



Innovation
Central

A collaboration led by 

Summer Internship Program

LoRaWAN Temperature Sensors for the City of Melville

Jack Downes

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Curtin University



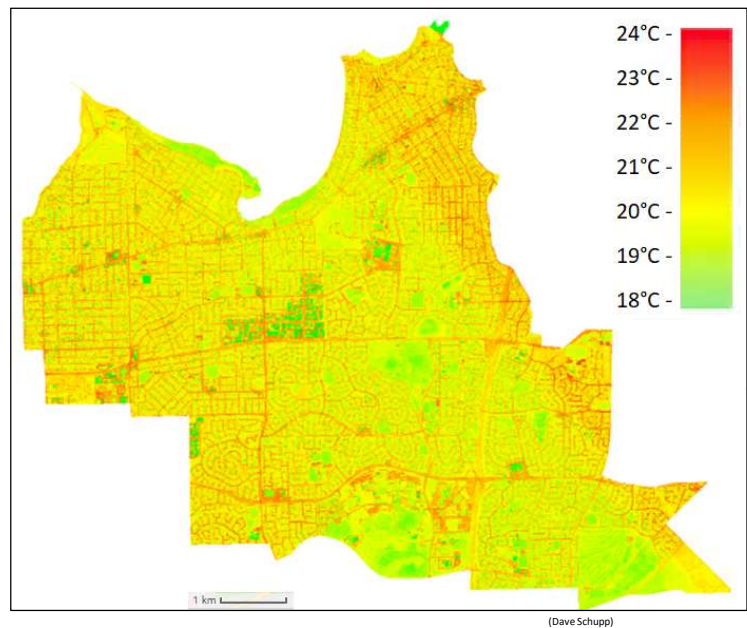
woodside

-I've developed a tool to effectively capture heat data for the City of Melville.

..relationship between local government and mapping heat.

Heat Islands & Urban Forests

- Heat Islands retain heat shown in red
- Urban Forests act to cool urban environments by shading areas and absorbing less heat
- Thermal imagery shows this well but it lacks granularity



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- explain HI and UF
- diagram context
-broad snapshot
- ...material specific design decisions.

Problem overview

How far apart should
trees be planted?

What types of Asphalt
dissipate heat fastest?

Can the colour of roofs
in the area have an
affect the amount of
heat it retains?

Does a row of trees
running East West
become more affective
than one running
North South?

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...At the moment these questions are answered using limited and costly thermal imagery, manual labour or simply best judgement.

...make evidence based choices, by supplying them with granular, time sensitive data.

The Requirements

Data

Cost

Flexibility

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- localised and accountable
- fraction of the price of thermal imagery
- scale and adapt

Solution

- LoRaWAN Enabled Sensor Array
- Featuring:
 - Short recording intervals
 - Long Battery life
 - Extensive network range
 - Precision location



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LoRaWAN enabled battery powered sensor array.

Boasting

-recording intervals

-battery life

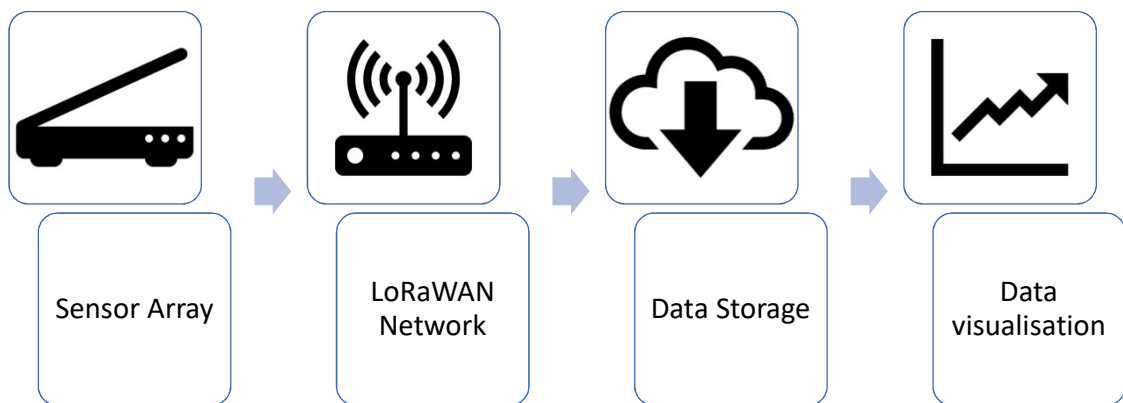
-network range

-Get only the data you need

-sharp good looks

elegant solution to an array of questions.

The System



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The beauty of this solution compared to others is it's low cost, versatility and scalability.

Includes: Light and temp sensors

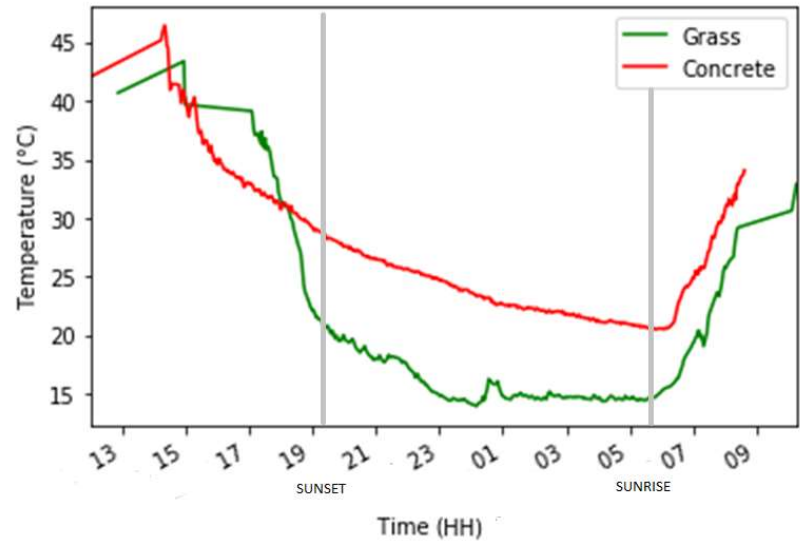
Can be added: moisture levels, humidity, location

3 sensors -> can be expanded

their data being stored in the same location and pulled together to be visualised in what ever manner makes the most sense.



Overnight Heat Dissipation



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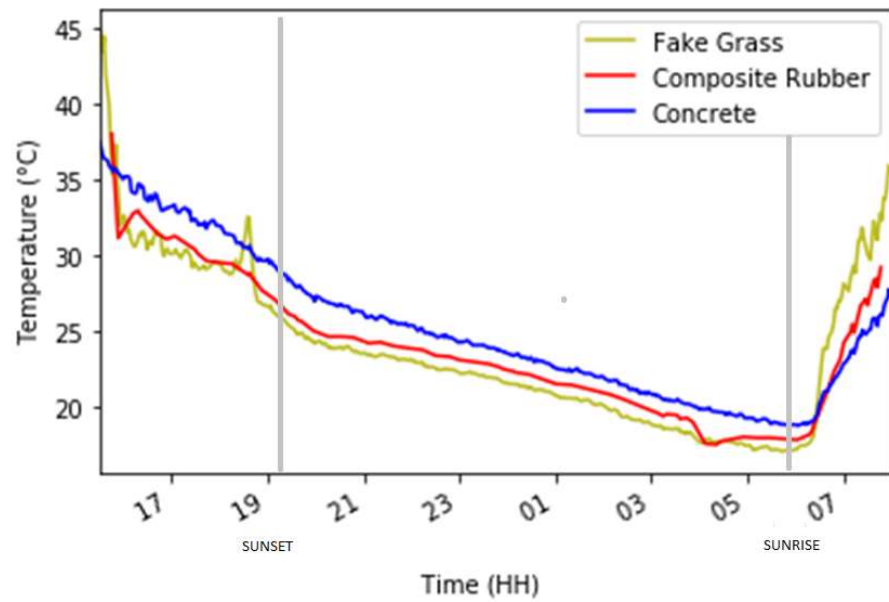
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-deployed 2 sensors

During daylight hours concrete and grass sit at a similar temperature, but as darkness falls the grass rapidly drops to below 20 degrees while the concrete dissipates heat much slower.

From this we can intuitively understand the differences in Heat Islands and Urban Forests.

Playground Materials

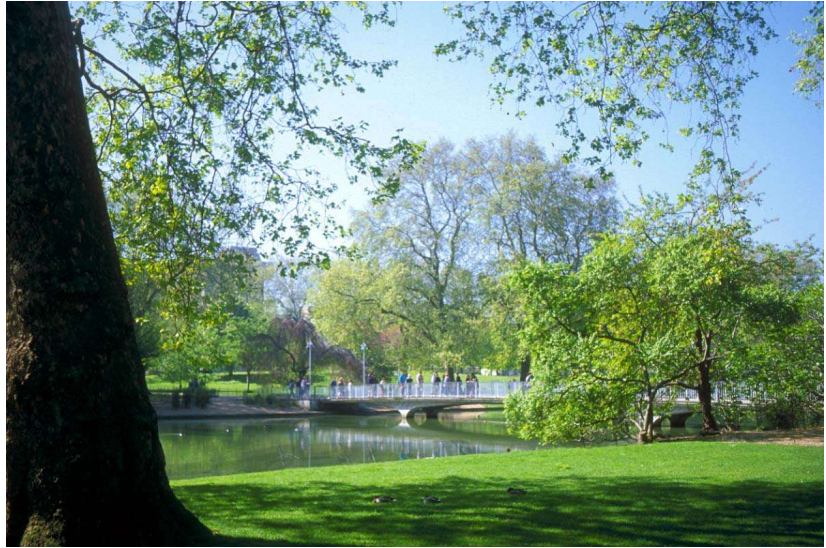


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- materials found in a play ground
- interesting points.
- direct insight -> identify trouble materials -> cooler choices.

Outcomes

- Sensors can be used in conjunction with thermal imagery to conduct more rigorous research
- Unit cost can be brought down with scale
- Future studies can go on to collect larger data sets over the course of a year
- Workflow can be adapted to suit a much faster learning curve



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In conclusion

I see this technology as a viable tool for studies into local climate control for the City of Melville.

With a growing public interest in our climate, I hope a sensor network of this type can take the guess work out of making our urban environments a cooler more inviting place to inhabit.



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