



BEES' ACTIVITY THROUGH THE LENS: A NEW MONITORING TOOL

Gaia Di Francescantonio¹, Marco Radocchia², Chiara Benedetta Boni¹, Francesca Coppola¹, Antonio Felicioli¹

¹ Department of Veterinary Sciences, University of Pisa, Viale delle Piagge, 2 56126 Pisa (PI), Italy

² Department of Physical and Chemical Sciences, University of L'Aquila, Via Vetoio, 42, 67100 Coppito (AQ), Italy

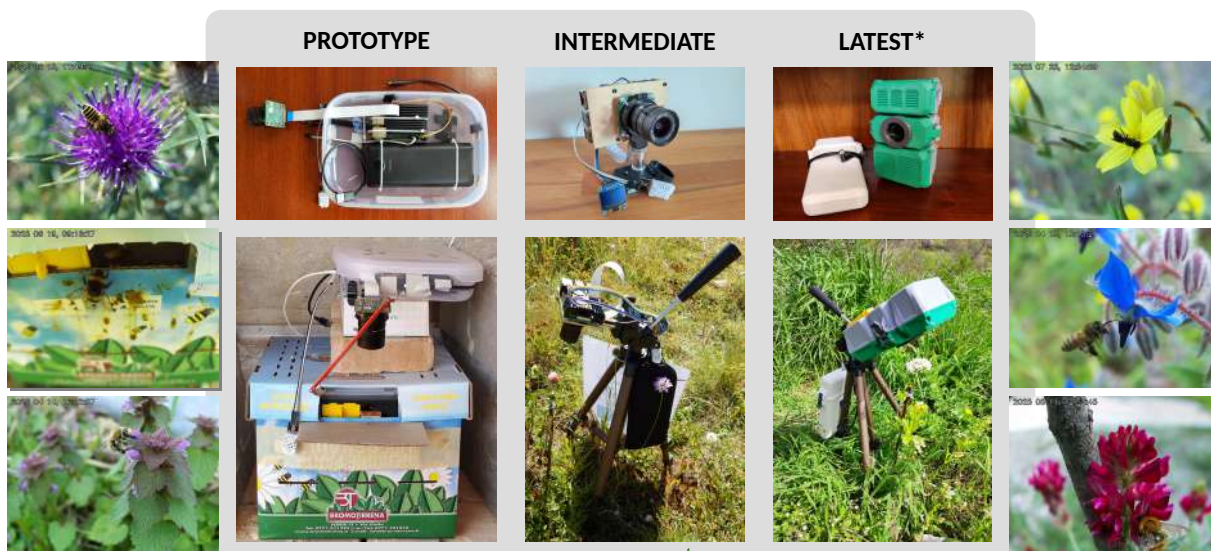
INTRODUCTION

The worldwide decline of bees' populations, the overall lack of data concerning many species, and the intrinsic downsides of classic monitoring techniques (e.g. time-consuming, indiscriminately lethal) call for an intensification of monitoring efforts and novel solutions.

We present a new, portable device running an *ad hoc* software that allows to capture pollinators' activity in different contexts, only detecting instances of movement, so that video processing time, storage and battery are saved.

MATERIALS & METHODS

The tool has been tested to monitor bees' activity on flowers, and its efficacy has been determined in terms of Precision and Negative Predictive Value (NPV). Assessed aspects also include monitored time cut by the software and number of records obtained (against number of records from transects).

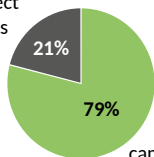


RESULTS

PERFORMANCE NO false negatives, precision = 0.19

NUMBER OF RECORDS

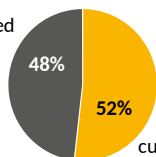
transect
walks



camera
traps

MONITORED TIME

recorded



cut

CONCLUSIONS

The proposed tool was proved to be useful in aiding in bee monitoring, providing a huge amount of additional data and significantly cutting down such data's processing time.

Given its versatility, the device could easily be repurposed to aid in honeybees' management.



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4. Bjerger, K., Mann, H. M., Høye, T. T. Real-time insect tracking and monitoring with computer vision and deep learning. Remote Sensing in Ecology and Conservation, 2021.
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* Latest case design by Davide Palusci (INTAEL S.N.C., Pescara (PE), Italy).

Gaia Di Francescantonio¹, Marco Radocchia², Chiara Benedetta Boni¹, Francesca Coppola¹, Antonio Felicioli¹

¹Department of Veterinary Sciences, University of Pisa, Pisa, Italy

²Department of Physical and Chemical Sciences, University of L'Aquila, L'Aquila, Italy

Bees are currently facing several man-made threats that endanger their populations worldwide (e.g. climate and land use change) [1, 2]. This, along with an overall lack of data concerning many species, calls for an intensification of monitoring efforts. Intrinsic downsides of classic techniques (e.g. time-consuming transects, indiscriminately lethal pan-traps) prompt researchers to find alternatives such as video monitoring [3, 4, 5]. Here, we present a new portable device running an ad hoc software [6] that allows to capture pollinators' activity in different contexts (e.g. foraging, at nest entrance), only detecting instances of movement, so that video elaboration time, storage and battery are saved. The tool has been tested to monitor bees' activity on flowers in high mountain sites, and its efficacy has been determined in terms of Precision and Negative Predictive Value (NPV). Assessed aspects also include monitored time cut by the software and number of records obtained (against that of transect records). The device ran for a total of 257 hours and automatically cut more than 50% of monitored time. Records obtained via the recordings account for 79% of all those collected during samplings and, despite the low Precision obtained (0.185), no false negatives occurred (NPV = 1). The proposed tool was proved to be useful in aiding in bee monitoring and, given its versatility, it could be easily repurposed to aid in honeybees' management.

1. Quaranta, M., Cornalba, M., Biella, P., Comba, M., Battistoni, A., Rondinini, C., Teofili, C. Red List of the Italian Threatened Bees. 2018.
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