

TINYML POSSIBILITIES FOR THE IMPLEMENTATION OF MÁJĚKÉYÉ-BÀ: A PEST PREVENTION UNMANNED AERIAL VEHICLE

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Introduction

Food security is a major concern among a growing world population. Thus the use of technology to solving persistent problems in food production is becoming increasingly popular. Robotic system design with computer vision capability has gained recognition in agriculture application [1-3]. The above had created the motivation for using unmanned aerial vehicle (UAV) with the configuration of observation, detection, tracking and action loop framework to prevent pest invasion on farmland.

TinyML is a field of study in Machine Learning and Embedded Systems that explores the types of models you can run on small, low-powered devices like microcontrollers.

Motivation

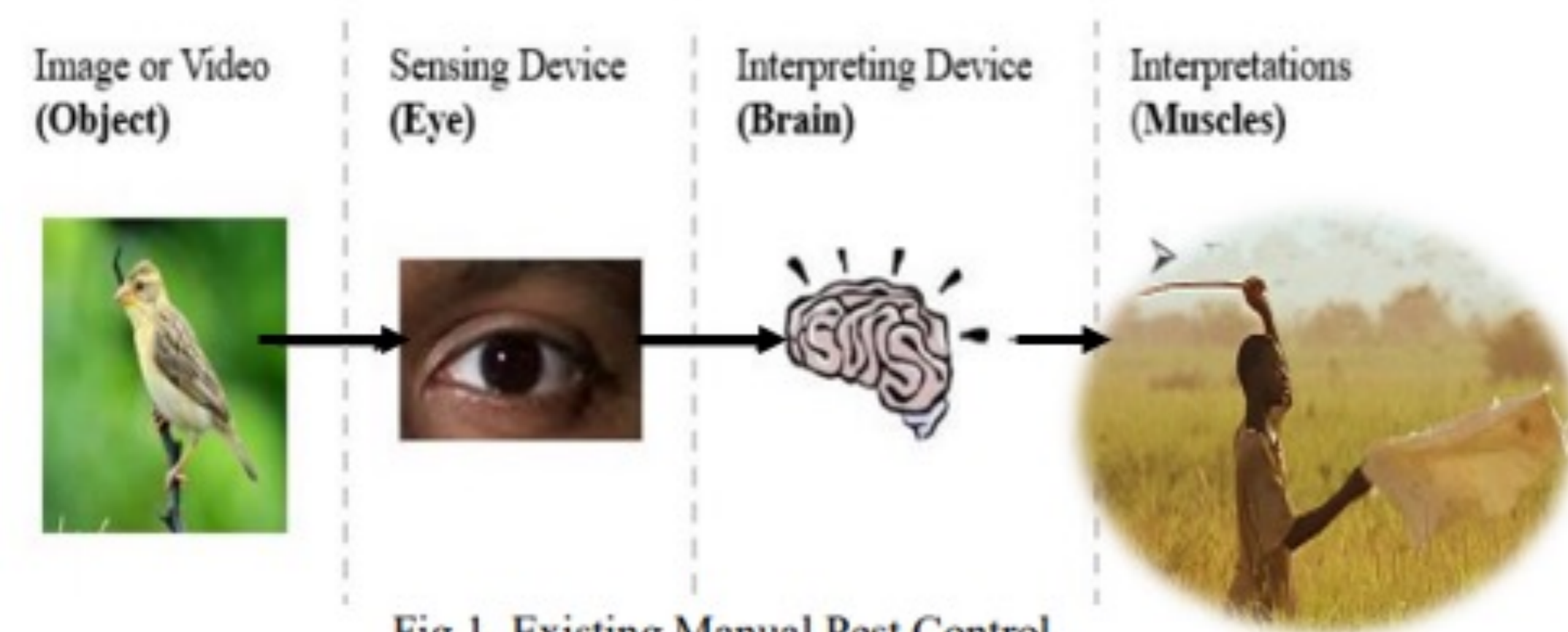


Fig 1. Existing Manual Pest Control.

Conceptual Framework

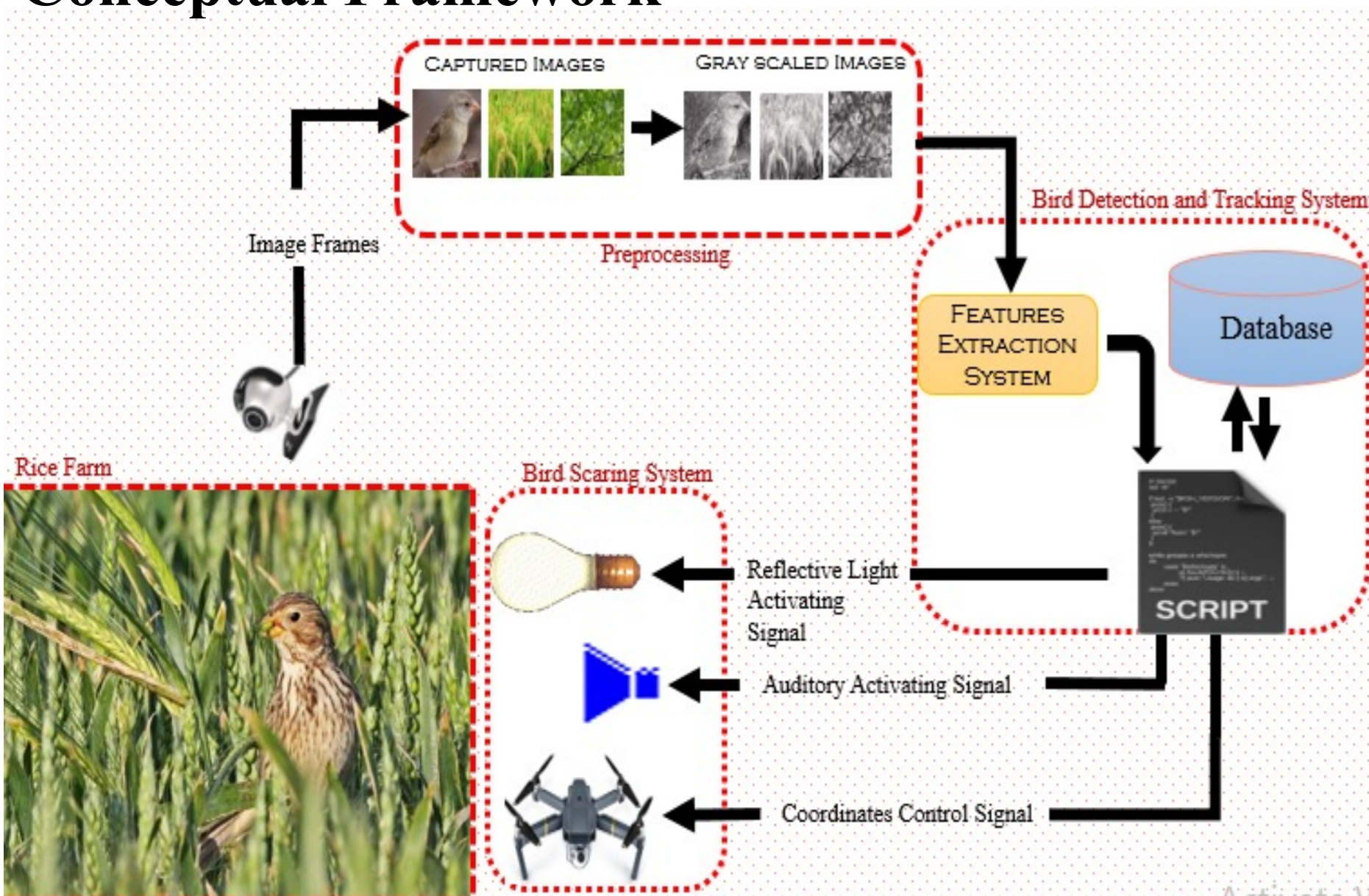


Figure 2. Conceptual Framework Design

Experimental Design

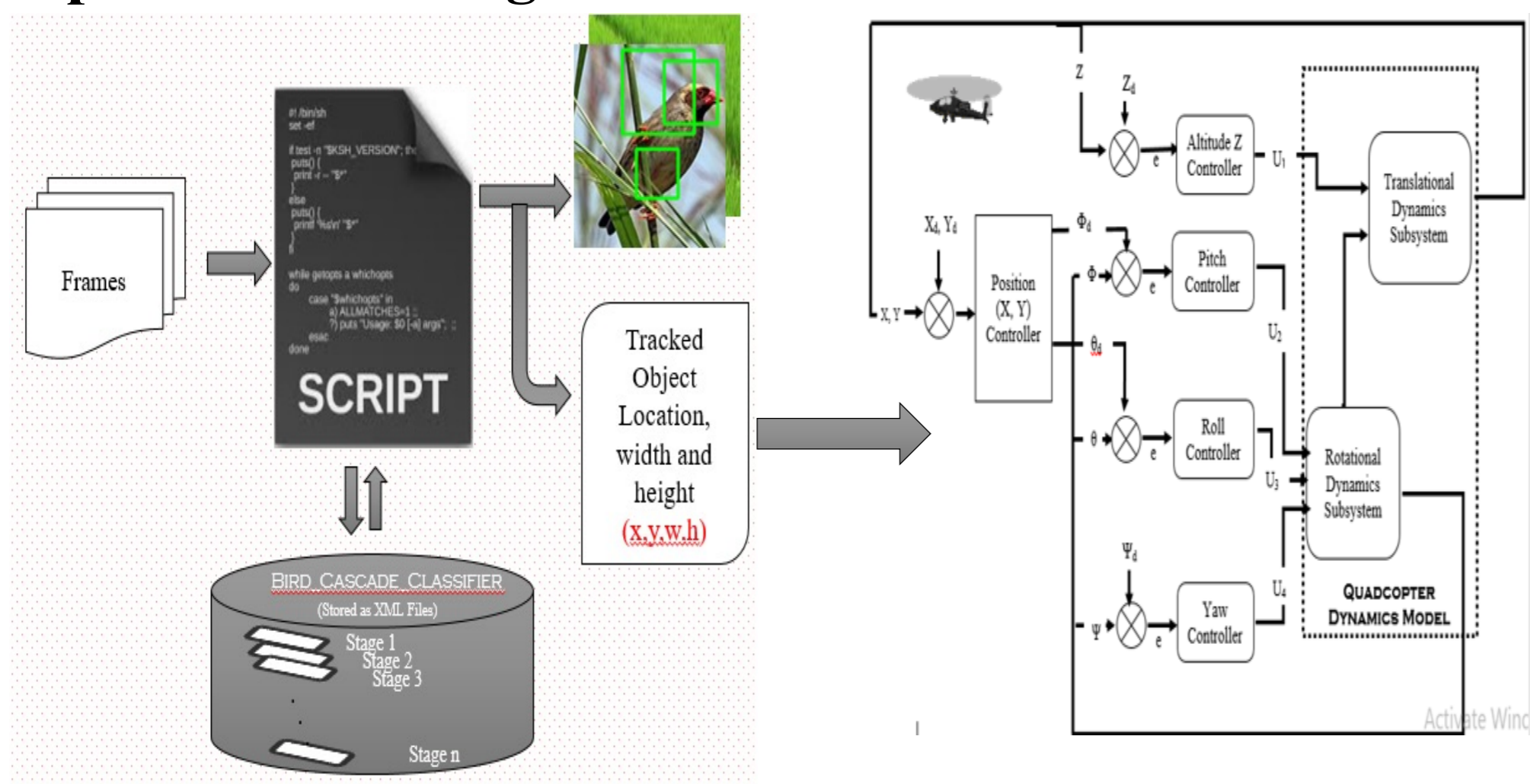


Figure 3. UAV Control Algorithm using computer vision

References

1. Tian, H., Wang, T., Liu, Y., Qiao, X., & Li, Y. (2020). Computer vision technology in agricultural automation—A review. *Information Processing in Agriculture*, 7(1), 1-19.
2. Choi, H., Geeves, M., Alsalam, B., & Gonzalez, F. (2016, March). Open source computer-vision based guidance system for UAVs on-board decision making. In *2016 IEEE aerospace conference* (pp. 1-5). IEEE.
3. Ouhami, M., Hafiane, A., Es-Saady, Y., El Hajji, M., & Canals, R. (2021). Computer Vision, IoT and Data Fusion for Crop Disease Detection Using Machine Learning: A Survey and Ongoing Research. *Remote Sensing*, 13(13), 2486.

Results



Figure 4. Image dataset for training algorithm

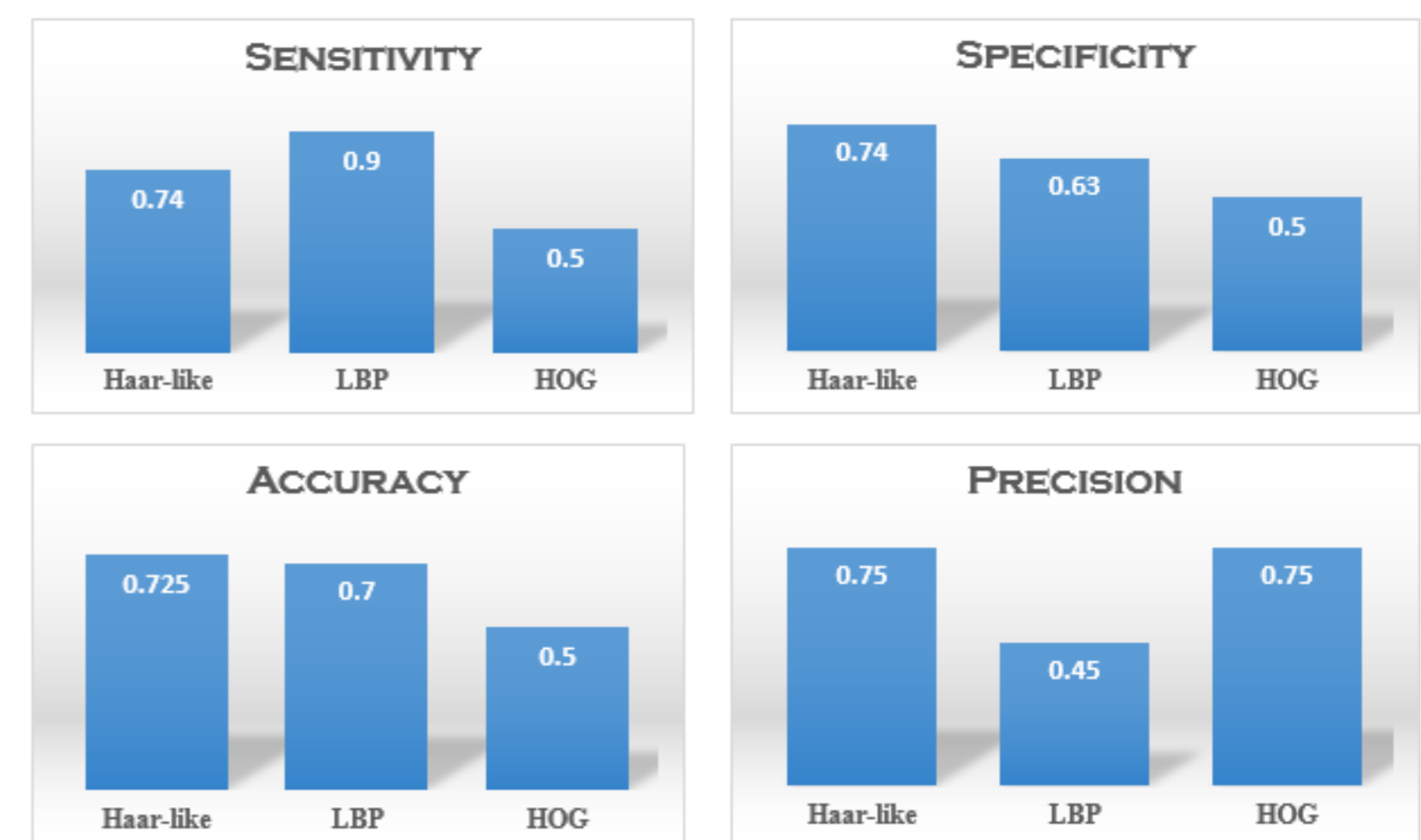


Figure 5. Performance Evaluation of the trained algorithm

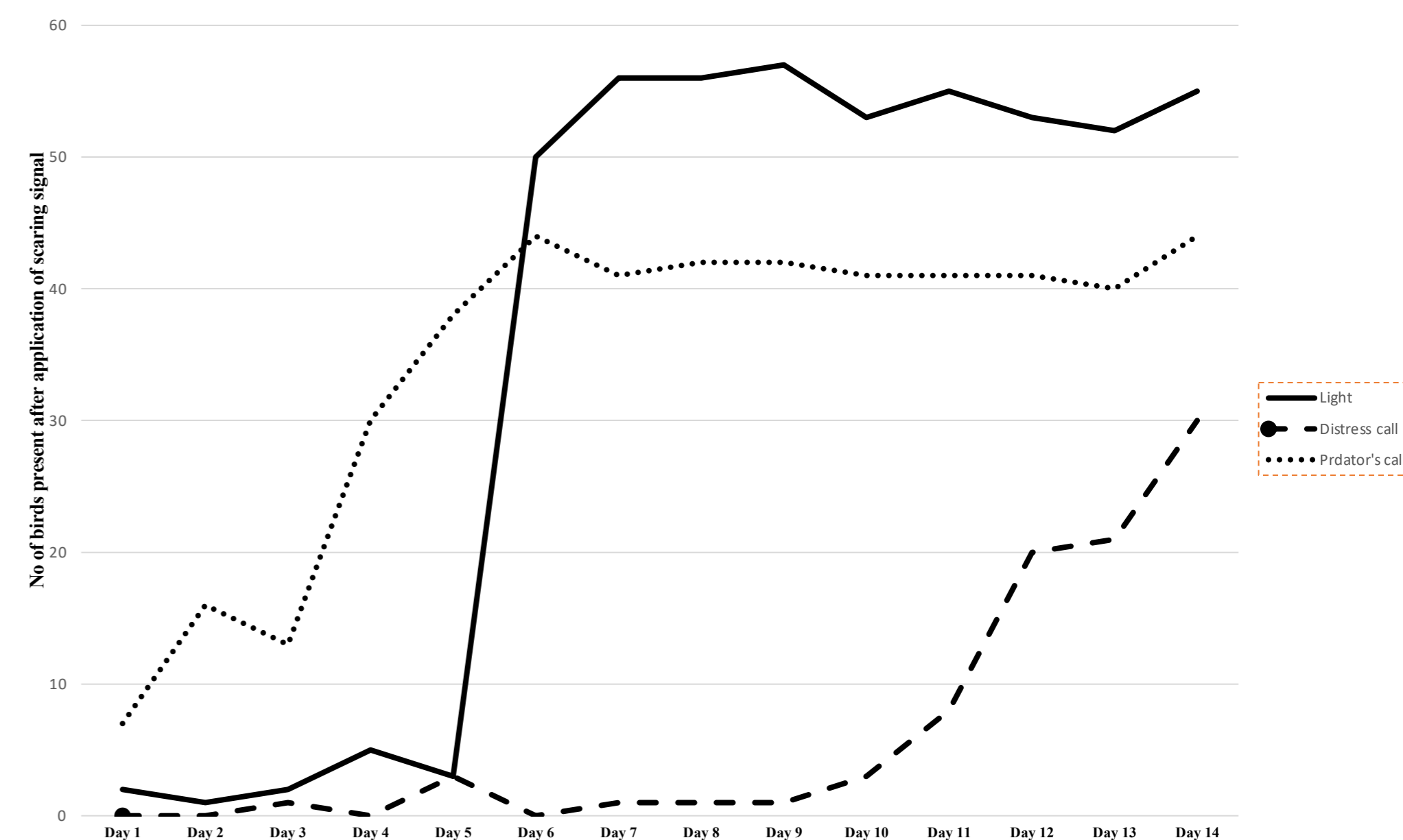


Figure 6. Effect of Bird Scaring Signals on Quelea Birds

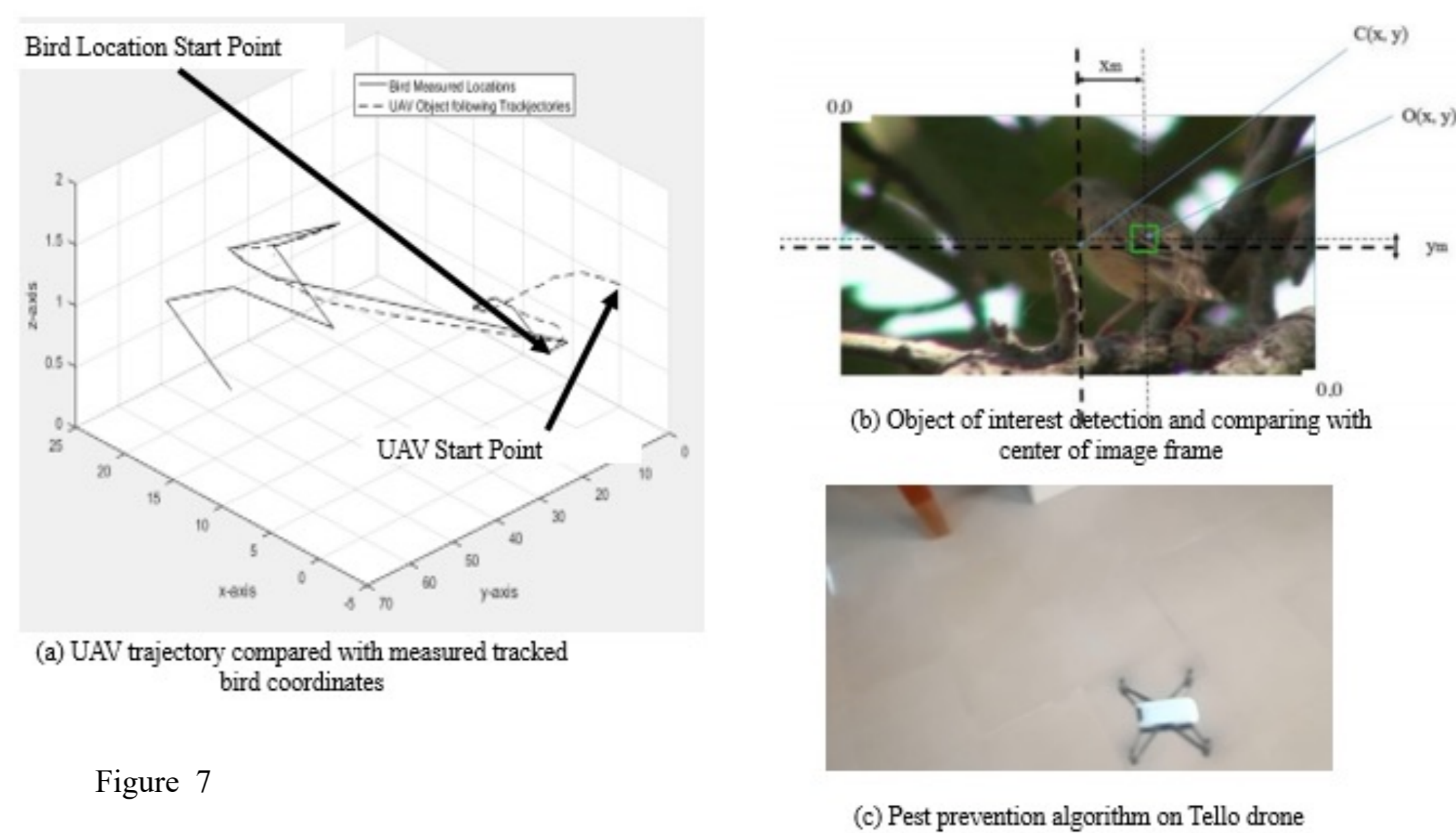


Figure 7

Conclusion

Pests are resilient and can attack farm at any time making it impossible for farmers to monitor or distract pests from destroying farmlands. Thus, a pest prevention system was developed to combat this menace and ensure an improved agriculture productivity for the sustenance of food security among nations.