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Curiosity driven exploration of sensory-motor mappings

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Publication date:
2011

Citation for published version (APA):

Karaoguz, C., Potapova, E., Drix, D., & Hülse, M. (2011). *Curiosity driven exploration of sensory-motor mappings*. Paper presented at Capo Caccia Cognitive Neuromorphic Engineering Workshop, Aberystwyth, United Kingdom of Great Britain and Northern Ireland. <http://hdl.handle.net/2160/7197>

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A cognitive robotic architecture for an active vision and reaching system

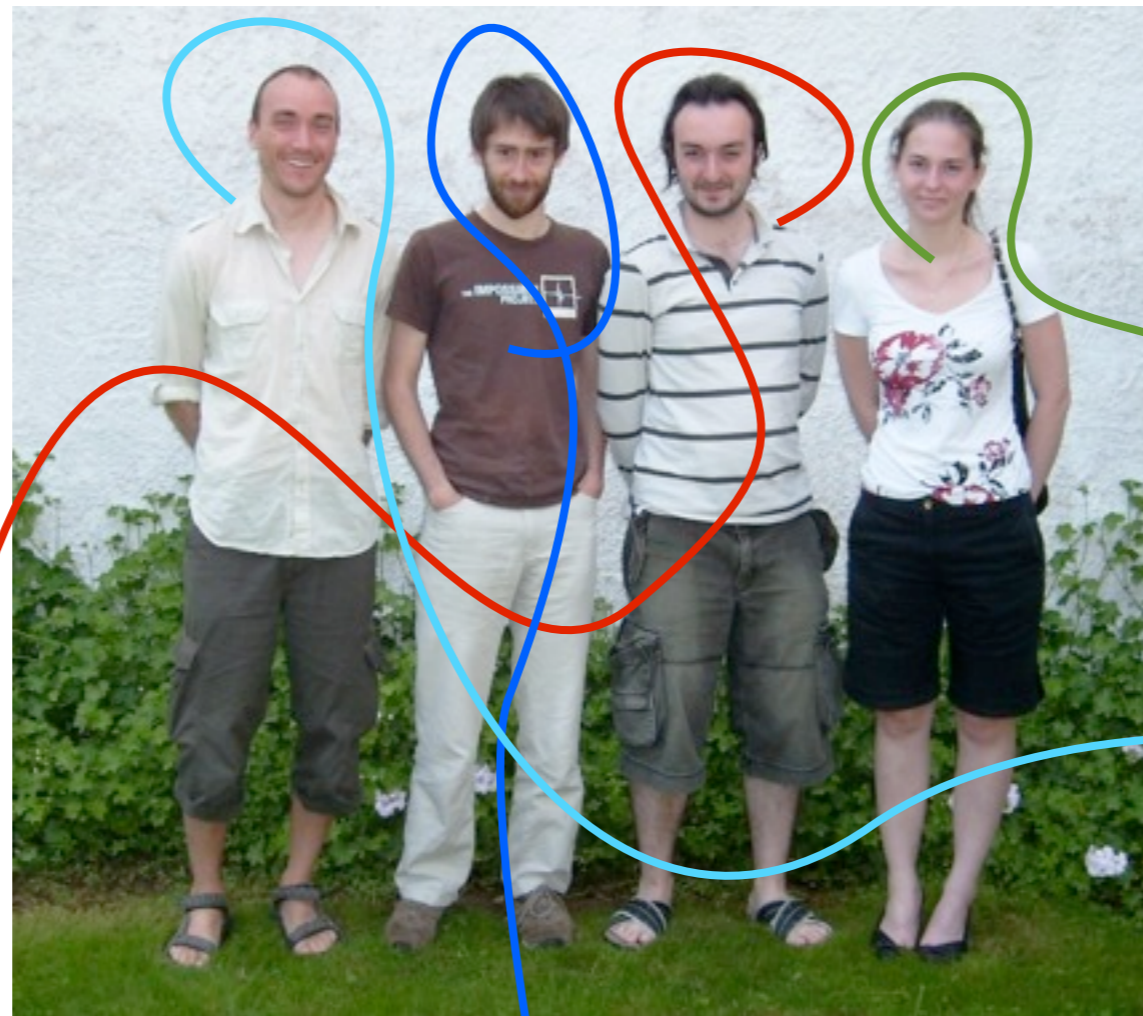
Curiosity-driven exploration of sensorimotor mappings



Cem Karaoguz, Damien Drix, Ekaterina Potapova,
Martin Huelse

A cognitive robotic architecture for an active vision and reaching system

Curiosity-driven exploration of sensorimotor mappings



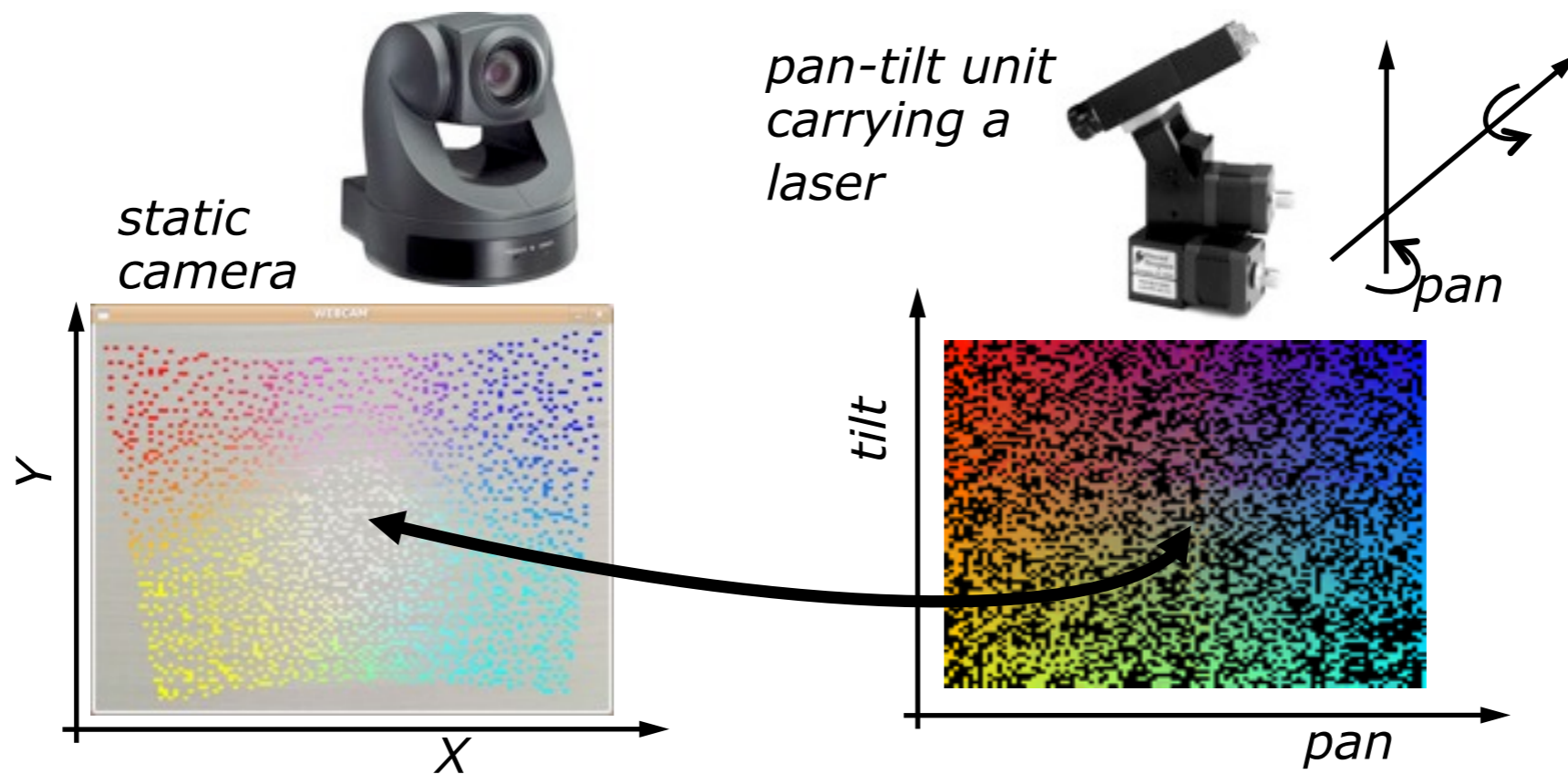
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Hypothesis:

A **curiosity-driven** exploration of the sensorimotor space results in faster adaptation to change than existing methods:

- uniform sampling
- gap method (uniform sampling with a minimum distance)

Existing hardware setup



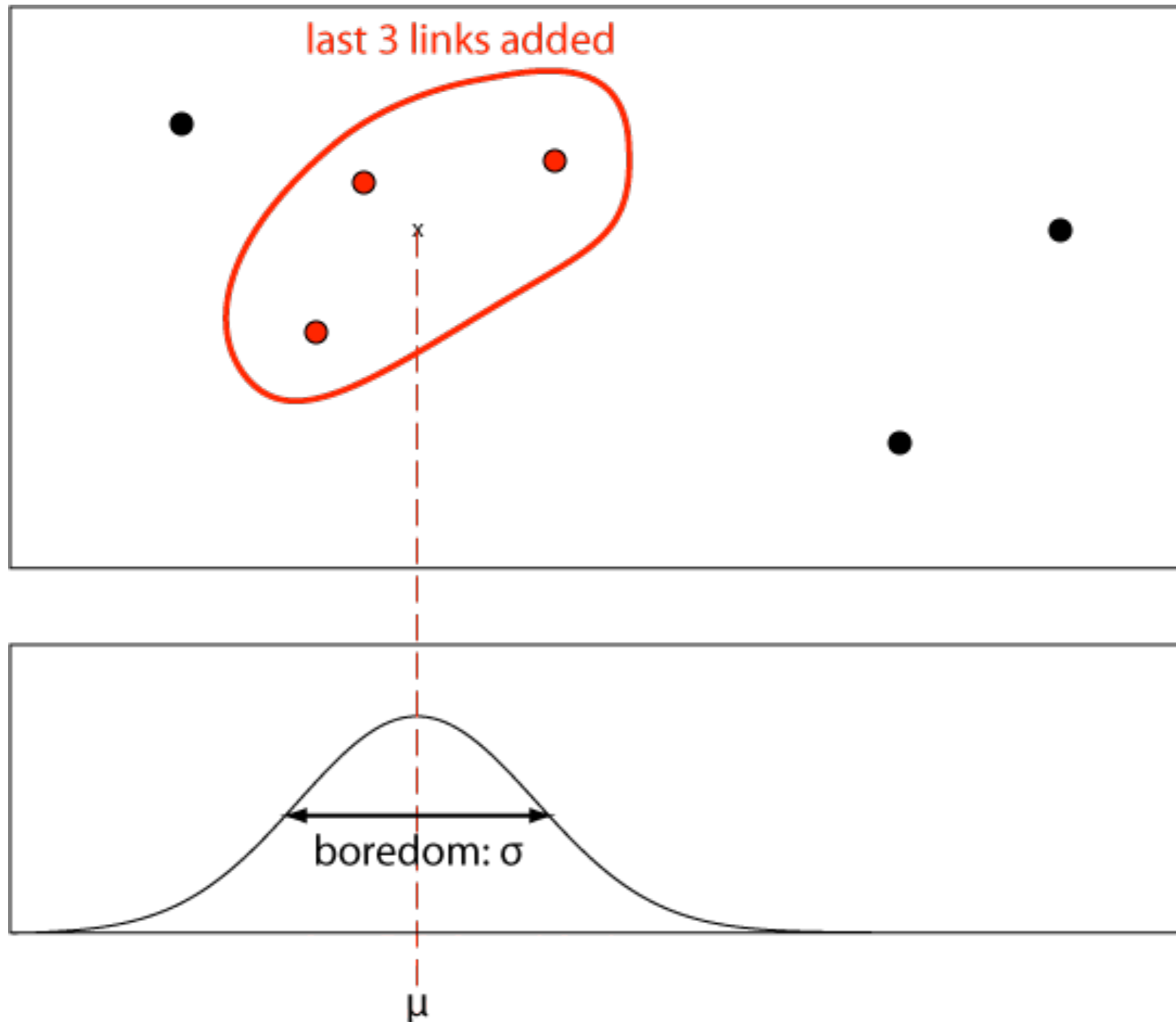
Task: Reach (point) where you look, look where you reach

Intrinsic motivation

Basic idea: focus on actions which bring improvement to the model.

- In practical implementations, can be done by keeping track of how fast the model is improving in each region of the space (ex. Kaplan and Oudeyer, 2007)
- In our case, the online estimation of the current error is too noisy to give a useful progress metric

Intrinsic motivation



Simulation

Robotic experiment



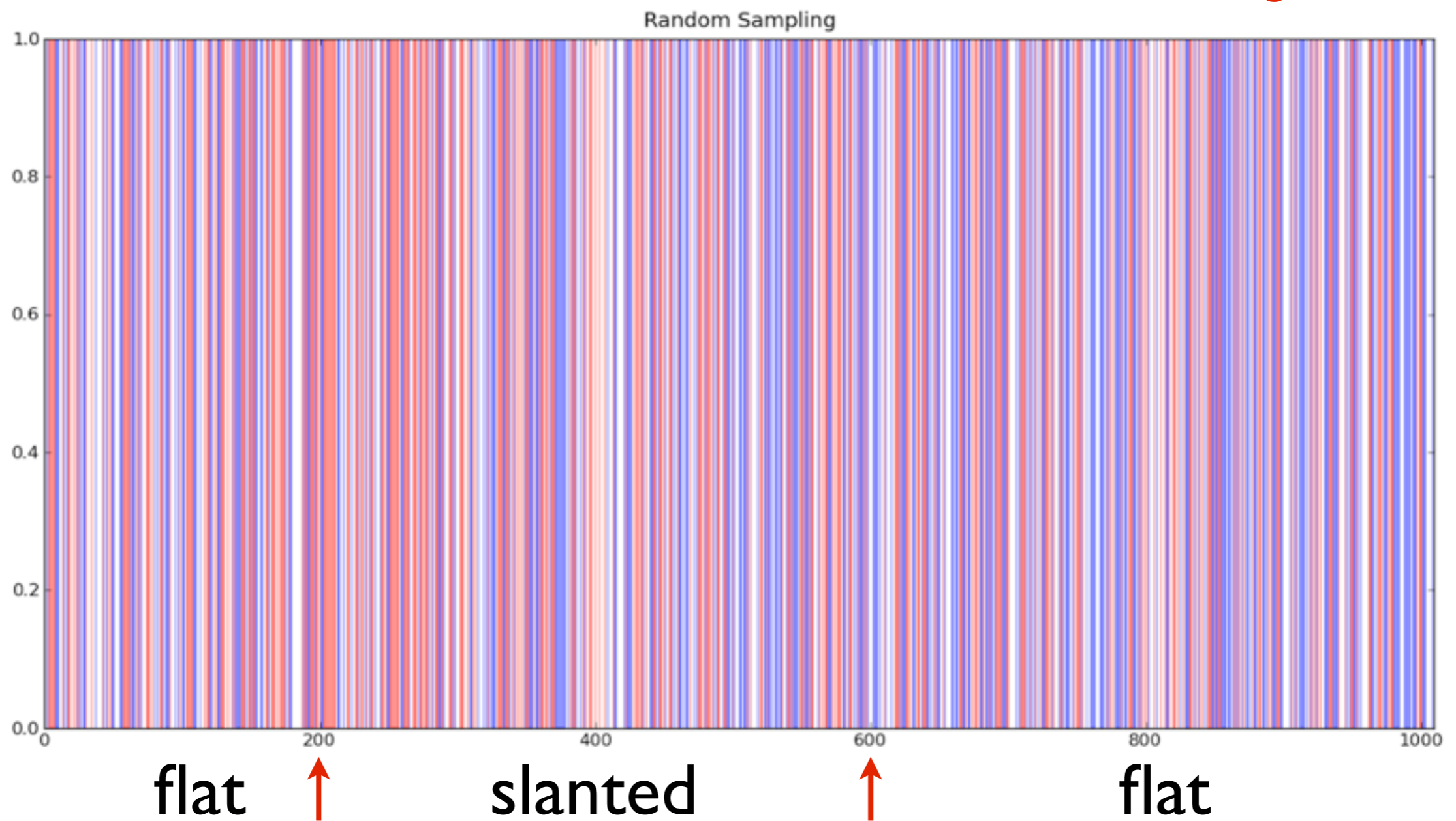
flat screen



right side slanted

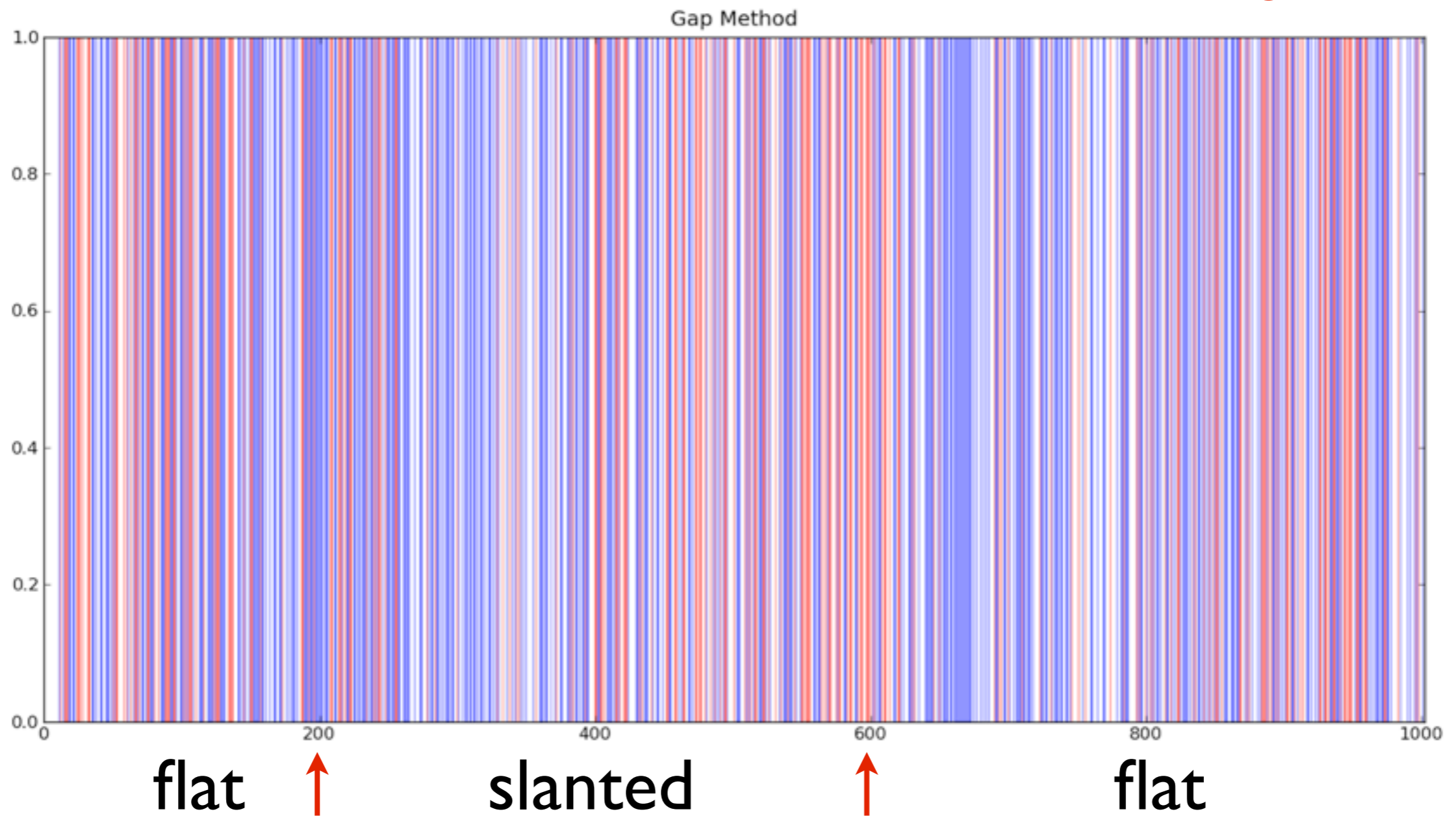
Robotic experiment: results

left side
right side



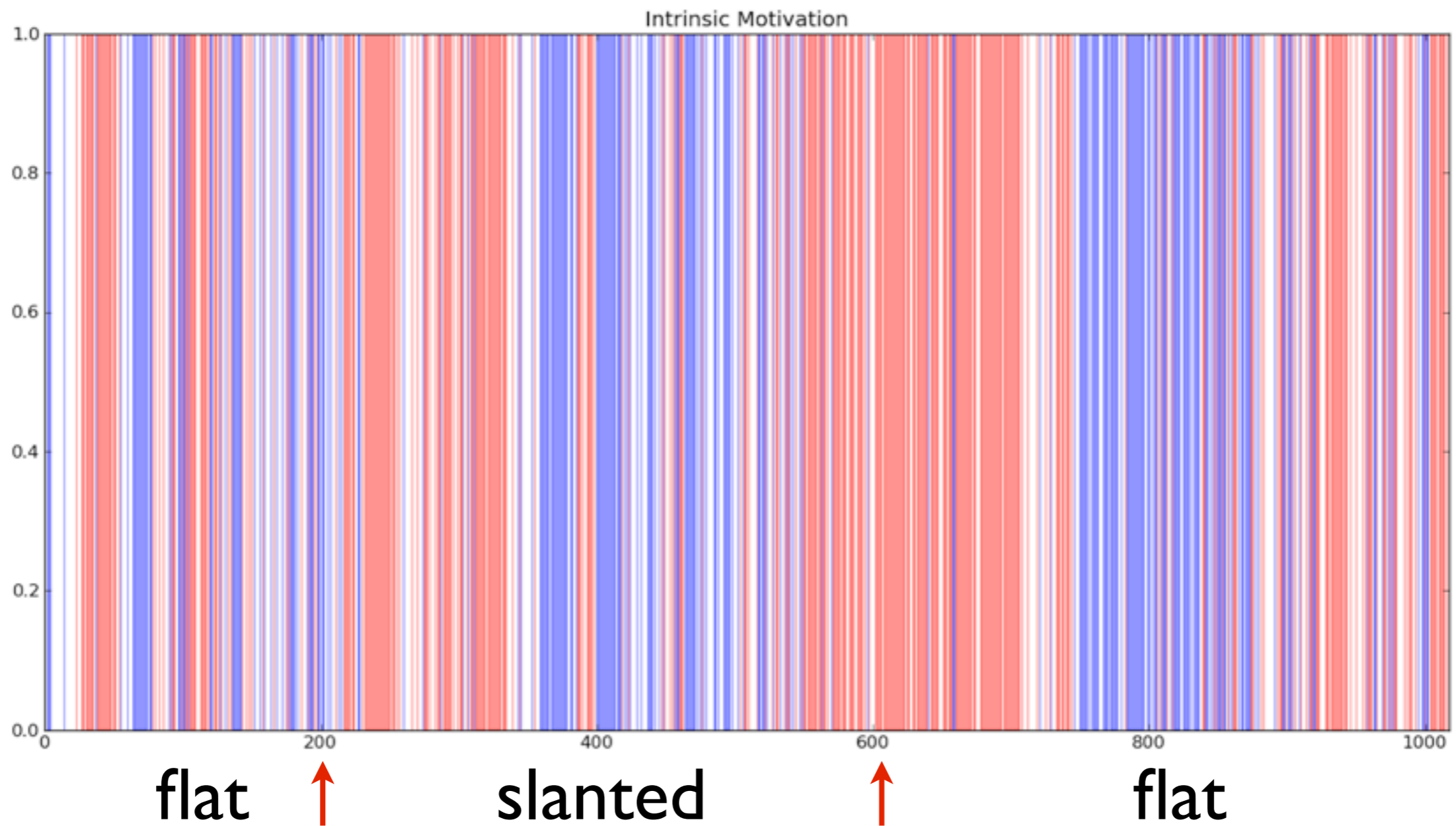
Robotic experiment: results

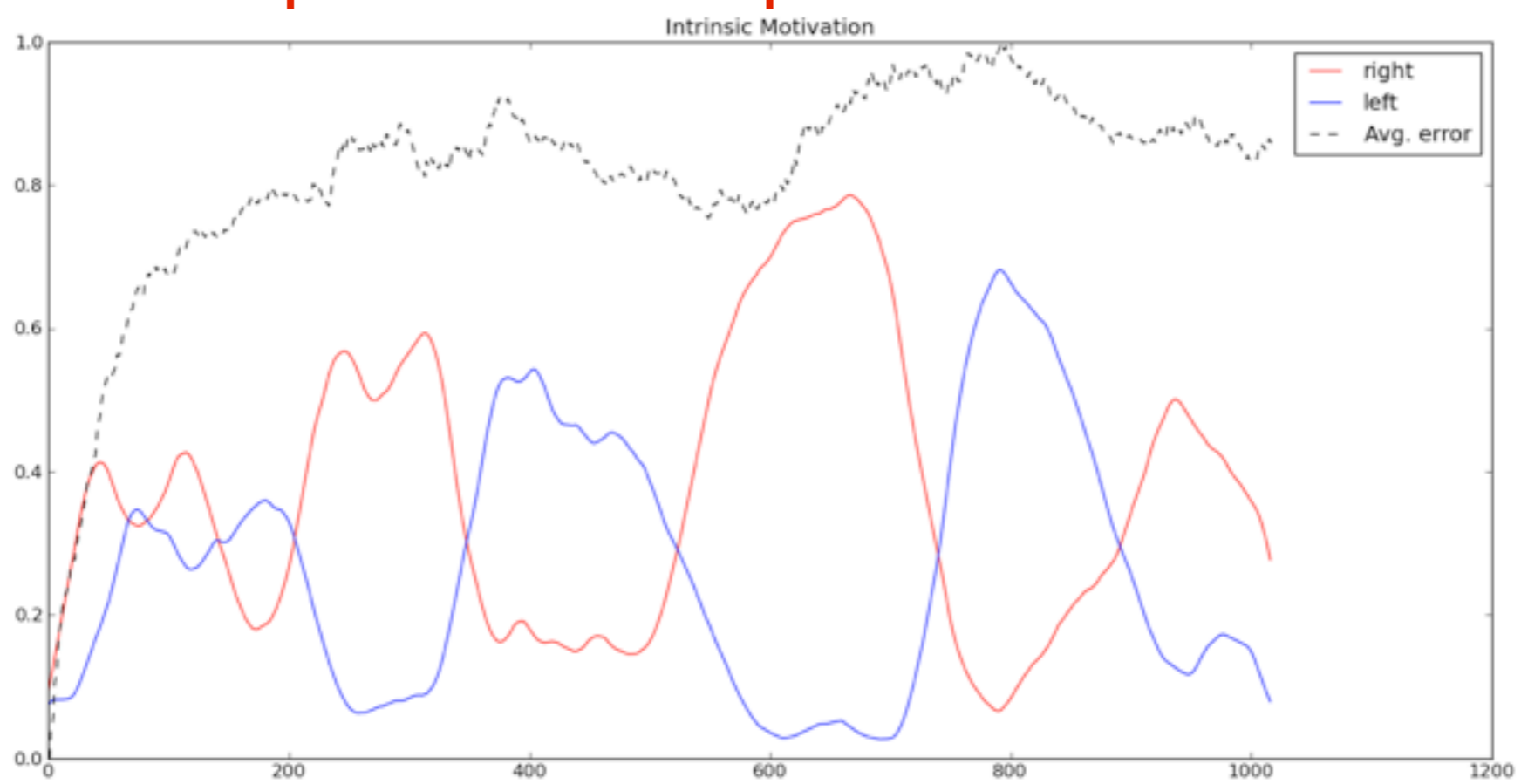
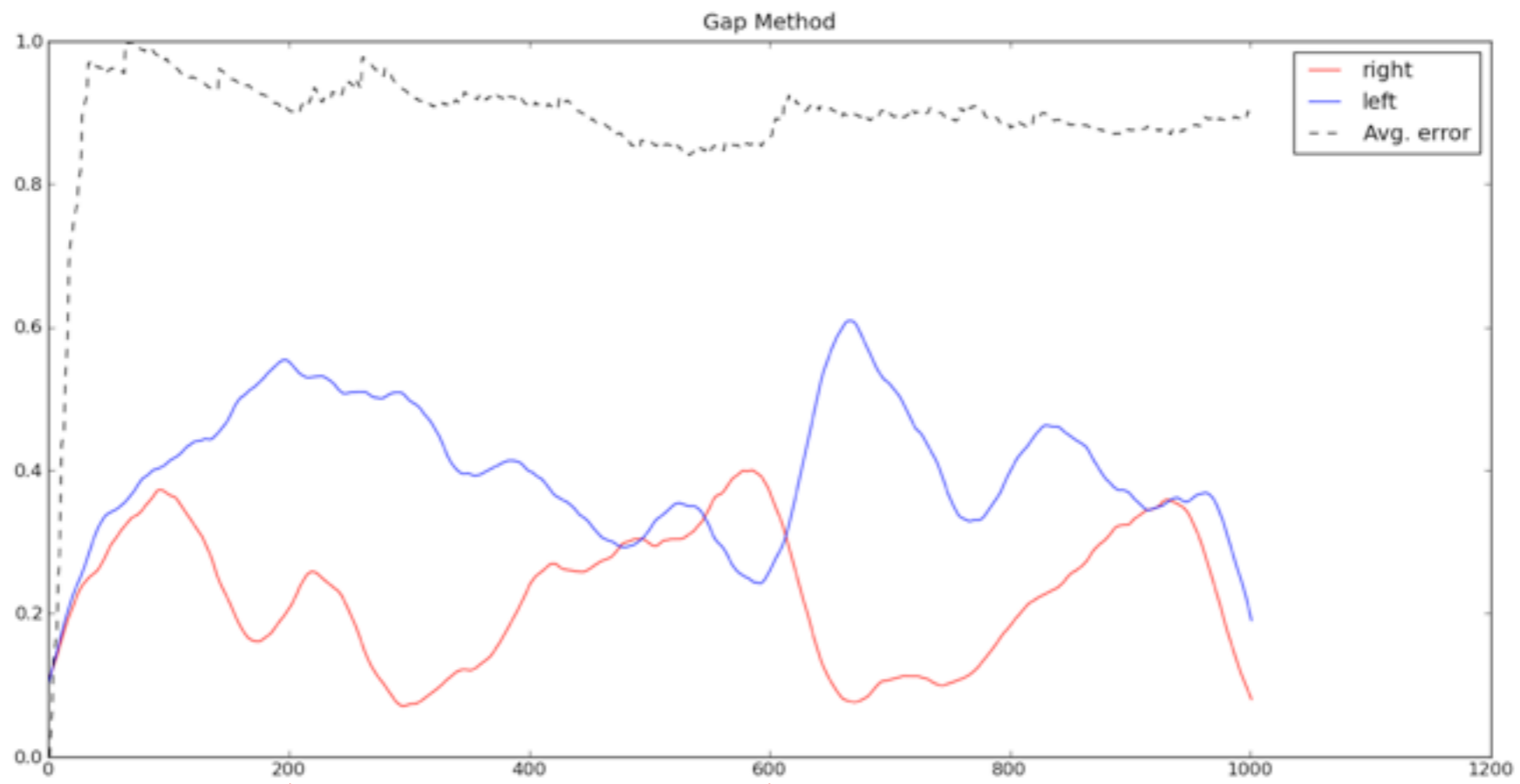
left side
right side



Robotic experiment: results

left side
right side





Conclusions: it works!

- The proposed method fits the intrinsic motivation paradigm
- It results in significantly different exploration patterns
- More data is needed to conclude on adaptation performance

Source code available upon intrinsically motivated request