

AI-Powered smart door: Revolutionizing animal health management for wild species

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⁴FAASNATURE & 4FAUNA – A smart approach to wildlife conservation. Lisboa, Portugal.

Objectives: Wild leporidae (wild rabbits and Iberian hares) are listed in Portugal's Red Book of Mammals, as their decline is linked to the decline of the Iberian lynx and the Iberian imperial eagle, among other species, leading to ecosystem imbalances. The aim of this project was to develop a smart door that counts animals and closes when a predetermined number is reached, facilitating captive management.

Material and methods: Artificial intelligence programming was implemented in Python using Arduino and OpenMV IDE software. Animal observation and counting was performed using a NiclaVision camera, and various electronic components were tested to convert these readings into the activation of a mechanical door using different hardware and magnetic locks.

Results: The final prototype accurately counted leporid entries and exits with an estimated error of 2% for entries and 5% for exits at maximum animal movement speeds of up to 47km/h. The door closed within 0.5 s of reaching the desired number of animals, with no adverse effects on animal behaviour. Subsequent use of the doors showed that the same animals passed through the same door for the next two captures, allowing multiple consecutive captures.

Conclusion: The integration of technology and artificial intelligence has enabled the development of innovative equipment that significantly improves the management of wild species and facilitates group management, including the capture of an exact number of animals for sanitary procedures such as vaccination, deworming or clinical observation.

Keywords: Wild rabbit, Artificial intelligence, Technologic solutions.