Novel automated pest detection and monitoring devices

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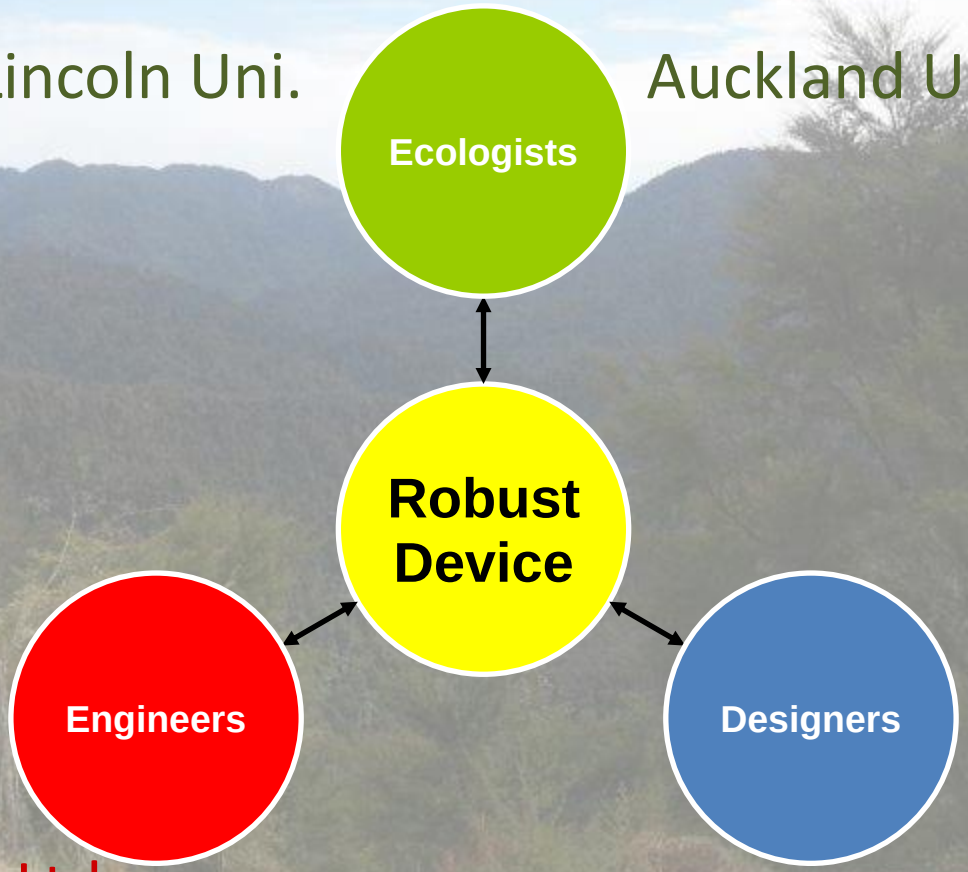
Background

- 2010: Responded to DOC RfP for a new "*small-mammal monitoring technique or tool*"
- 2011: Began research on paw-recognition surfaces for animal ID and monitoring
  - Proof of concept obtained
  - Enclosure trials completed
- 2012 - 2013: Field trials of devices
  - Performance in the field
  - Optimal 'architecture' of devices
  - Simulated island reinvasion trial
  - Developed final model
  - Comparative trials vs tracking tunnels

Team brief: Develop a new, automated monitoring tool with advanced species ID capabilities

Lincoln Uni.

Auckland Uni.

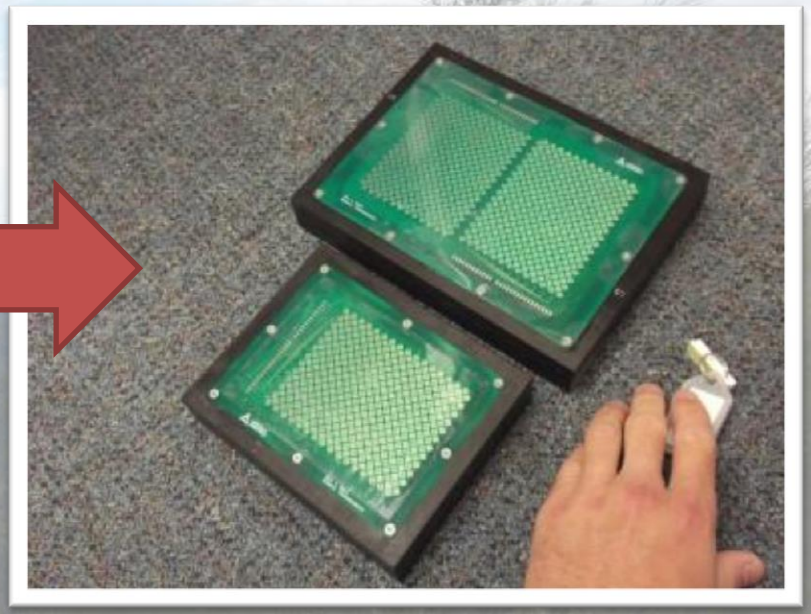


Lincoln Agritech Ltd.

AUT School of Design

How it works

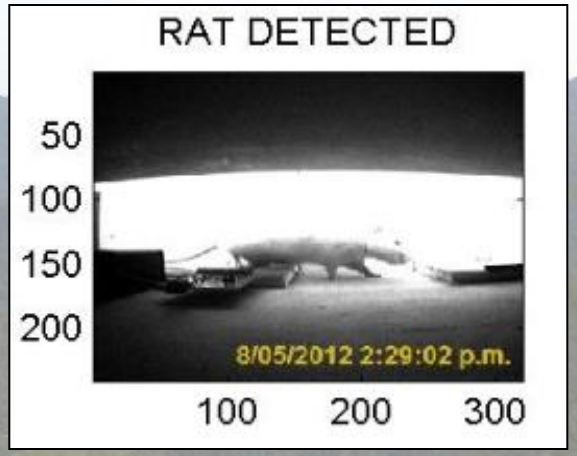
Primary component: Custom built paw-recognition surface

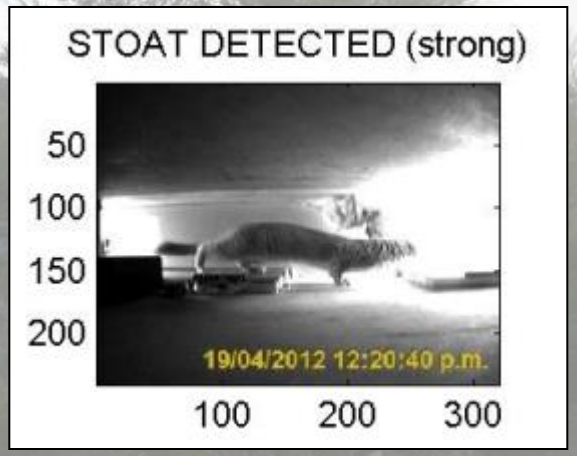


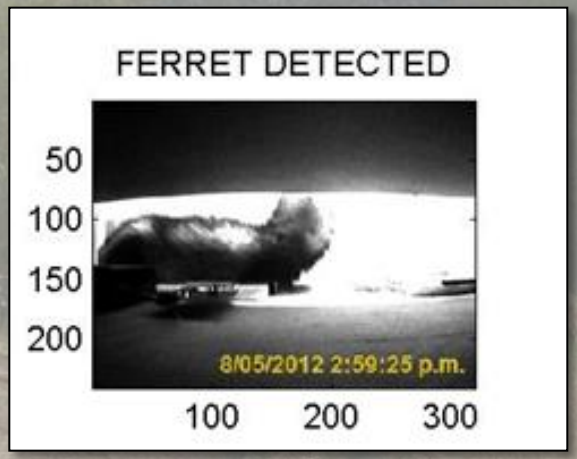
Animal stands on surface → Paw characteristic data obtained → Recognition algorithms run → Animal successfully identified

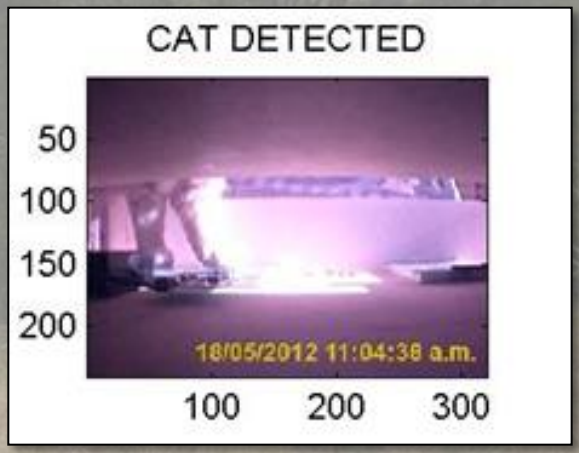
Pen trials to collect baseline data on a range of species

- Stoats
- Ferrets
- Rats
- Mice
- Possums
- Feral cats
- Weasels
- Hedgehogs









Creating a field version

- Trialled different ‘architecture’ possibilities (pen & field research)
  - Paw orientation & detection time
  - High interaction rates
  - High detection probability
- One stand-out candidate shape

Final working design

Final working design

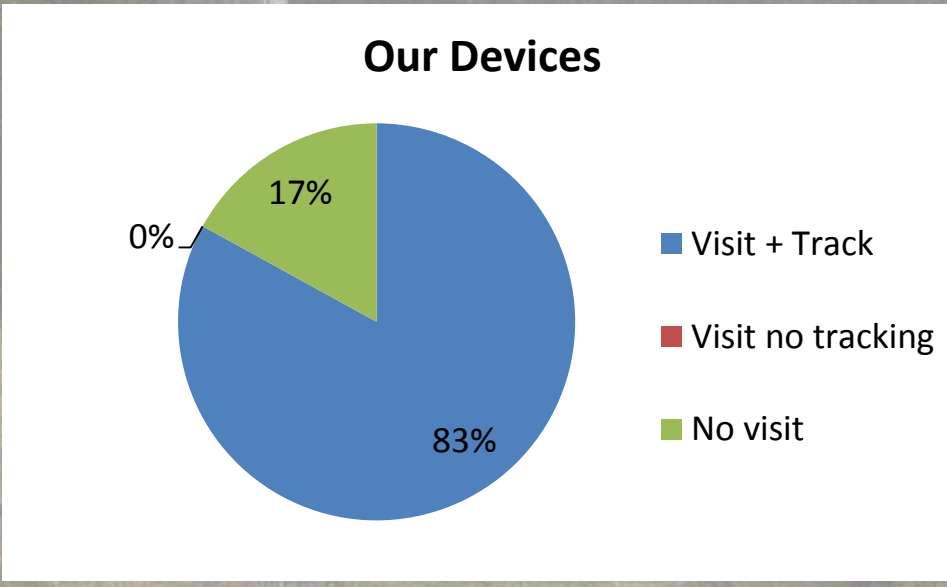
Tracking tunnels vs our designs – which is better?

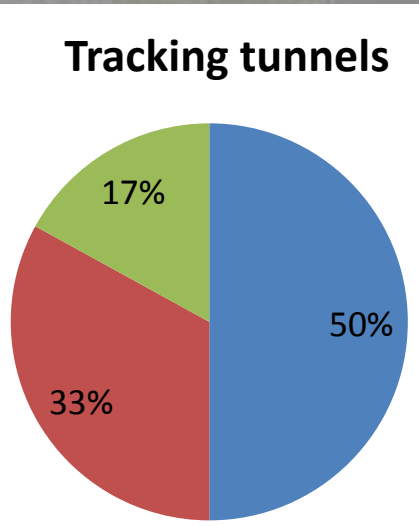
- Deployed devices and tunnels within the same timeframe and habitat
- Three trials in the South Island
- All tunnels/devices monitored with cameras
- Standard DOC protocol followed

Vs.

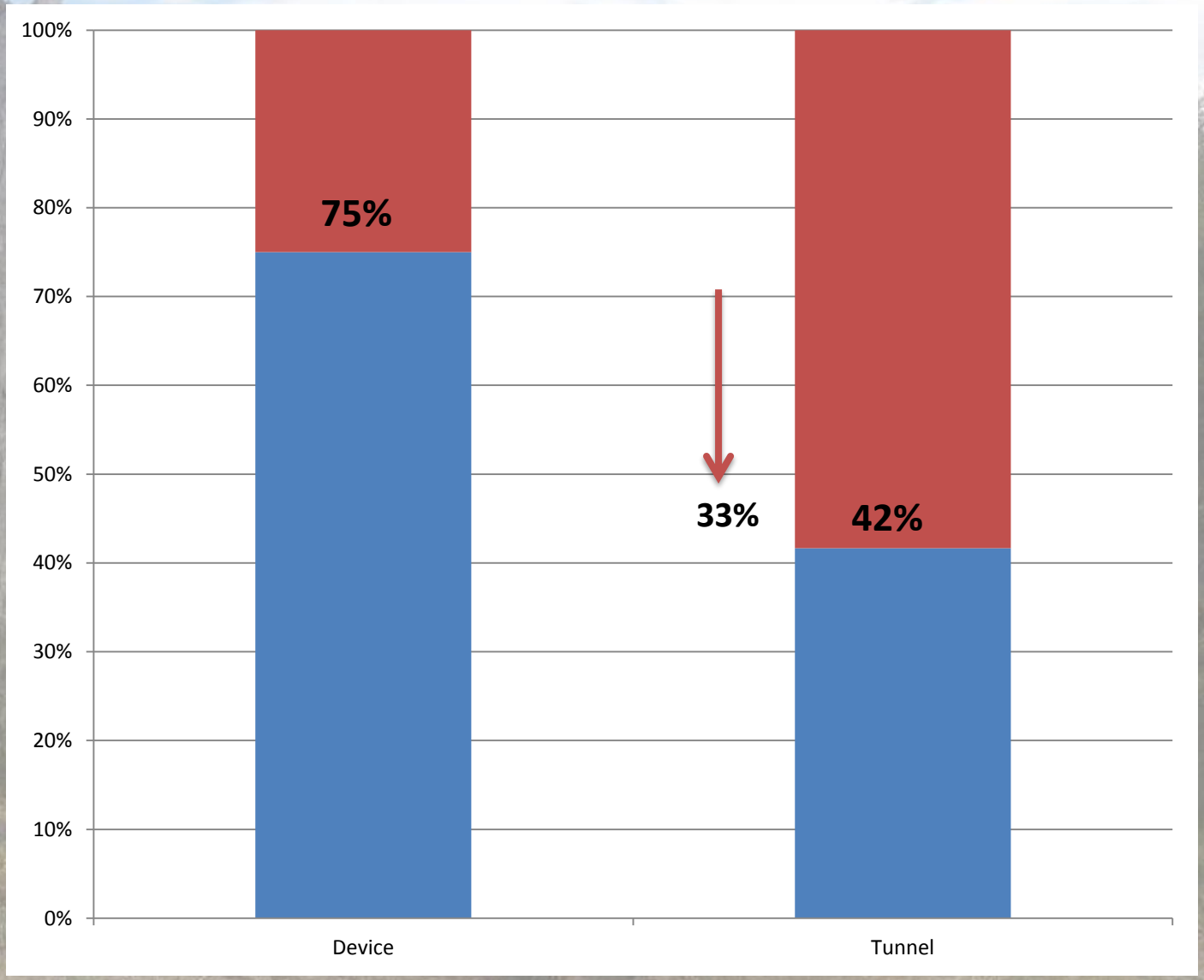
Comparison – rat tracking

- 100% of visits to our devices resulted in tracking data
- Only 62% of visits to tracking tunnels resulted in a successful track



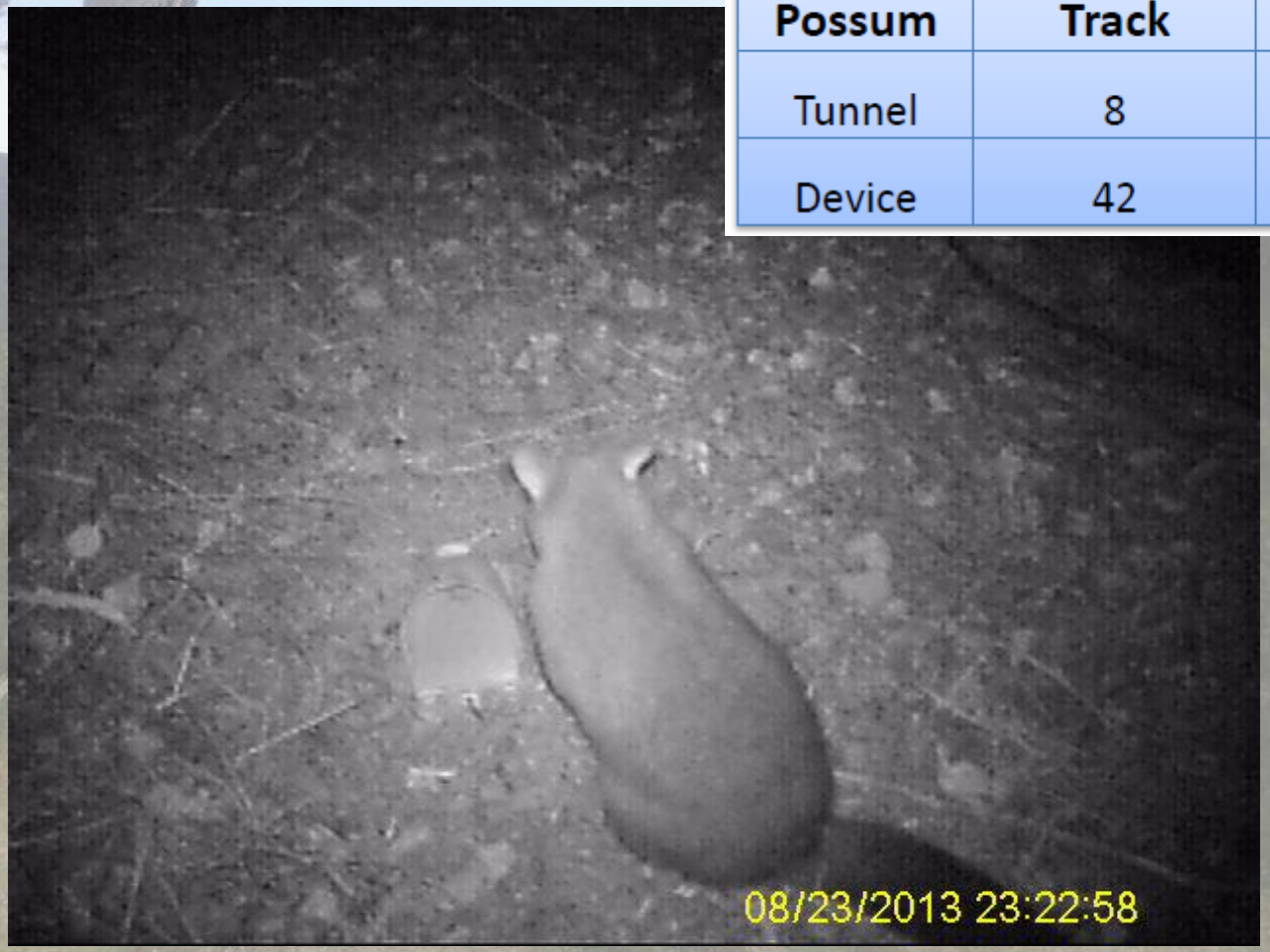


Rodent detection
(low rat density site, high mouse density)



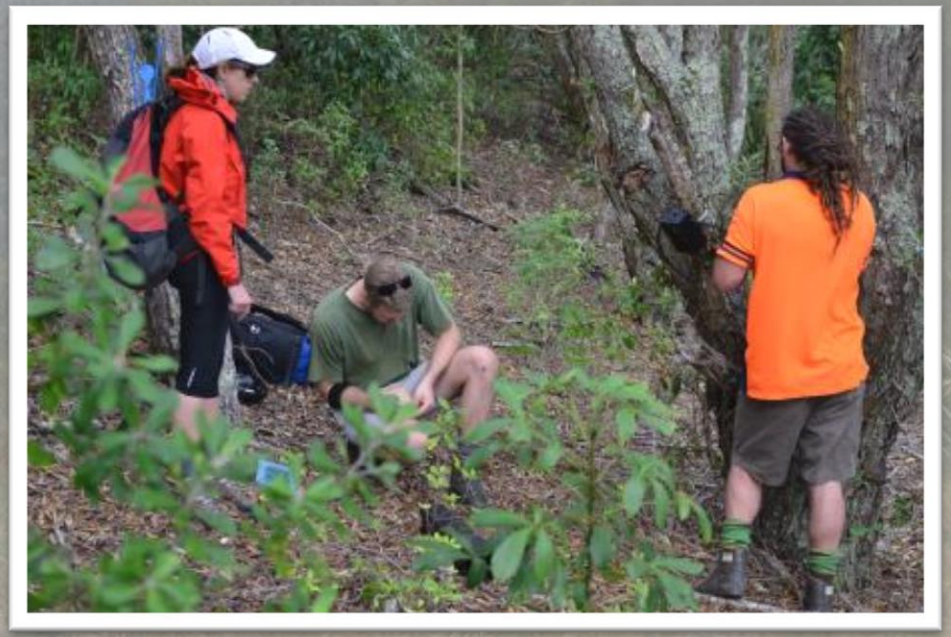
Possum detections

Possum	Successful Track	Possum visit but no Track
Tunnel	8	25
Device	42	8



Performance vs camera traps

- Almost double the number of interactions recorded on our devices then on camera traps
  - 157 animal ID's on our devices
  - 81 on cameras
- No missed events



Key results & advantages over tracking tunnels

- Our device has higher levels of interaction
- Our device has a higher (more accurate) rate of detection
- No missed events on our devices
- Monitors more species, more efficiently, on one device
- ID with time and date stamp
- No saturation
- Application to many species
  - Great potential for feral cats and possums

Where to next?

- Proof of concept completed
- Larger-scale field trials
- Algorithm fine-tuning
- Trialling robustness
- Extending battery longevity (6-12 months)
- User-interface and software
- Incorporating remote download capabilities
- Commercialisation and scale-up of manufacturing
- Species-specific traps/toxin delivery units

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