

# In-cage monitoring of individual movement patterns and space use in laboratory housed macaques

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## Overview:

Animals show consistent individual differences in their movement and behaviour. These are correlated to physiological measures and are useful to identify ethological needs [1, 2]. Consequently, identifying these differences can be beneficial in the efforts of improving animal welfare [3]. Laboratory housed primates show individually distinct patterns of movement and space use, however, methods to identify individual differences and needs are still deficient, labour intensive or invasive [4-6]. We present a simple and cost-effective design for a custom-made enclosure camera, as well as an automated pipeline based on Yolact to predict location of pair-housed rhesus macaques [7].

## Results:

1

	AP <sub>mean</sub>	AP <sub>50</sub>	AP <sub>75</sub>	AP - average precision
box	36.41	63.90	37.37	AP <sub>50</sub> - AP at IoU threshold .5
mask	36.80	62.80	38.62	AP <sub>75</sub> - AP at IoU threshold .75

2

	M1 Body	M1 Head	M2 Body	M2 Head	M2 Headpiece	mean
AP	53.2	65.9	57.9	66.6	56.8	60.0

3

	Accuracy
Logistic Regression	0.832
Support Vector Machine	0.848
Random Forest Classifier	0.856
Multilayer perceptron	0.868

## Application:

We want to show that this method is capable of capturing individual differences and can identify average behavioural expression and individual behavioural variability [8]. This automated process could therefore enable us to detect diverging patterns of behaviour in laboratory housed Rhesus Macaques. We aim to apply this method to capture data that can help us to investigate individual differences and potentially automate personality measures. Estimates of activity or boldness traits can be drawn from movement and location data [1]. We propose this method to be a cheap complement for current welfare measures and a step toward individualised welfare approaches in laboratory housed animals.

## Cam-Specs:

- Based on Raspberry Pi
- Arducam Synchronized Camera HAT
- IMX219-D160 Wide Angle lenses
- PiJuice HAT
- ~35 fps - 1648<sub>(2)</sub> x 1232 pixels
- ~30h Battery life (2 \* 50'000 mAh Batteries)

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