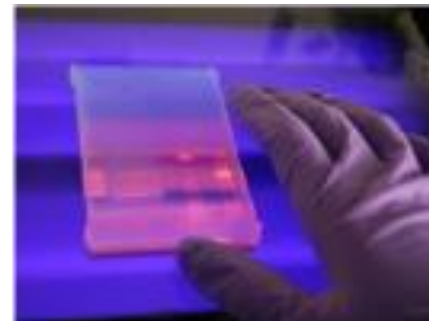
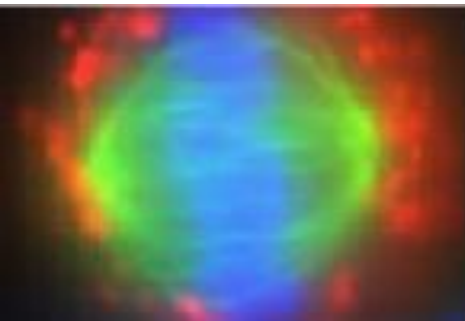
Mouse-Cam(era)





Ok, so it seems like we enjoy ourselves...but how useful is this to other scientists and industry ?

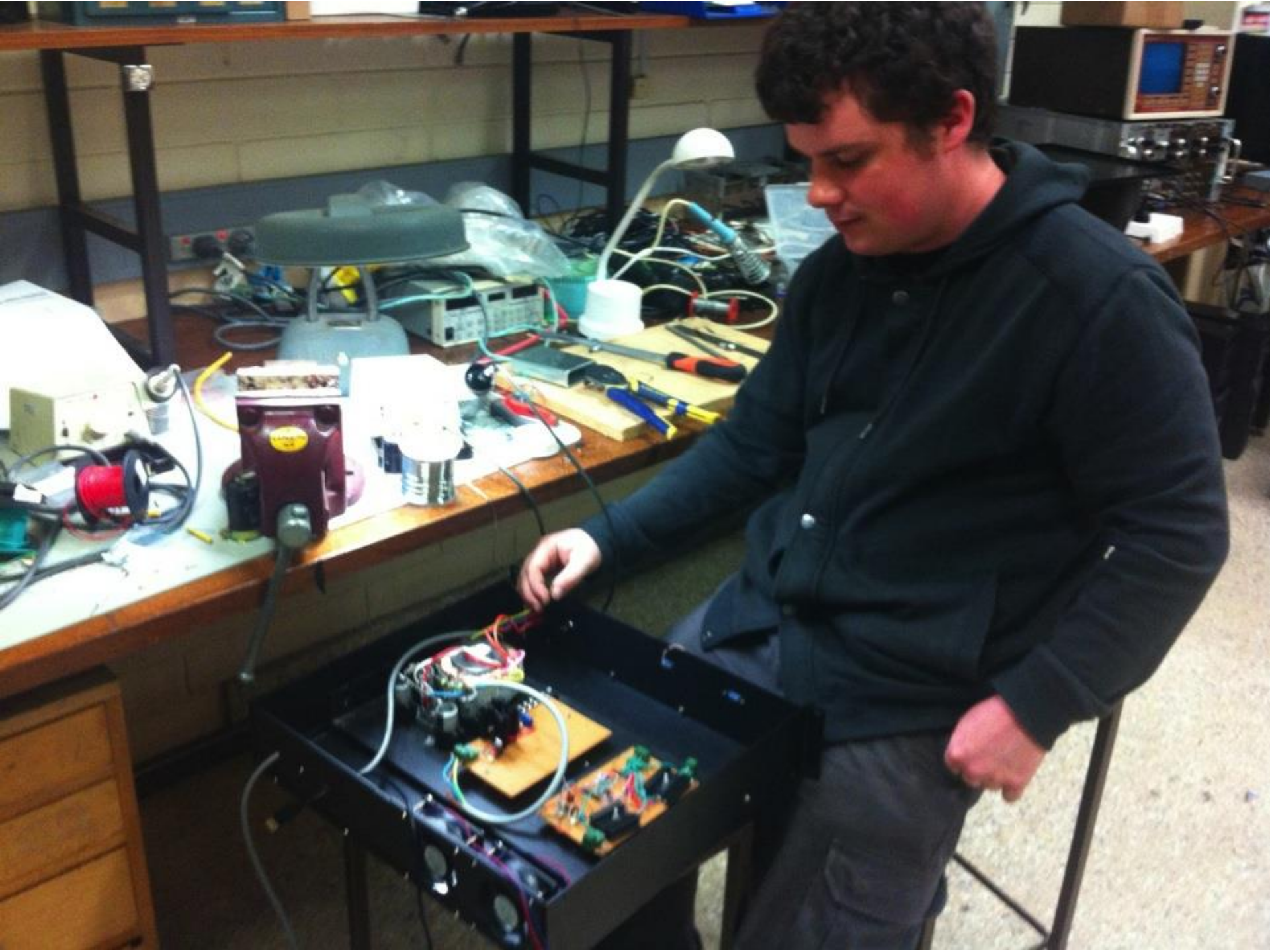
It's all about relationships..

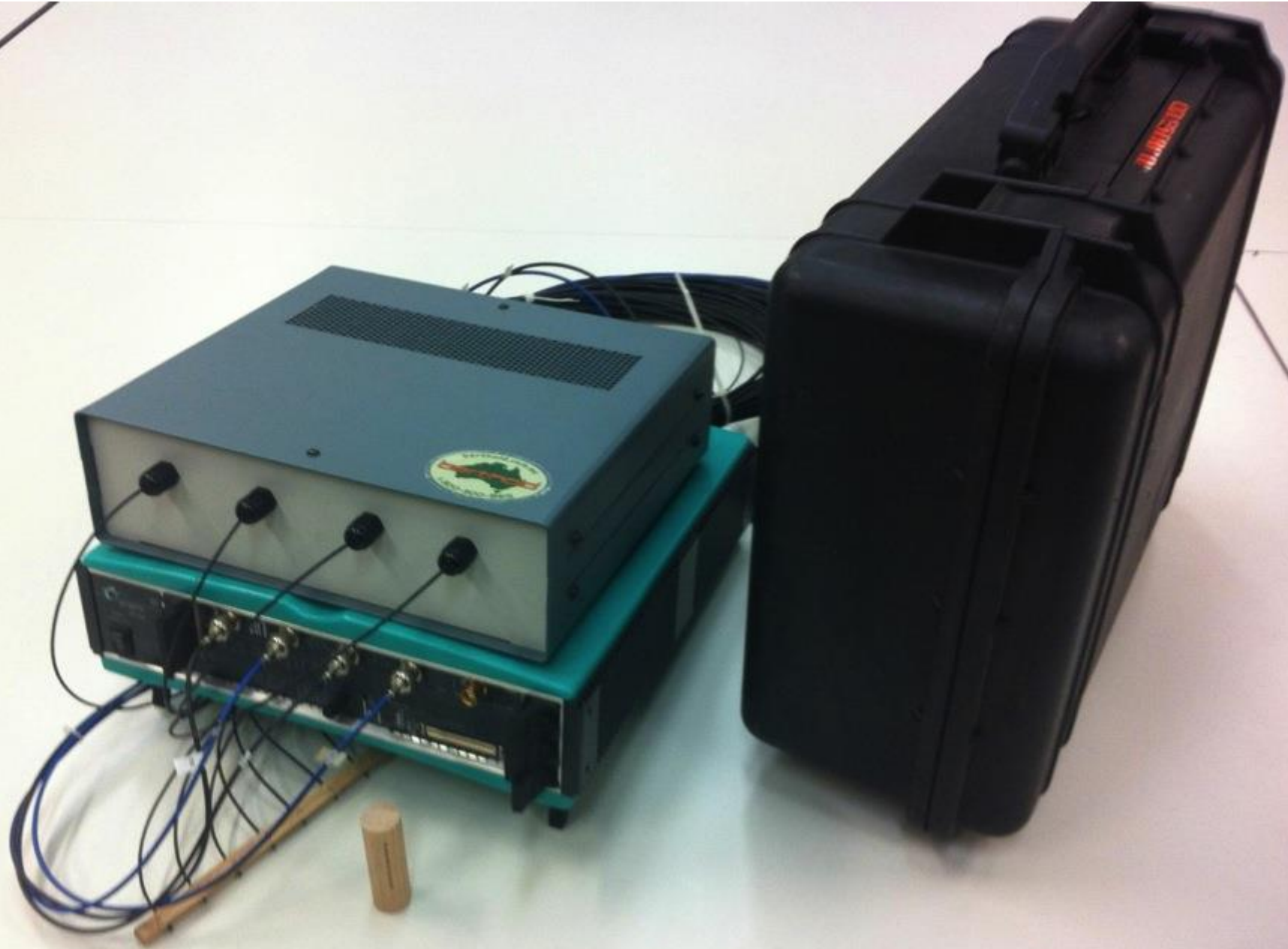


We are experts in the latest technologies for radiation detection, Visible, X-ray and CT imaging systems for non-destructive testing, and image acquisition....

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..and

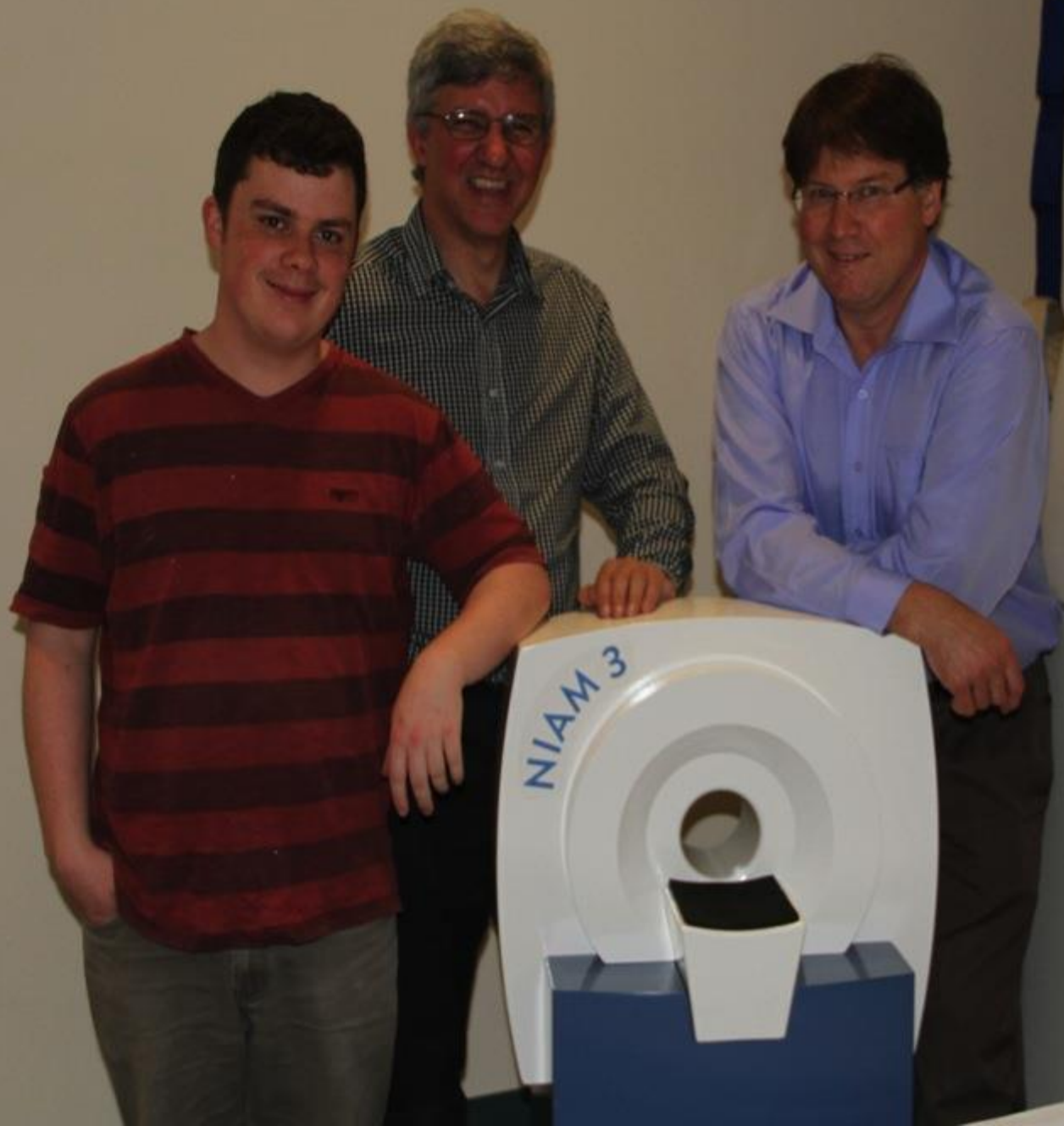






DO NOT ENTER.
EXPERIMENT IN PROGRESS







Lady IDEAS Centre

The 3Qs

1. What can be developed ?
2. How long will it take ?
3. How much will it cost ?

The 3Qs

1. What can be developed ?
2. How long will it take ?
3. How much will it cost ?

Anything is possible....

The 3Qs

1. What can be developed ?
2. How long will it take ?
3. How much will it cost ?

Some time....

The 3Qs

1. What can be developed ?
2. How long will it take ?
3. How much will it cost ?

Too much initially....



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1940s

Military Radar.

UNITED STATES PATENT OFFICE

2,495,429

METHOD OF TREATING FOODSTUFFS

Percy L. Spencer, West Newton, Mass., assignor
to Raytheon Manufacturing Company, Newton,
Mass., a corporation of Delaware

Application October 8, 1945, Serial No. 620,919

6 Claims. (Cl. 99—217)

1

My present invention relates to the treatment of foodstuffs, and more particularly to the cooking thereof through the use of electromagnetic energy.

Such energy has been used before for this purpose, but the frequencies employed have been relatively low, for example, not over 50 megacycles. I have found that at frequencies of this order of magnitude, the energy necessarily expended in order to generate sufficient heat to satisfactorily cook the foodstuff is much too high to permit the practical use of the process. I have further found, however, that this disadvantage may be eliminated by employing wave lengths falling in the microwave region of the electromagnetic spectrum, for example, wave lengths of the order of 10 centimeters or less.

2

lying therebetween, a cavity resonator whose natural resonant frequency is, as is well known to those skilled in the art, a function of the geometry of the physical elements making up the same. For the purposes of my present invention it is desirable that the dimensions of each such cavity resonator be such that the wave length of the electrical oscillations adapted to be generated therein is comparable to the average dimension of the foodstuff to be cooked, for example, of the order of 10 centimeters or less.

Centrally located in each envelope **12** is a highly electron-emissive cathode member **14**, for example, of the well-known alkaline-earth metal oxide type, said cathode member being provided with conventional means (not shown) for raising the temperature thereof to a level sufficient

By 1947, the first commercially available microwave oven was the "Radarange"

- Height 1.8 metres,
- Weight 340 kilograms
- Water cooled

- 1950 Raytheon licensed its patents to Tappan
- 1955 Units appear, but still too large and expensive for general home use.
- 1967 The first bench-top microwave oven - Amana Corporation (??)
- 1969 The first microwave imported in Australia.
- 1980 Microwaves everywhere !

1947: the "Radarange"

was almost 1.8 metres,

- weighed 340 kilograms and
- cost *about US\$5,000* (A\$75,000 in today's dollars) each.

2016: Ikea Varma \$99



6+ **IKEA - VÄRMA Microwave oven, stainless steel \$99 (Save \$200)**
1-

VÄRMA Microwave oven, stainless steel for only \$99. Original price was \$299.

Key Features:

- 5 year guarantee. Read about the terms in the guarantee brochure.
- Ideal for your everyday cooking, quick defrosting and heating.
- For delicious vegetables and fish dishes use the steam function together with the supplied steamer set.
- Jet start function for fast warming up at full power; ideal for heating of beverages.
- Auto defrost function for 4 categories (bread, fish/seafood, meat and poultry): adjusts microwave emission to the quantity of food.
- Easy to install at a comfortable work height in a wall cabinet or high cabinet.

Size: 700 W



See Deal





NLIS Multi Sheep Tag

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Approved NLIS Identifier

For effective identification of Sheep, Goats and Deer. Joined in strips of 10 for fast, easy application.
Tough material to suit Australian conditions.
Easy and fast, one operation application.
Self piercing, tag cannot fall out. Heat resistant and ultra violet light stabilised.

Applicators

The tag can be applied with the Multitag Applicator

Marking

1950s

Military.

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(Including WAVES AND ELECTRONS Section)

Published Monthly by
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Index to Volume 36—1948



Communication by Means of Reflected Power*

HARRY STOCKMAN†, SENIOR MEMBER, IRE

Summary—Point-to-point communication, with the carrier power generated at the receiving end and the transmitter replaced by a modulated reflector, represents a transmission system which possesses new and different characteristics. Radio, light, or sound waves (essentially microwaves, infrared, and ultrasonic waves) may be used for the transmission under approximate conditions of specular reflection. The basic theory for reflected power communication is discussed with reference to conventional radar transmission, and the law of propagation is derived and compared with the propagation law for radar. A few different methods for the modulation of reflectors are described, and various laboratory and field test results discussed. A few of the civilian applications of the principle are reviewed. It is believed that the reflected-power communication method may yield one or more of the following characteristics: high directivity, automatic pin-pointing in spite of atmospheric bending, elimination of interference fading, simple voice-transmitter design without tubes and circuits and power supplies, increased security, and simplified means for identification and navigation.

I. RADAR TRANSMISSION WITH SCATTERING TARGET

IN THE CONVENTIONAL radar application, the return radiation from the target carries the information that the target exists. In the simplest case, therefore, the radar receiver response indicates a "yes" or "no," and the type of modulation employed may be considered as being of the "on-off" type. The following paper concerns utilization of reradiation from a target when the target is subjected to any kind of modulation; in particular, voice and telemetering-data modulation.

The geometrical configuration, size, shape, and surface conditions of the target determine to a considerable extent the law of propagation for the chosen type of transmission. In the conventional case of radar transmission with scattering target, the propagation follows basically an inverse-fourth-power law, which may be written:

$$d_{max} = \sqrt[4]{\frac{A^2 k^2}{4\pi\lambda^2} \frac{P_T}{(P_R)_{min}}} \quad (1)$$

The minimum received power $(P_R)_{min}$ which will give satisfactory radar operation over a maximum distance d_{max} is determined by a number of factors, some of which will be discussed later. For simplicity, the factors under the radical sign A , k , and λ may be assumed constants. It then follows that the range of the radar depends on the radar cross section of the target, and the ratio of transmitted pulse power to minimum received power, required for satisfactory radar operation. The result may not indicate the ultimate value of d_{max} for the reason that (1) is merely the prediction on paper of a relationship between transmission characteristics. This relationship is rather complicated in practice.

The signal-to-noise ratio in a conventional radar with A-scope presentation is boosted by integration performed by the human eye, although other integration may be utilized. It is of interest to study the maximum distance that can be obtained with fourth-power propagation, assuming a reasonable time T_{tot} available for integration, such as $T_{tot} = 1$ minute. This maximum distance can then be compared with that achieved with second-power or better propagation, obtainable in communication using a properly modulated nonscattering target. Consider first the signal-to-noise ratio when no integration is present. The random noise power (thermal noise, shot-effect noise) is proportional to the bandwidth B or inversely proportional to the pulse duration τ_p , so that for a noise amplitude N

$$N \sim \sqrt{B} \sim \sqrt{1/\tau_p} \quad (2)$$

The transmitted energy is proportional to $h^2\tau_p$ when h is the height of the pulse, and also proportional to $P_{Tav}T_0$ where P_{Tav} is the average transmitted power and T_0 is $1/f_{op}$. Thus

$$h \sim \sqrt{\frac{P_{Tav}T_0}{\tau_p}} \quad (3)$$

1960s

Inventors began applying radio frequency technology to devices aimed at markets beyond the military.

- Sensormatic, Checkpoint and Knogo develop theft prevention
- “1-bit tags” meant that systems could only detect the presence of (or absence of) the tag.

1970's

Academic institutions, government laboratories companies and independent researchers are all working to develop RFID technology.

→ electronic toll collection, animal and vehicle tracking, and factory automation.

1990's

RFID technology is fully implemented.

Europe and the U.S. apply RFID to transportation systems, animal tracking, and business applications.

RFID Becomes Commonplace

- widespread, standards begin to emerge.
- widely used by consumers and companies globally.

2010's

RFID Enhancements

- Improved technology leads to miniaturization.
- Cost of RFID continues to fall.

And the cost...

Important notice about Multi Sheep Tag Serial numbers:

Serial numbers cannot be repeated on Multi Sheep tags. If you order 10 Yellow with serial numbers 00001 - 00010,

you cannot repeat those serial numbers on another colour.

The exception to this is the Pink colour, which is considered a post breeder colour.

\$0.33 per tag

Please note: Multi Sheep Tags are available in strips of 10 only.

Please ensure your order quantity is to the nearest multiple of 10.

OLV-5100

青柳卓雄氏(日本光電)

1972年 世界で最初にこの原理を発明

1975年 製品化 OLV-5100

1979年 国内特許取得



青柳卓雄氏とOLV-5100

1950s

- Not military !! (sort of)

Wikipedia Meta Data: pulse oximetry -> history: last modified: September 10, 2002

History of Pulse Oximetry

Oximetry is the measurement of transmitted light through a translucent measuring site to determine a patient's oxygen status noninvasively. Oximetry measurements can be traced to the early 1930's when German investigators used spectrophotometers (instruments that measure different wavelengths and intensities of light) to research light transmission through human skin. In 1934, one investigator reported measuring oxygen saturation in blood flowing through closed vessels in animals.

In 1939, German researchers reported use of an "ear oxygen meter" that used red and infrared light to compensate for changes in tissue thickness, blood content, light intensities and other variables. However, it was not until World War II that interest in oximetry took hold. At that time there was a need to evaluate oxygenation of high altitude pilots.

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Between 1940 and 1942, a British researcher, Millikan, used two wavelengths of light

1950s

- Not military !! (sort of)

Between 1940 and 1942, a British researcher, Millikan, used two wavelengths of light to produce a practical, lightweight aviation ear oxygen meter for which he coined the word "oximeter". He noted that light transmitted through a red filter was oxygen-saturation-sensitive and light passing through a green filter was independent of oxygen saturation. It was later determined that oxygen insensitive-signals were not due to the green light filter but instead to infrared light.

The system went through many modifications during the 1940's and 1950's and was eventually manufactured by the Waters Company. This system was mainly used in physiology, aviation, and experimental studies.

In 1964, a San Francisco surgeon developed a self-calibrating, 8- wavelength oximeter that was marketed by Hewlett Packard in the 1970's. This system was used in clinical environments but was very large, weighing approximately 35 lbs., and had a bulky, clumsy earpiece. The unit was also very expensive (approximately \$10,000.00). However, it did allow for continuous noninvasive monitoring of arterial oxygenation.

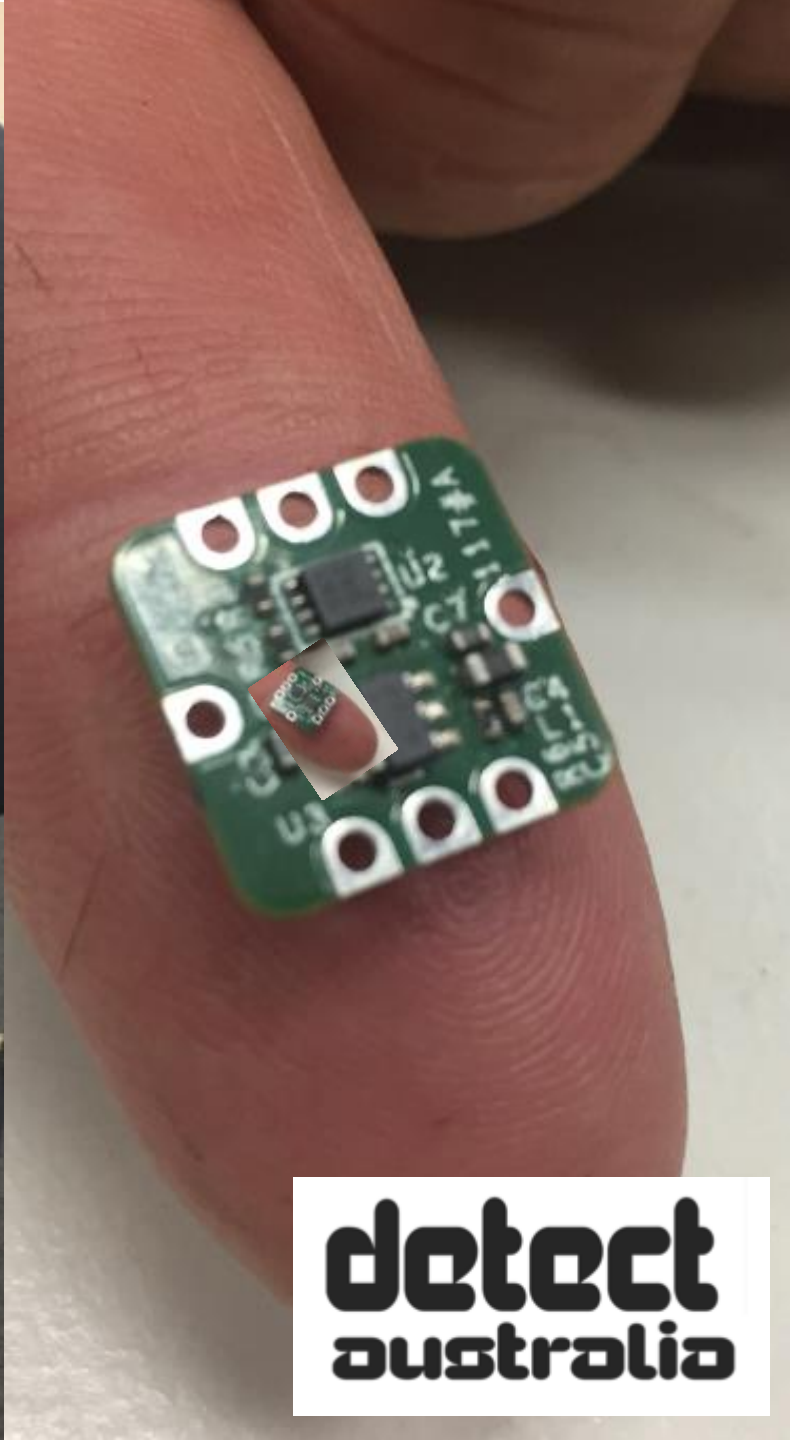
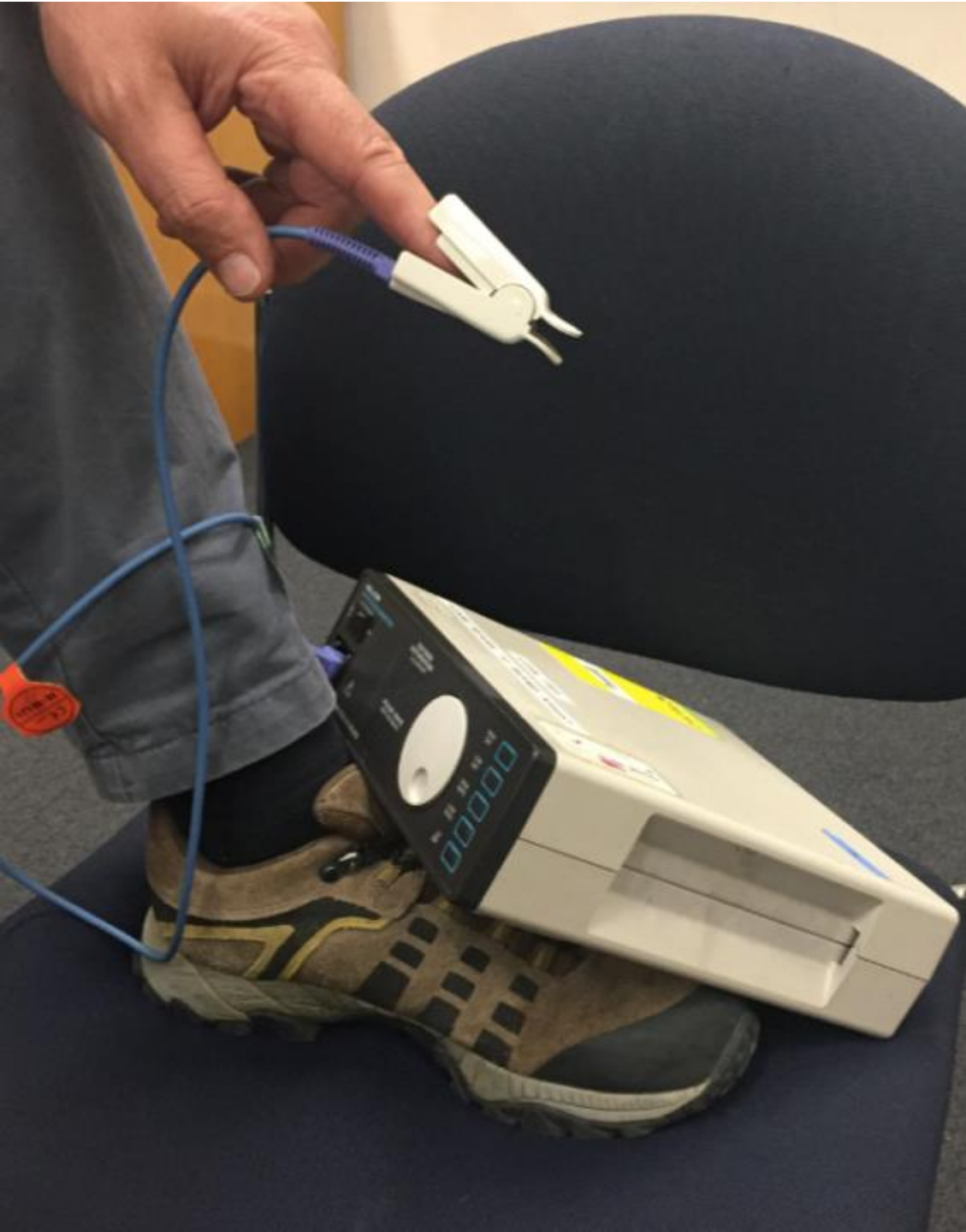
Rassool - Remote Monitoring of Animal Welfare Seminar – Attwood 22/11/2016
In the early 1970's, Takuo Aoyagi, a Japanese bioengineer, was trying to develop a

1950s

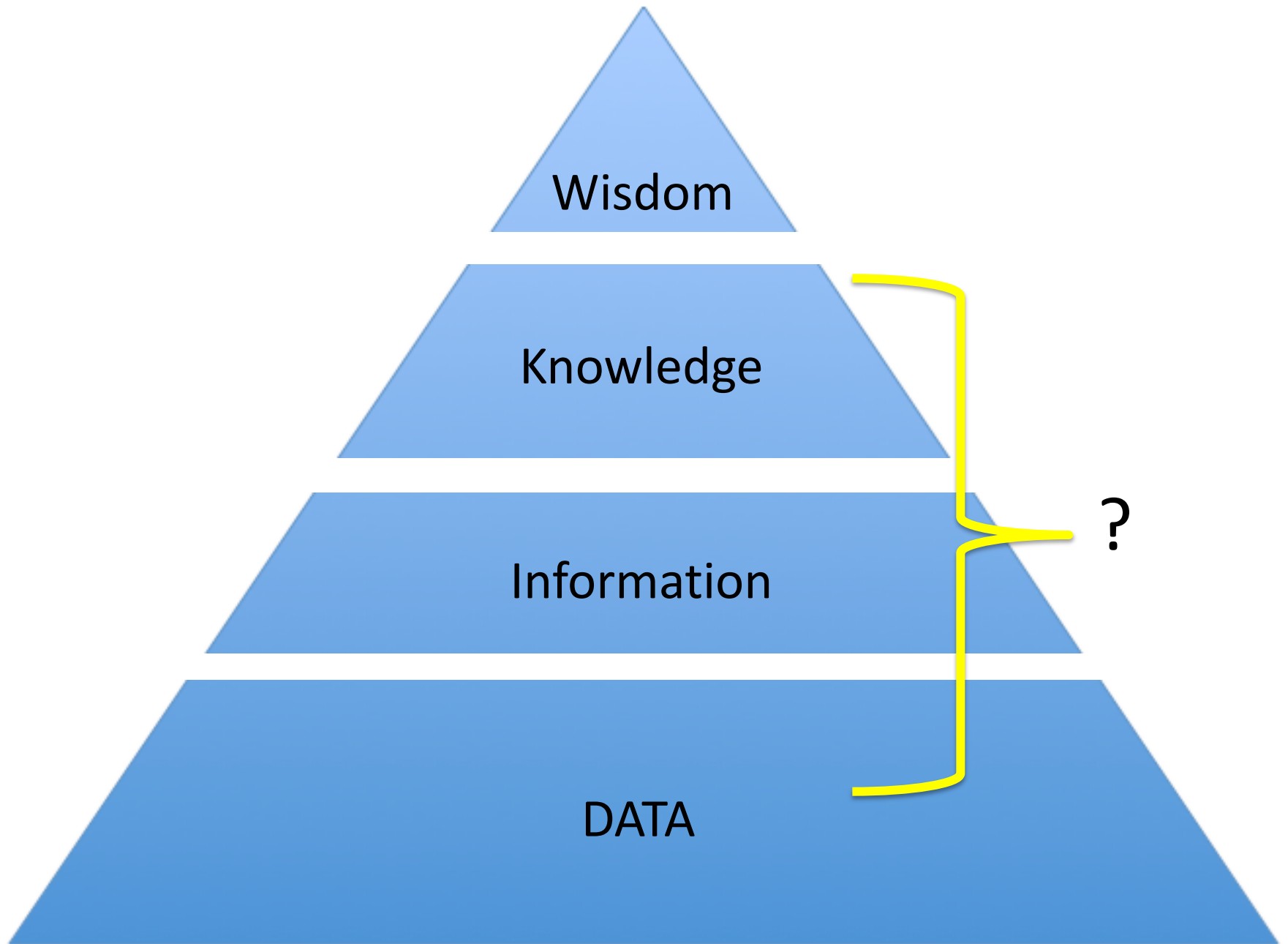
Not military !! (sort of)

In the early 1970's, Takuo Aoyagi, a Japanese bioengineer, was trying to develop a noninvasive method to determine cardiac output using cardiogreen dye and measuring light passing through an earpiece. He found that light transmitted through the ear exhibited pulsatile variations that made it impossible to compute cardiac output.

Fortunately, he was also interested in oximetry and was familiar with previous oximetry work. **He recognized that he might be able to use the pulsating changes in the light transmission through the ear to measure arterial oxygen saturation.** He then went on to develop a pulse oximeter and applied for a Japanese patent. At the same time, another Japanese researcher with Minolta was working on the same concept and applied for a patent a month later. This patent was denied in Japan but approved in the U.S.



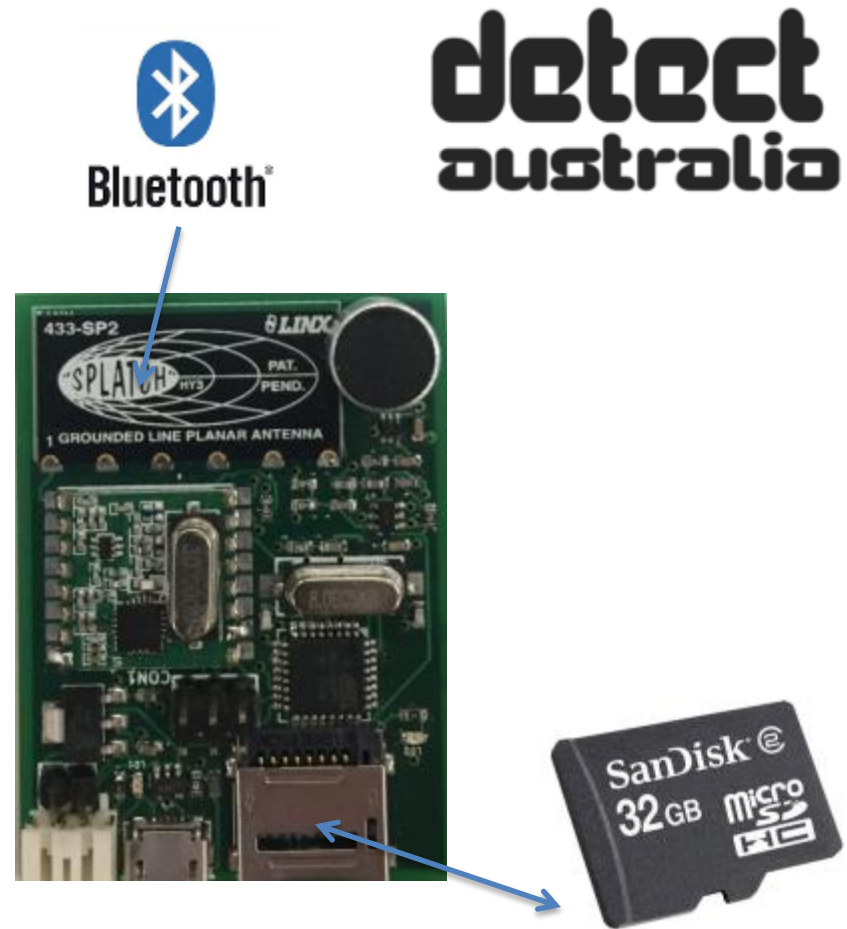
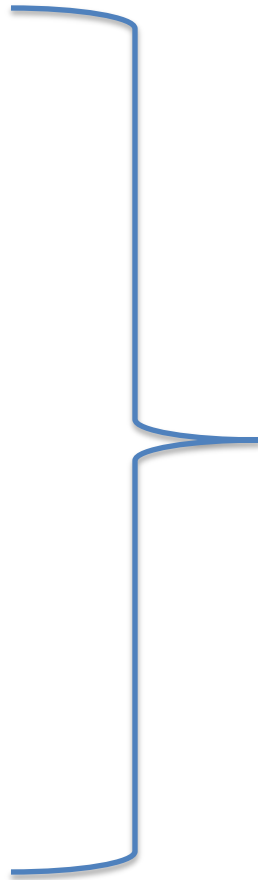
**detect
australia**



What's on our drawing board ?

- Small, smaller, even smaller
- Cheap, low power circuits
- Automated data collection 3/4G access
- Design Custom Sensors
- Motion and attitude sensors
- Multi-parameter event tagging
- Environmental Logging

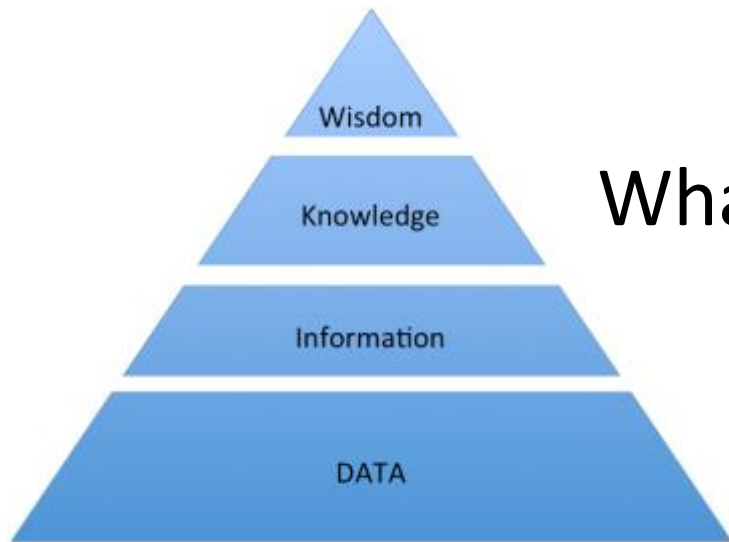
- Position
- Orientation
- Motion
- Temperature
- Heart Rate
- Oxygenation
- Sound
- ...



Currently 3cm x 4cm x 1 cm
Battery Life 3-9 months

Those 3Qs again...

1. What can be developed ?
2. How long will it take ?
3. How much will it cost ?



What would you like to know ?