

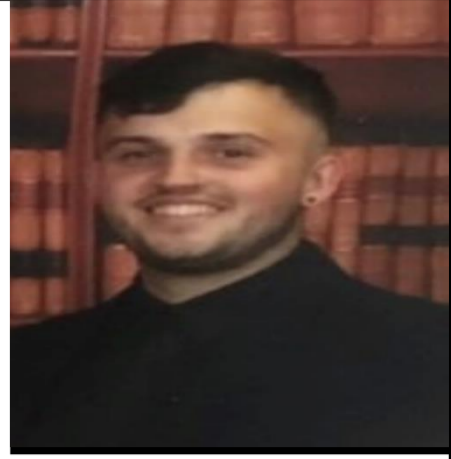
Design and Operation of an Electronic Nose.

B.Sc. (Honours) in Applied Physics and Instrumentation

Department of Physical Sciences

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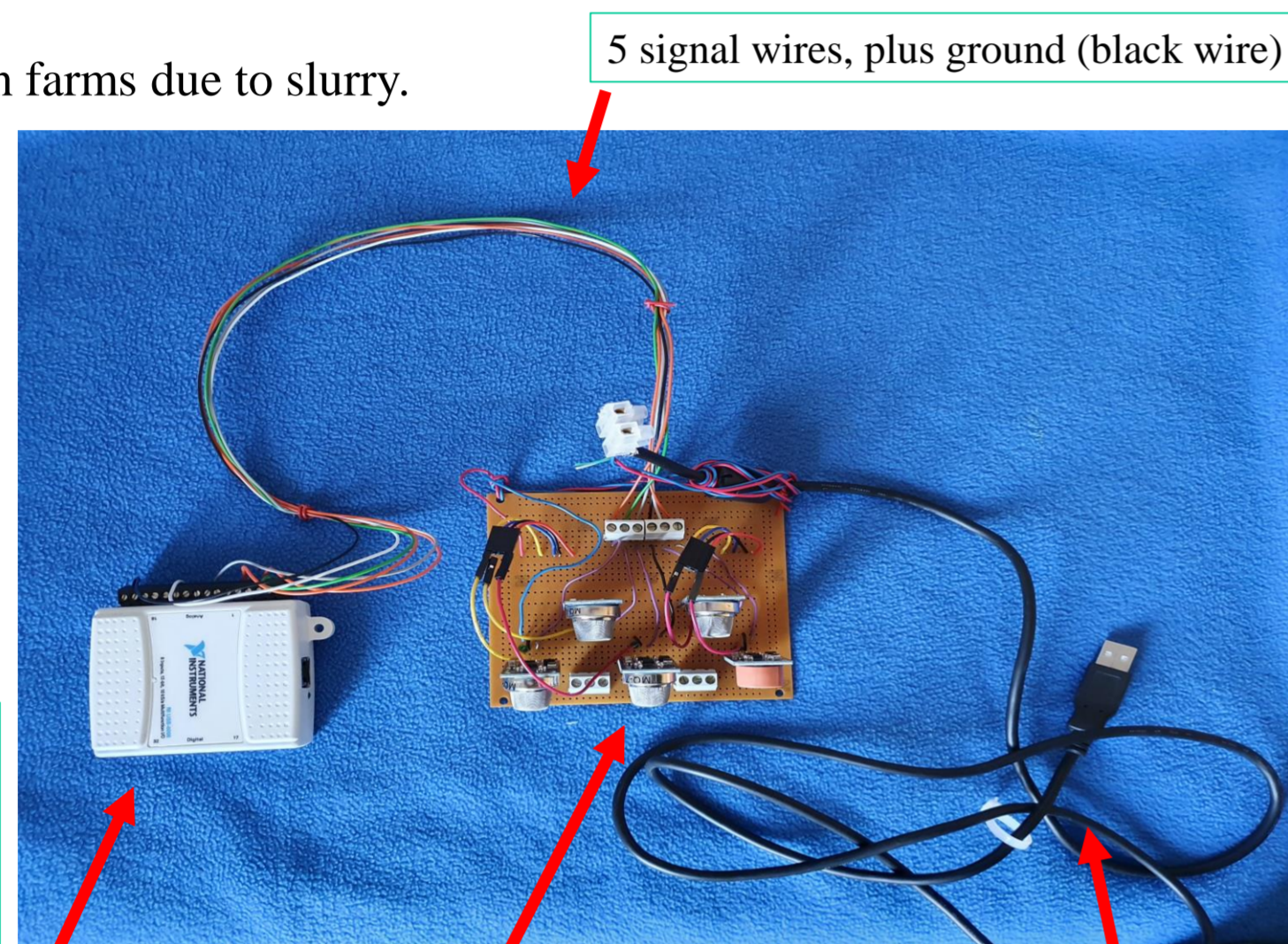
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Electronic Nose and its strengths & weaknesses

Introduction.

- Sensor based system, prevents large scale contamination.
- Needs large initial investment.
- Taguchi gas sensors, two circuits involved.
- Gas levels on farms due to slurry.



ADC module: USB cable in box to plug into PC

Sticker also in box with pin assignments

Taguchi gas sensors. (MQ-X)

Power cable: plugs into amazon USB charger

Electronic nose Strengths and weaknesses

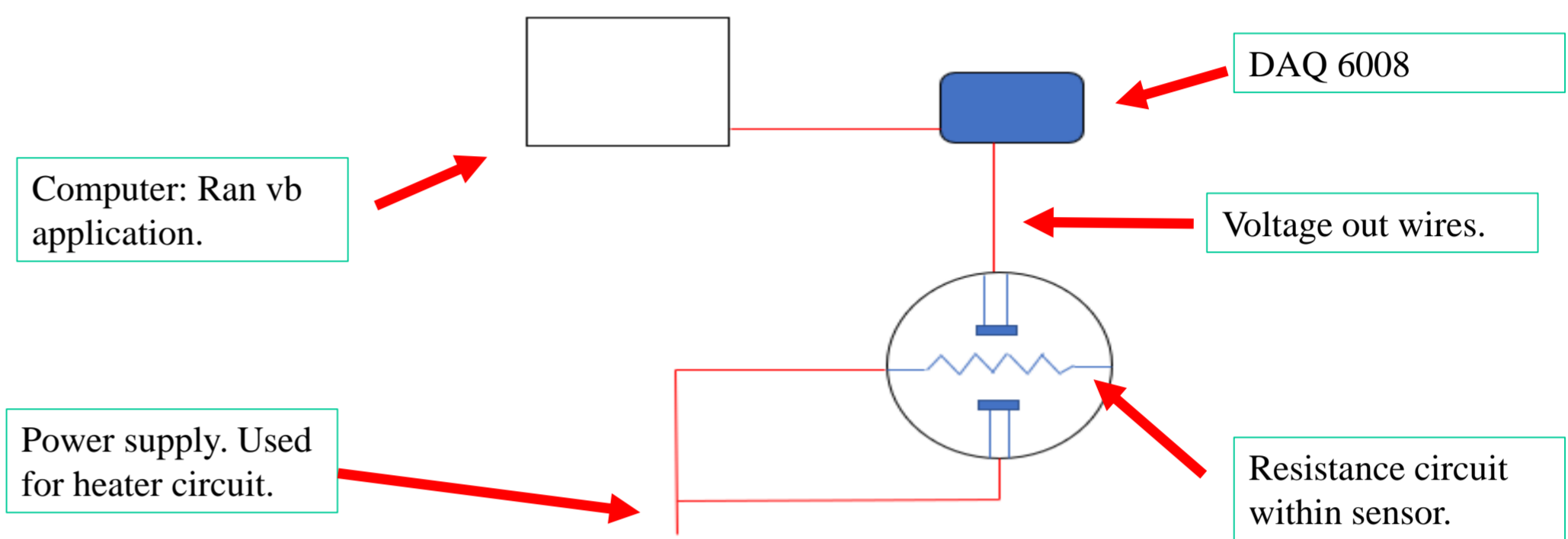
- New source of technology which is not fully developed.
- Pros and cons still being realised.
- My research shows that the strengths out weigh the weaknesses.

Strengths	Weaknesses
Power efficient	Large size
Robust	Limited sensitivity
High range of operation temperature	
Sensitive to diverse gasses	

Uses and preparation of equipment.

Uses of an Electronic Nose

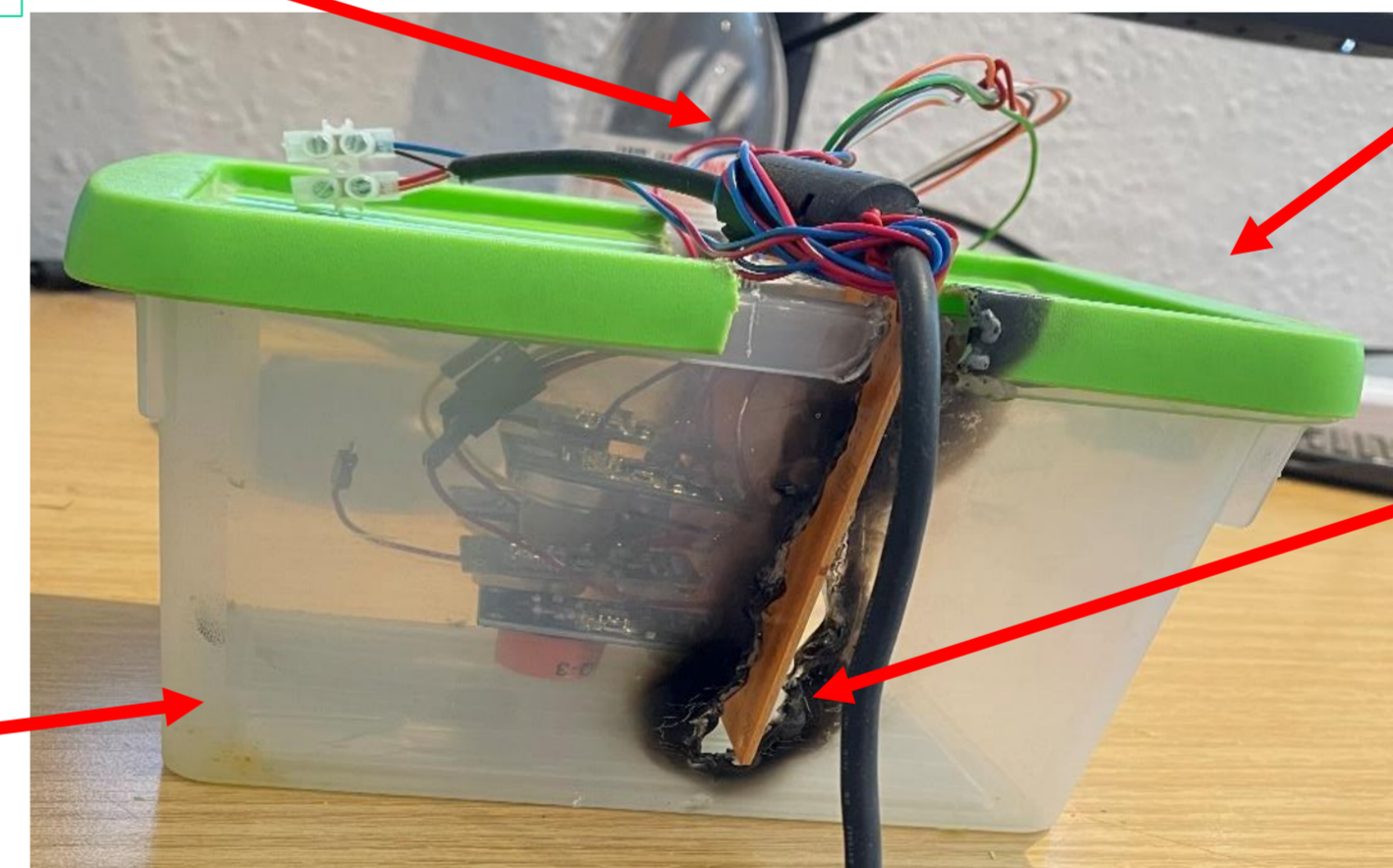
- Developed hugely in recent years.
- Massive potential, used in very distinct applications and different industries.
- Industries include; Food and beverage, Agriculture and medicine.



Preparation of equipment.

- Holding the sensors in a modified area.
- Modifications needed to create an experiment that was reproducible.
- Lunch box changed to hold both the sensor and the product.

Power supply to the sensors.



Modified area, lunch box which holds the sensor and the product.

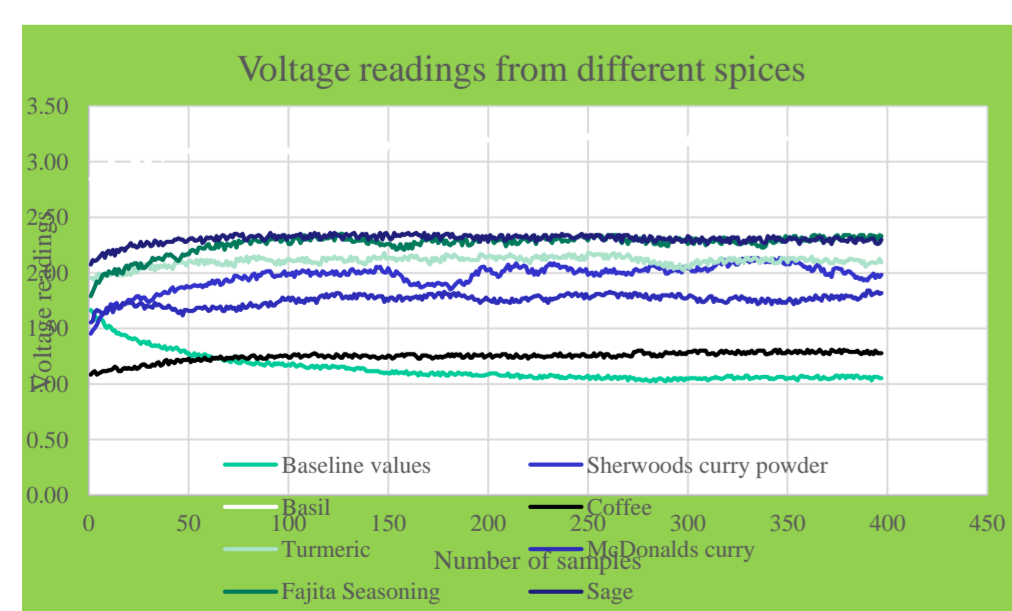
Sensor and product held within the sealed area.

Slits made on two sides of box.

Results, analysis and conclusion.

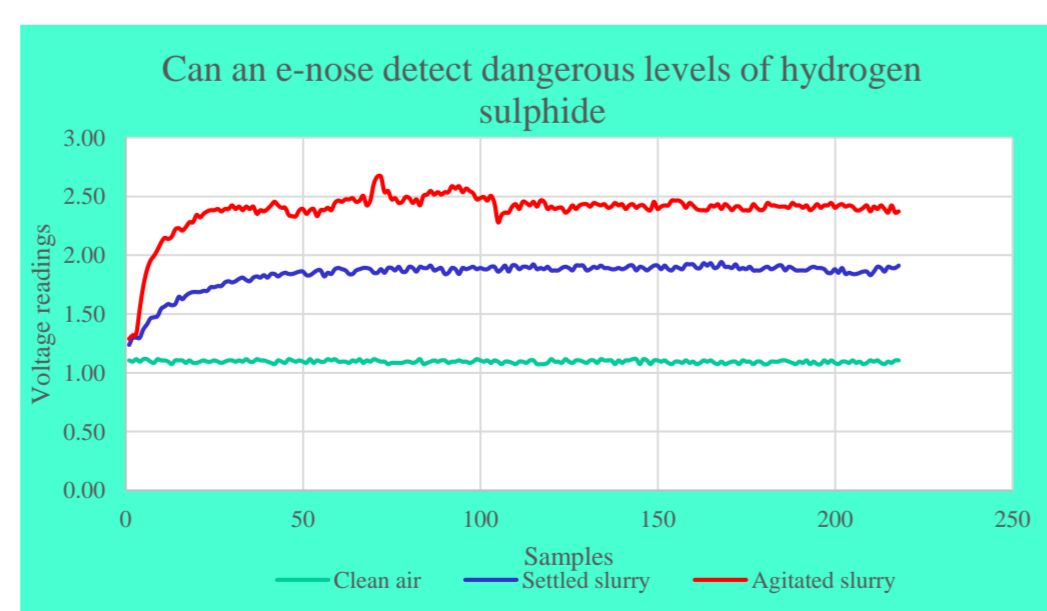
Experiment 1

- The first experiment that was carried out was the analysing of voltage readings from the MQ-3 sensor. This was the only sensor on the board that had not malfunctioned and as a result it was tested to see if it was able to distinguish between different products.



Final Experiment

- The final experiment put the other experiments to use and helped to create an application which sensed the poisonous gas from slurry, Hydrogen Sulphide. The result from this can be seen below.



Analysis.

- Experiment 1:
 - From experiment one, it is clear that when the product was in the area of the sensor it was able to sense it. The plot of the data also shows that in theory a voltage set should be able to be created for each product and from this the sensor would be able to identify the product.
- Final experiment:
 - This experiment put the e-nose into a real-world use. This allowed hydrogen sulphide to be sensed at dangerous levels. This has caused deaths in the past and is not able to be identified by a human nose.

Conclusion.

- The overall goal for the project was to create an application that could be used in the farming world. The main problem that I could see the e-nose fixing was when agitated slurry leave off gas it can be fatal to humans. This has caused over 10 deaths in the last 5 years.
- I was able to create an application which sensed when the gas was at a toxic level and when this occurred a LED was turned on to warn the farmer not to enter the location. In the future this could save many lives if it was used in enclosed areas where the build up of gas becomes toxic. This could save many lives and also money in cases where the gas has killed animals.

References

- [1] Karakaya, D. (2020, April 17). Electronic Nose and Its Applications. Retrieved from Karakaya2020_Article: Karakaya2020_Article_ElectronicNoseAndItsApplicatio.pdf
- [2] Harper WJ. (2001). The strengths and weaknesses of the electronic nose. Retrieved from PubMed: <https://pubmed.ncbi.nlm.nih.gov/11548160/>
- [3] Sparkfun.com. (n.d.). Retrieved from Technical Data MQ-X gas sensor: <https://www.sparkfun.com/datasheets/Sensors/MQ-3.pdf>