

PHOENIX ZOO FIGHTING BACK AGAINST POACHERS

Deploys Gunshot Detection System in Costa Rica Preserve to Protect Rare Jaguars

Disclaimer: For visioning purposes only, document may not reflect current state of project

(Phoenix, AZ - March 15, 2022) The Phoenix Zoo led a delegation to the La Amistad International Park in Costa Rica this week to deploy a gun-shot detection sensor network across the park to help game wardens identify and prevent animal poaching. The preserve is home to the endangered jaguars that are prized on the market. Given the size of the park it is impossible for the wardens to cover every area. The new system gives the wardens a tool to understand in real time where hunters are active so the preserve can better deploy resources to catch poachers in the act and protect the jaguars.

The La Amistad-Pacific Park in Costa Rica covers 2,000 square kilometers of dense jungle and rainforest. The preserve was established in 1983 to be a safe home for the native wildlife of Costa Rica, including the jaguar which is listed as an endangered species. The park has limited roads which makes it hard for the game wardens to patrol by vehicle. The poachers know where the most isolated parts of the park are and are able to camp and hunt there without being detected. Jaguars are native to areas from Mexico to Argentina, but are most threatened in Costa Rica.

To help out the game wardens and protect the jaguars and other species, the Phoenix Zoo developed a gunshot detection system that is low cost, easy to deploy and maintain in the park where there is limited access to power and communications. The Zoo system uses low power, battery operated sensors that last for two years. The sensors are connected to a LoRa (long range) communications network through gateways back to the ranger station. The game wardens receive an SMS alert on their phones within seconds of a gun-shot being fired with the specific GPS location.

“We simply did not have the ability to prevent poaching before the Phoenix Zoo deployed the shot detection system. These sensors make the park much easier to navigate and give our wardens the information they need to find and catch poachers,” said the Director of La Amistad International Park. “Now when a gun is fired on the preserve, the system alerts our wardens and tells them exactly where so they can plan the best response to capture the poachers.”

The deployment is very easy, the preserve installed IoT gateways in the main warden stations and then connected them together to form a mesh network covering the preserve. The sensors are deployed in a grid, every half mile and connected to the network. The battery powered sensors use a microphone and an algorithm to identify the unique sound a gunshot makes and send an alert to the wardens with the time and exact location of the gunshot. The wardens get the alerts on their phones in real time wherever they are in the preserve and are able to respond strategically. An asset management tool shows the health of the system and shows if any sensors have failed so they can be replaced.

“The jaguars were easy money for poachers. The poachers would hike into the remote parts of the preserve and poach without getting caught. It was really frustrating, but there wasn’t much we could do,” said Julie Jones, Game Warden. “With the new system we get an alert whenever a shot is fired and dispatch the teams to cover the roads and paths. We catch them in the act, recover the carcass, confiscate the weapons and arrest them. With no more easy money, the poachers are moving on to other things and fewer jaguars are being killed.”

For more information, please visit www.phoenixzoo.com/poaching.

Frequently Asked Questions (FAQ)

1. What are we building and why?

The Phoenix Zoo is building a low cost, open source gunshot detection system to reduce illegal animal poaching in Costa Rica. Gunshot detection will help game preserves cover more area with limited resources and prevent poaching from happening. This will protect endangered species from poaching.

2. How does gun-shot detection work?

Gun-shot detection acoustical sensors that are deployed on street poles, on buildings, bridges and other infrastructure. The sensors use a LoRa network to transmit signals to the Internet and to a software application used by officers. When a firearm is discharged, the sensors register the time and location of the activity which is then shared with officers.

3. What types of sensors does gun-shot detection use?

Gun-shot detection uses acoustical sensors that are deployed in the tree canopy. The sensors use a LoRa network to transmit signals to the Internet and to a software application used by officers.

4. What type of network does gunshot detection use?

The system can be deployed using different typologies from LTE to WiFi. The Zoo deployment uses a LoRa network.

5. How many sensors are required per square mile?

Every deployment is different due to housing density, built environment and geography, but the standard deployment is one sensor per quarter mile or sixteen per square mile. The sixteen sensors report back to one gateway.

6. Can the community access any system information?

The information is under a strict security policy and is not available to the public. However, the Zoo will publish a report on its use and effectiveness in order to provide transparency to the public. Ideally the system will be used to develop new community collaborations.

7. Where is the system data stored?

The data is stored in the cloud.

8. What data sets does the system use?

The system combines mapping and location data along with sensor data.

9. What products and services does the system use?

The system uses a Raspberry Pi, omni-directional microphone and communications node all packaged in a weather-proof box.