Automated roadside video surveys for detection and monitoring of damage to coconut palms by coconut rhinoceros beetle, *Oryctes rhinoceros* 

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## Abstract

Coming soon!

# Author summary

Coming soon (if necessary)

Introduction

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## Materials and methods

#### Data acquisition: recording roadside videos using a smart phone

Roadside videos were recorded using a smart phone (Samsung Galaxy S10) attached the exterior of a vehicle using a magnetic mount (Fig 1). Videos were recorded using the free OpenCamera app (url) and location was recorded using the free GPSlogger app (url). Details for mounting the smart phone and setting app parameters are available in S1.

#### Digital image analysis: detecting CRB damage in video frames

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Object detector development

Data analysis workflow

### Visualization: mapping CRB damage

An interactive web map for each survey is generated using QGIS version 3.14 using the qgis2web plugin. QGIS reads survey data directly from a SpatiaLite database. The database and a Python script for generating maps are available in a public repository, https://github.com/aubreymoore/Guam-CRB-damage-map. The most current web map is publicly available on an HTML page stored in this repository, https://aubreymoore.github.io/Guam-CRB-damage-map/.

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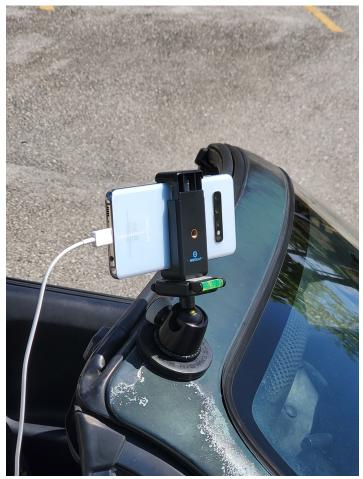


Fig 1. Smart phone attached to a vehicle with a magnetic mount.

Results

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1. react

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- 2. diffuse free particles
- 3. increment time by dt and go to 1

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Discussion

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Conclusion

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# Supporting information

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# Acknowledgments

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### References

- 1. Conant GC, Wolfe KH. Turning a hobby into a job: how duplicated genes find new functions. Nat Rev Genet. 2008 Dec;9(12):938–950.
- 2. Ohno S. Evolution by gene duplication. London: George Alien & Unwin Ltd. Berlin, Heidelberg and New York: Springer-Verlag.; 1970.
- 3. Magwire MM, Bayer F, Webster CL, Cao C, Jiggins FM. Successive increases in the resistance of Drosophila to viral infection through a transposon insertion followed by a Duplication. PLoS Genet. 2011 Oct;7(10):e1002337.

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