AI for Arctic species conservation: improving monitoring and decision-making under changing conditions

Alasdair Davies | Arribada Initiative

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Case study:

Early-warning detection of polar bears to mitigate human-wildlife conflict in Eastern Greenland

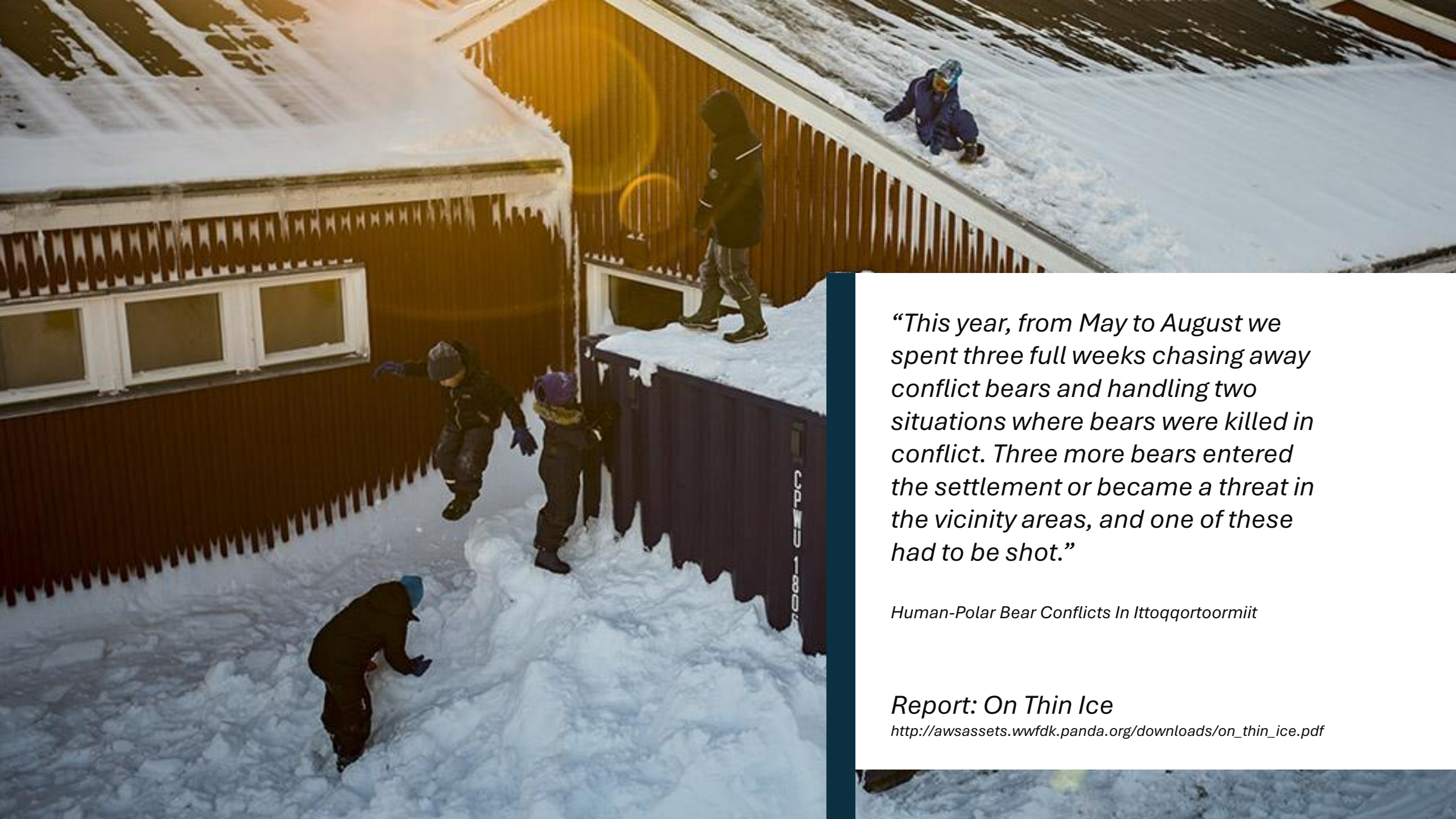
Ittoqqortoormiit

Population: 363 (2024)

Objective

- *Confidently detect the presence of a polar bear under challenging environmental conditions*
- *Alert members of the community in real-time*
- *Be easy to maintain, operate and deploy*

“Interviews with residents in Ittoqqortoormiit uncovered fears that human-bear conflict will only worsen with time. The community is calling for greater attention to the problem from authorities and the Greenlandic media.”



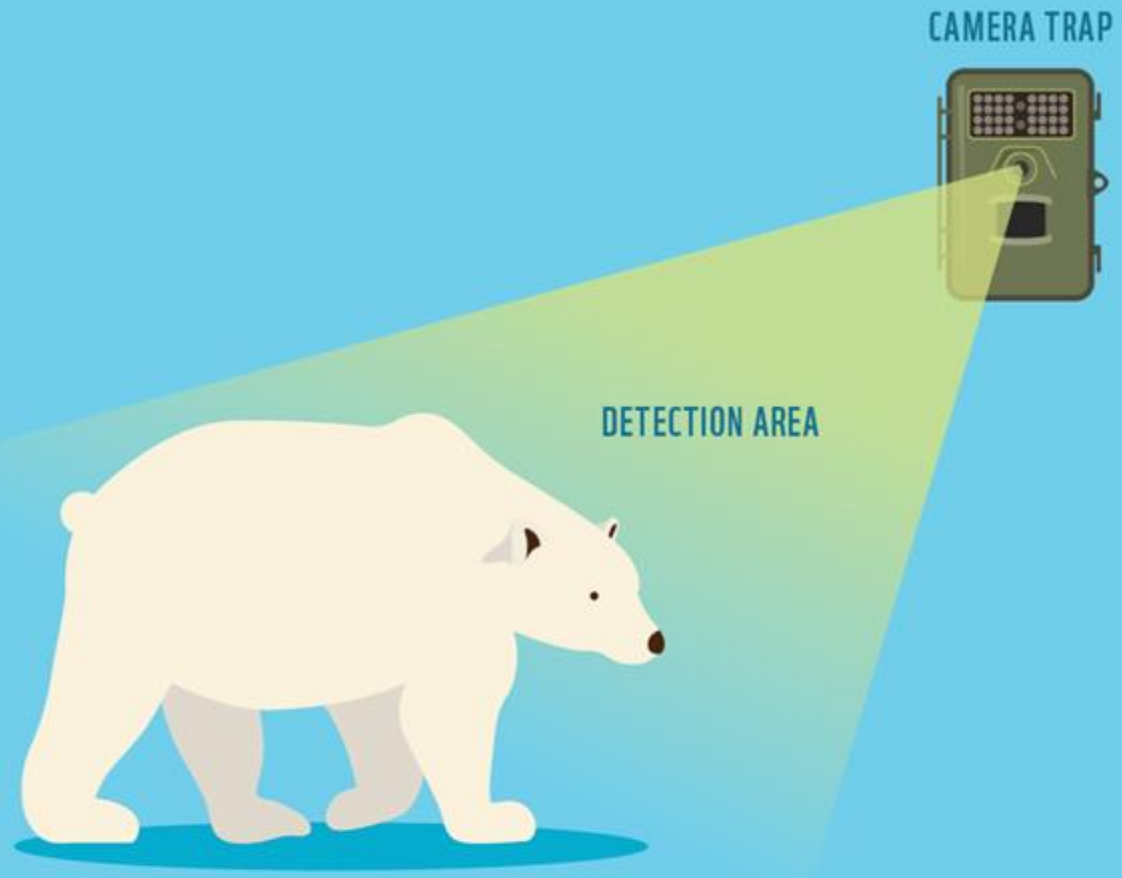
“This year, from May to August we spent three full weeks chasing away conflict bears and handling two situations where bears were killed in conflict. Three more bears entered the settlement or became a threat in the vicinity areas, and one of these had to be shot.”

Human-Polar Bear Conflicts In Ittoqqortoormiit

Report: On Thin Ice

http://awsassets.wwfdk.panda.org/downloads/on_thin_ice.pdf

Existing infrared sensor technologies
Camera traps

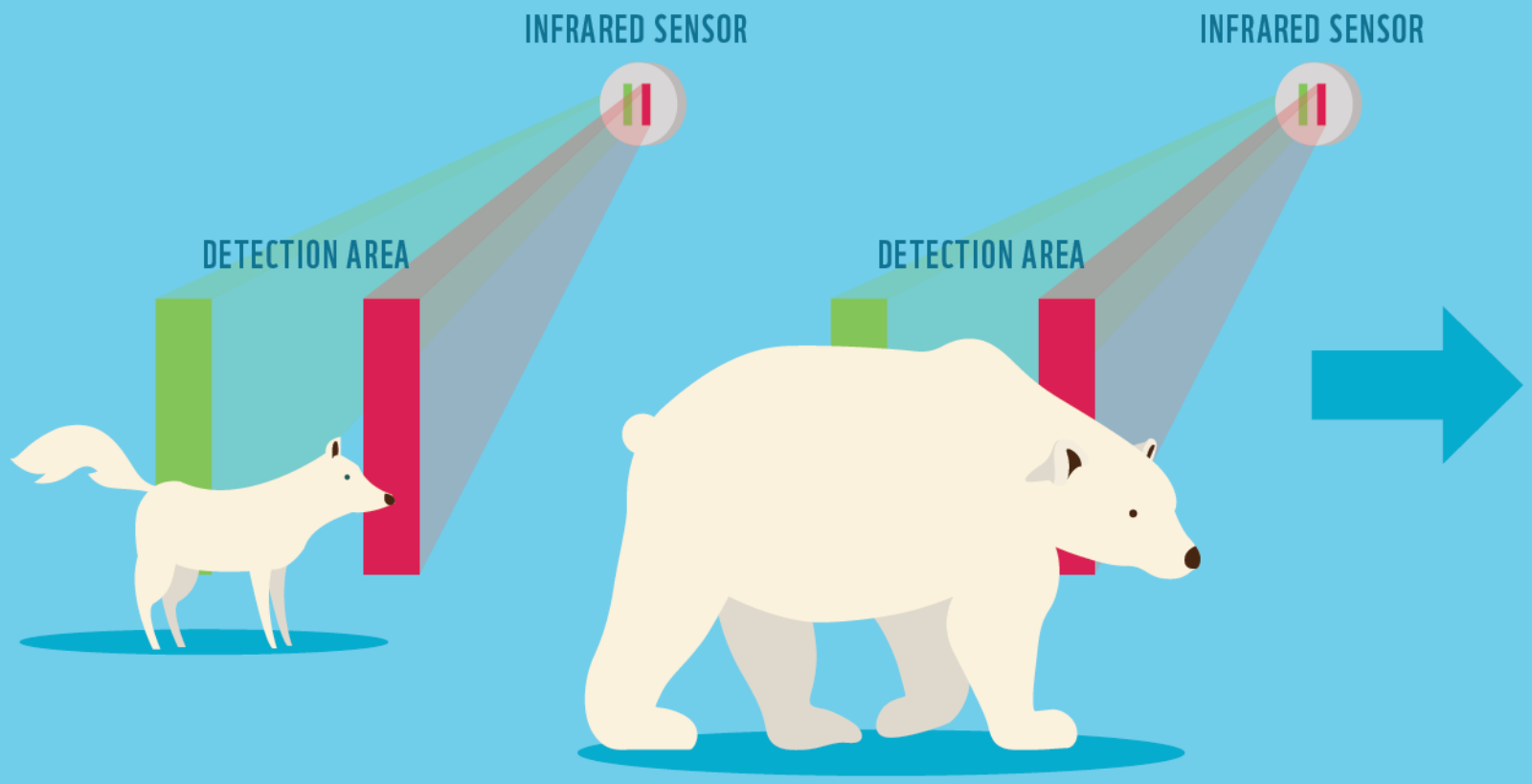


Results from a camera trap

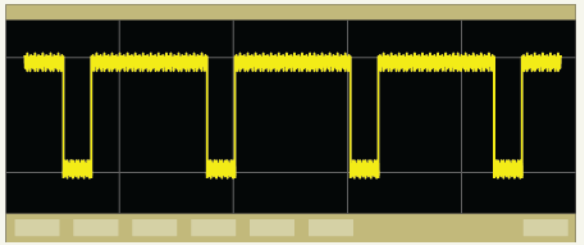
Pros and cons

- ✓ Identify species
- ✗ Work in poor light
- ✓ Cost effective
- ✓ **Notify** in real-time

Existing infrared sensor technologies
Traditional passive infrared sensors (PIR)



Results from traditional PIR sensor



Pros and cons

- ✗ Identify species
- ✓ Work in poor light
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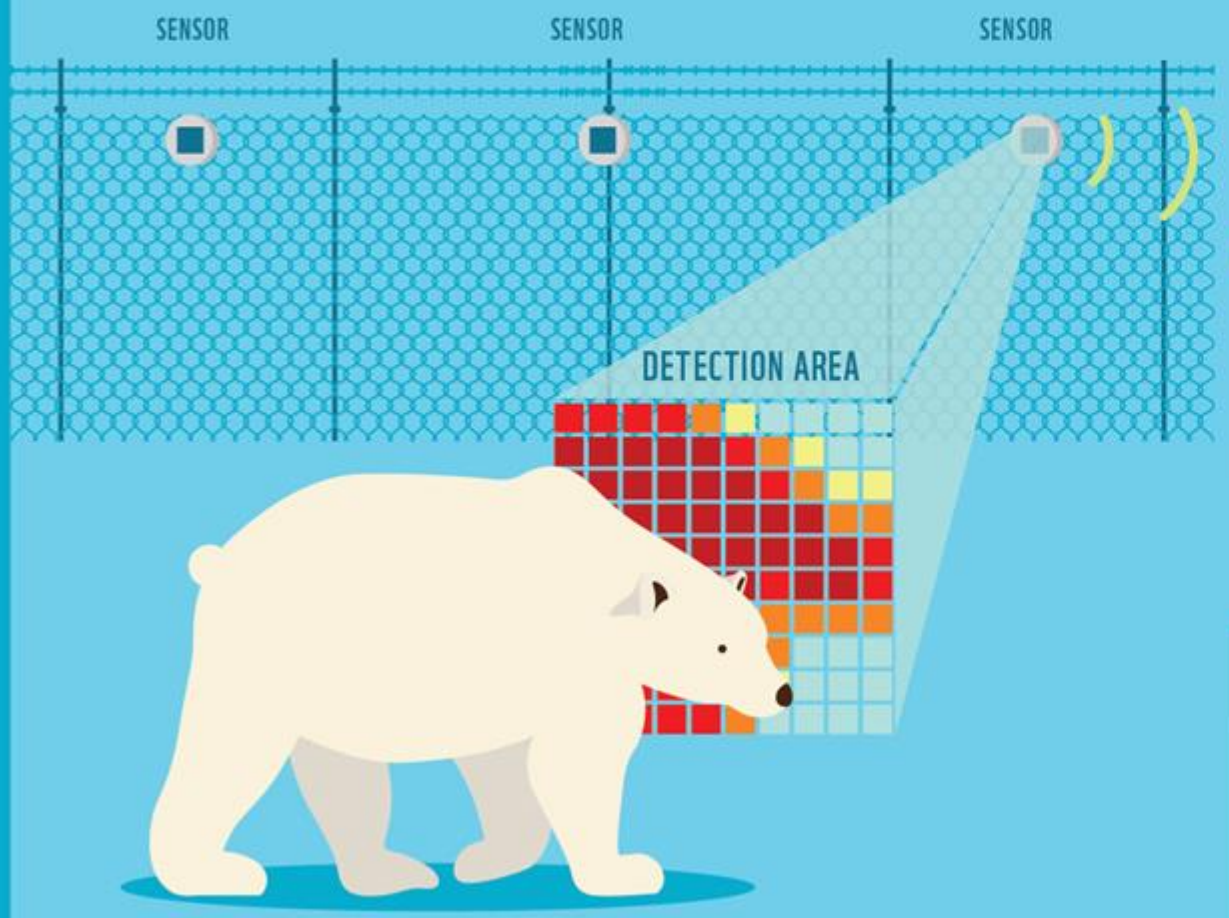
- ✓ **Notify** in real-time

New advances in infrared technologies

Thermal detection in real time

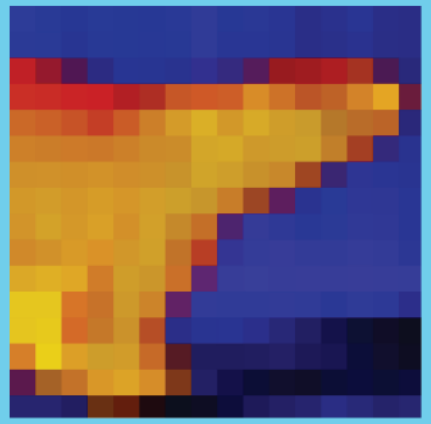


Pros and cons

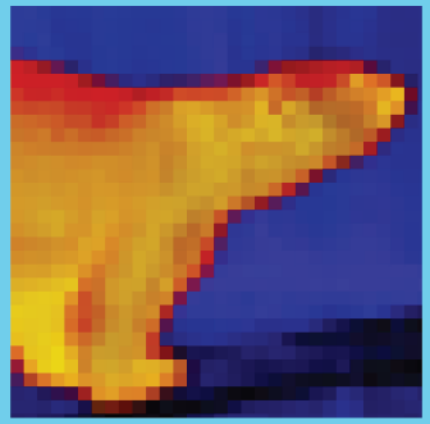
- ✓ Identify species
- ✓ Work in poor light
- ✓ Cost effective
- ✓ **Notify** in real-time

New advances in infrared technologies
Potential grid resolutions outputs:

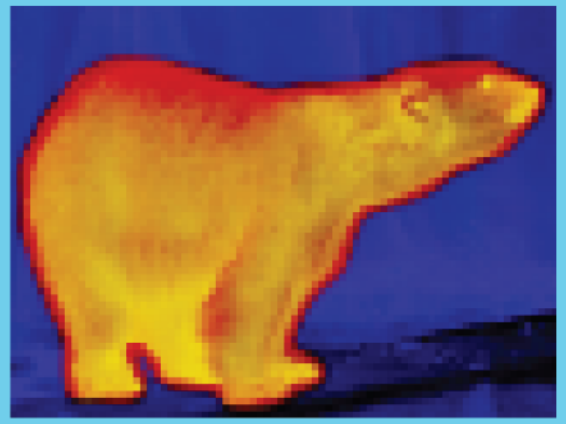
8 x 8



16 x 16



32 x 32

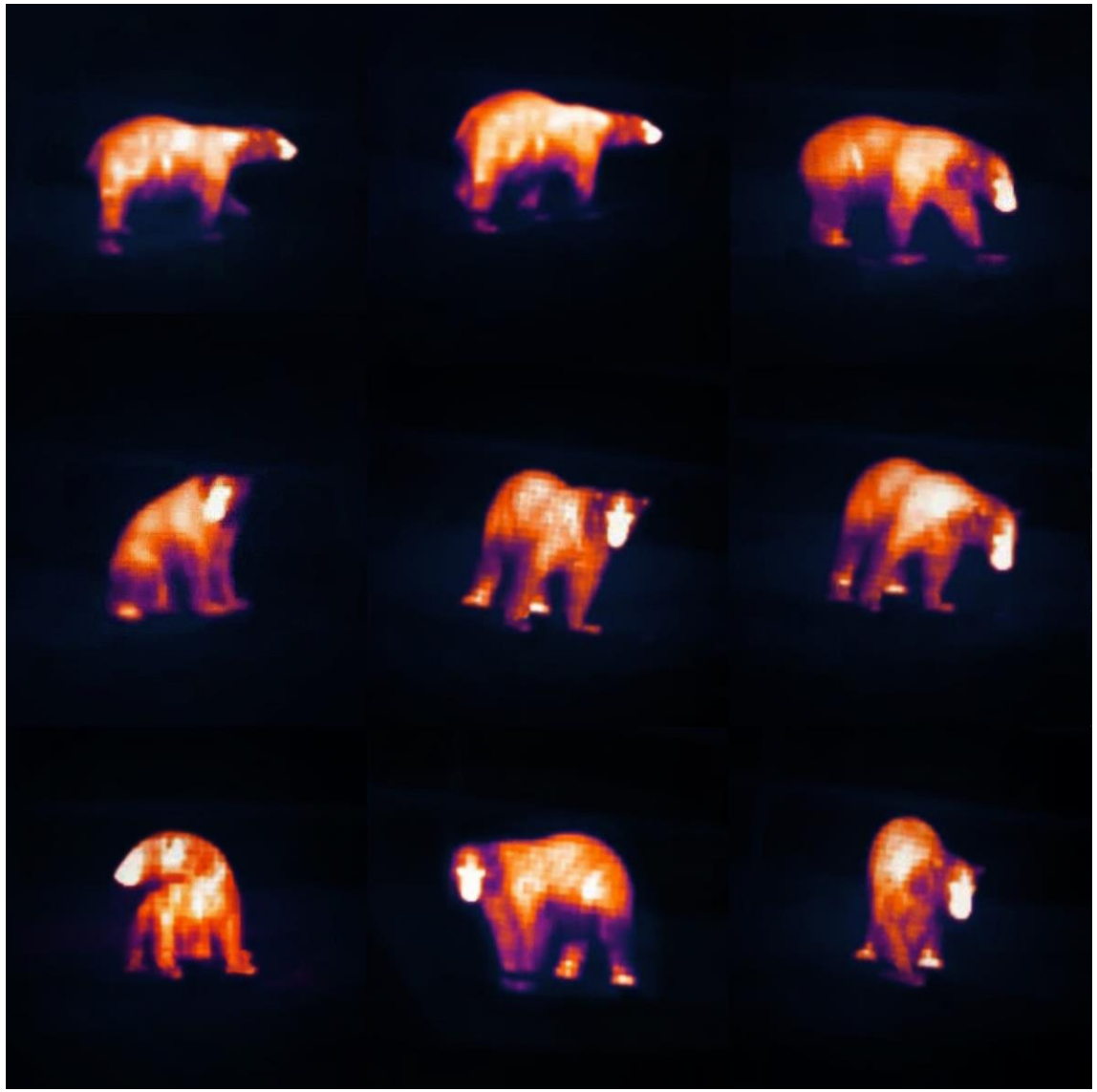


80 x 64

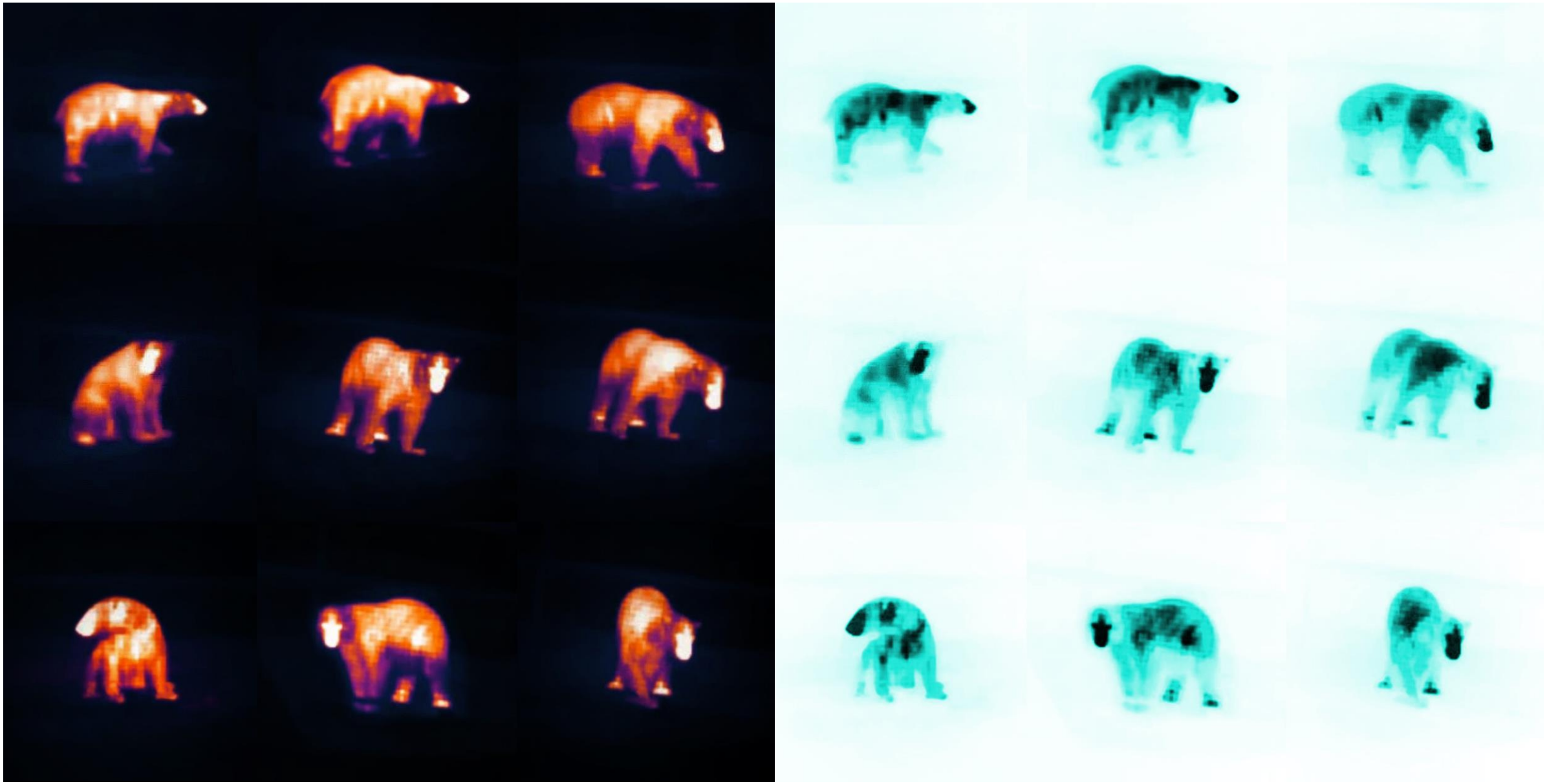
320 x 240 resolution < $300

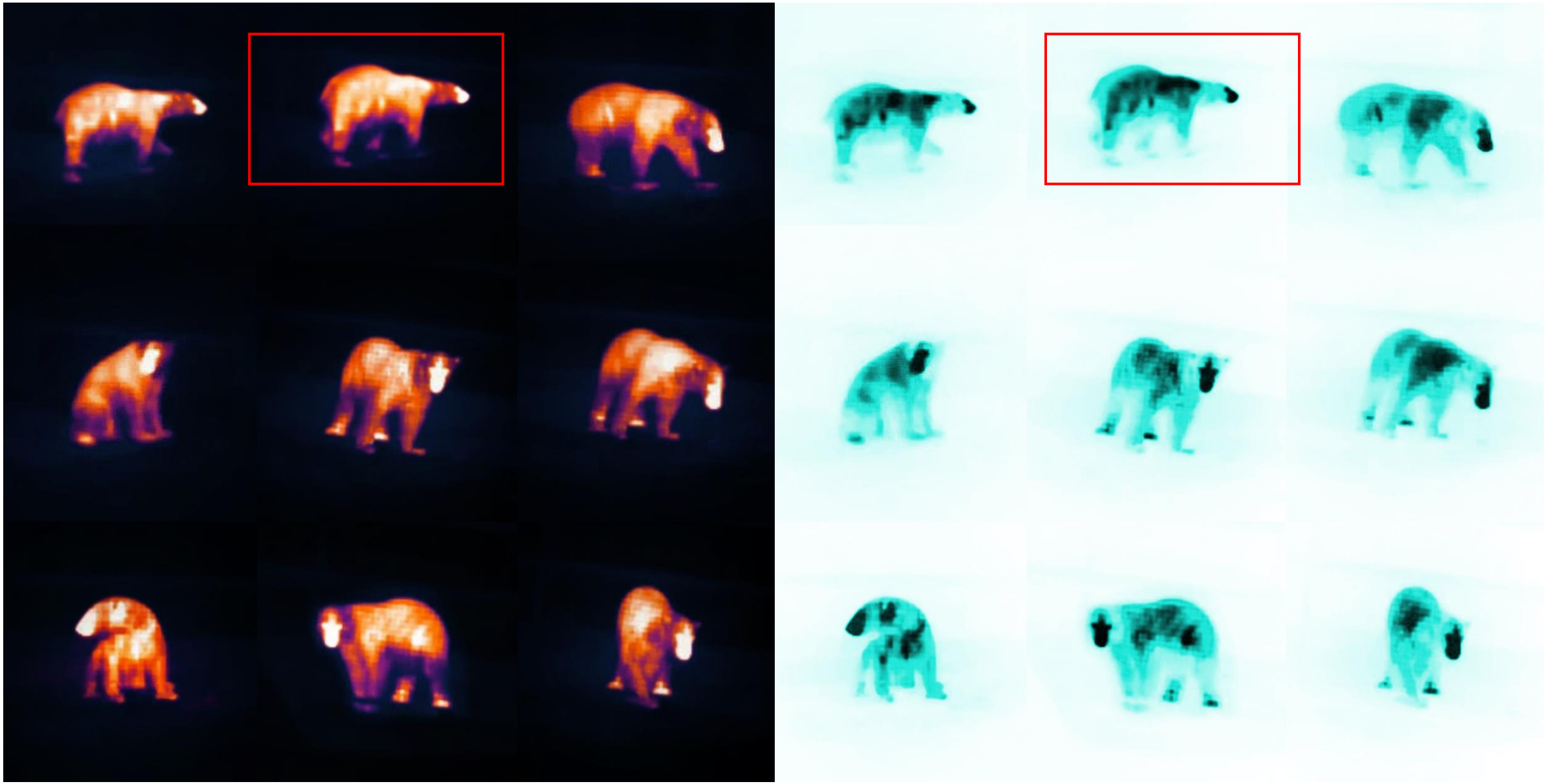
Low-cost microbolometer (thermal sensor)

Microcontroller with embedded machine learning



Teaching a camera to detect polar bears in thermal vision requires lots (and lots) of training data






Polar Bear 0.98

Machine learning

Machine learning

Artificial intelligence

Merging together predictive data (AI), together with ground truthed sensor data (ML) could lead to better decision-making under changing Arctic conditions

AI-supported decision-making could lead to a better outcome for communities and species living side-by-side in the Arctic in a changing world

Thank you

alasdair@arribada.org
https://arribada.org

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