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Cover: Emperor Tamarin *Saguinus imperator*: a look into a better world through the mustache lens – mixed media illustration. © Maya Santhanakrishnan.

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NOTE

Design and field installation of automated electronic Asian Elephant signage for human safety

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The Human-elephant interactions have intensified exponentially over the years across tropical and subtropical countries of Asia and Africa. As human habitation is gradually overtaking the traditional elephant territories, the conflicts become more regular and extreme. The conflict not only causes financial turmoil in those remote areas, but it also causes fatal injuries and even deaths of both humans and elephants (Shaffer et al. 2019). When associated with India, the number of human deaths due to elephant attacks is significantly high and is a serious concern (Nath et al. 2009). One of the major reasons for such high numbers of human deaths is 'surprising human-elephant encounters' at remote elephant crossing points during night hours. Even though elephant corridor locations are mostly precise, it's difficult to identify them in the dark even for the locals. Whereas for outsiders, either in a vehicle or on foot, it's like moving through a deadly conflict zone without any hint of danger. Some of the crossing points are marked mostly with retroreflector signboards by the forest department and NGOs. Since they don't possess inherent luminescence, these objects remain invisible from a distance at night and require a specific angle of vehicle headlights to be illuminated (Karanth & Ranganathan 2018). Along with financial loss due to crop raids, such human death creates a terrifying and tense environment in those remote pocket areas which sometimes counter-fire by the killing of elephants through poison and electrocution (Panda et al. 2020). One of the possible solutions to neutralize the situation is to demark the elephant crossing points with electronic elephant signage (EES). The EES is an elephant-shaped light that glows during the night to warn vehicles and people about the specific location of the elephant crossing points and thus help them to take proactive measures to avoid any potential conflict. This innovative solution has the potential to significantly reduce human-elephant interactions, saving lives and preserving the delicate balance of our ecosystems.

The iterative co-designed Indigenous EES is pragmatic and aesthetic to be Indigenous-specific and relevant in this practical real-world application (Image 1) with a 12-in. x 12-in. x 2-in. (H x L x W) waterproof plastic enclosure with a LASER cut elephant shape as the front cover. This device is shown as a block diagram in Figure 1 and contains an integrated solar panel, battery, and electronic circuits. This has a darkness sensor that turns on the unit at night, where it flashes every second

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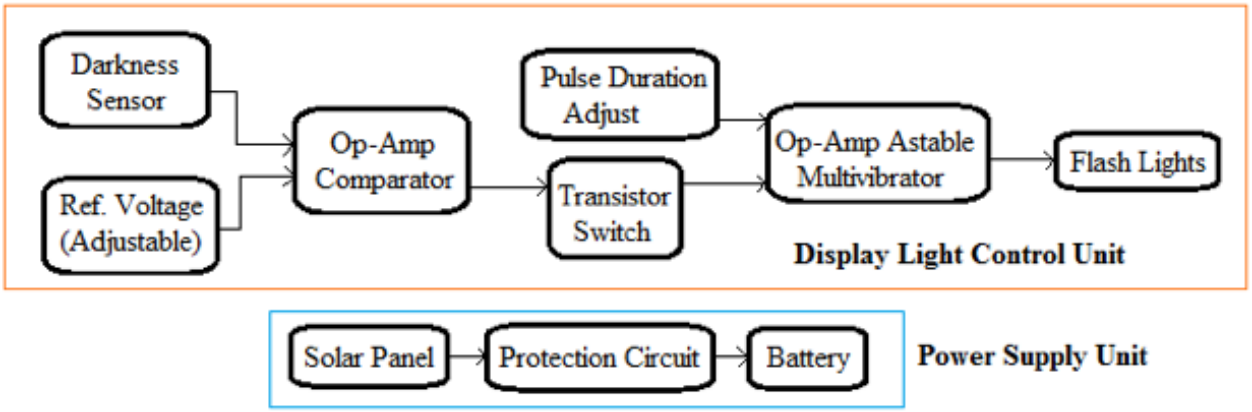

Figure 1. Circuit block diagram for electronic elephant signage.

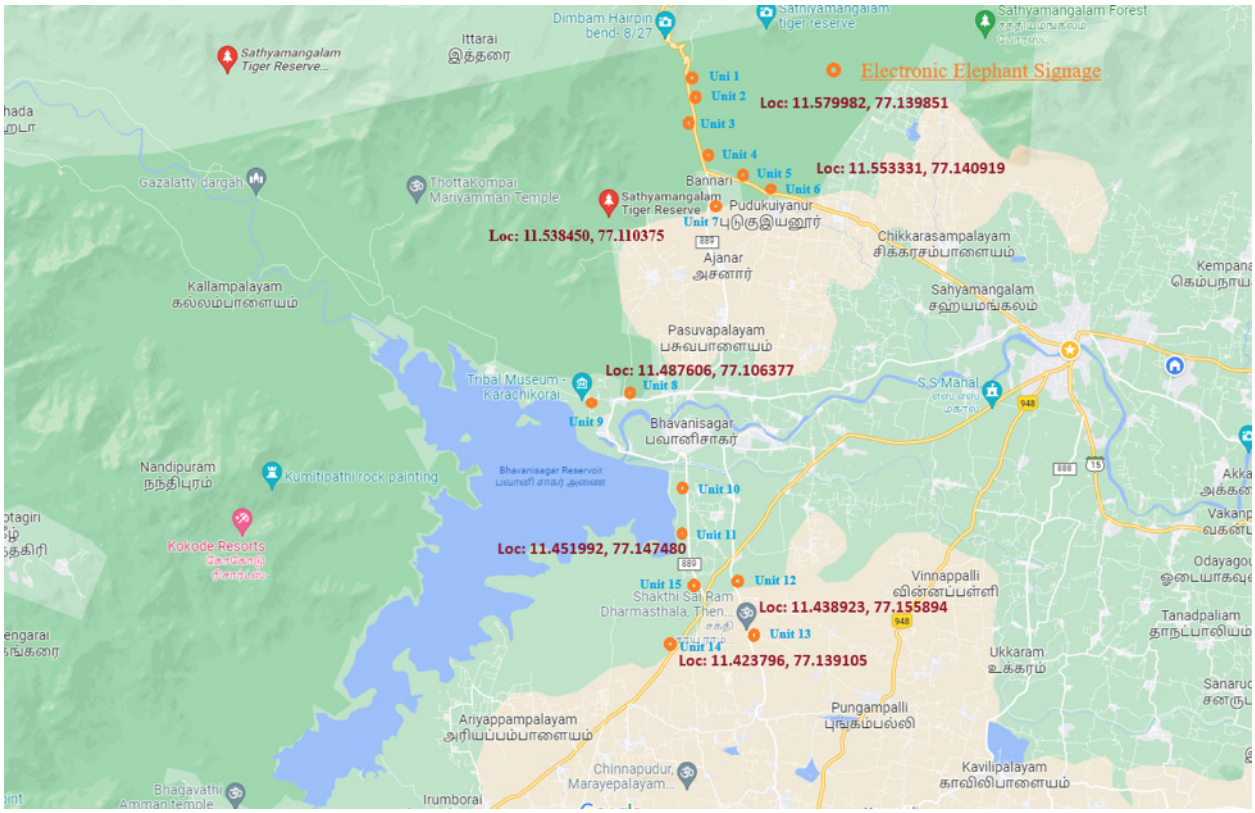

Figure 2. Locations of fifteen electronic elephant signage in the Sathyamangalam Tiger Reserve (STR) area.

until being turned off in the sunlight so that it can get people's attention from a far distance without running all day on battery. The 'reference voltage adjusting' potentiometer is to set the switching on-off time and the 'pulse duration adjustment' potentiometer is to adjust the on-off duration of the light. The signage has four sets of 0-watt red LED lights, each set containing four lights. A red glossy reflector sheet on the back boosts the light intensity.

A manual control switch is given for the user to make the signage 'on' or 'off'. The overall weight of the signage is 1.1 kg therefore it can be easily clamped over any pre-existing structures (pole, wall, and even on the tree wood) and thus extremely suitable for field installation. Even though it is relatively small, it's extremely bright and technically superior to any other existing comparative design. This innovative EES, designed and developed entirely in India, stands out for its affordability (Rs. 1,600

Image 1. Rooftop testing and trial run of EES for three days before taking to the field. © Sanjoy Deb.

Image 2. Glowing full elephant shape EES during the night at STR. © Sanjoy Deb.

Image 3. Glowing elephant head shape EES during the night at STR. © Sanjoy Deb.

Image 4. Installation of EES with support from the forest department at Velamundi, Bhavanisagar, and Sathy ranges of STR. A—Unit 2 Location 11.438163 N, 77.14556 E | B—Unit 7 Location 11.425191 N, 77.135714 E | C—Unit 8 Location 11.434828 N, 77.136601 E. © Sanjoy Deb.

INR/unit) and unique features. The built-in darkness sensor and control circuit automatically adjusts lighting based on ambient light, optimizing energy usage and reducing operating costs compared to passive non-self-glowing signage. Its user-configurable settings further enhance its adaptability and value.

The Sathyamangalam Tiger Reserve (STR), which is one of the prime human-elephant interphase hotspots on the Indian map, is selected for electronic elephant signage installation under the present project. The NH948 and the number of state highways form a mesh-like structure that spreads through forest buffers and core areas. There are hundreds of elephant crossing points over the forest road network. Moreover, there are hundreds of elephant activity zones in remote village areas that are scattered all over the STR. The spot identified for signage installation in the STR area after consecutive field surveys with the forest department at 15 elephant crossing points, as shown in Image 1. Images 2–4 show various stages of the EES installation project such as design testing and field installation. The devices were installed in September 2023 and have been running successfully ever since. The radiant elephant signage has received praise from residents, nature lovers, the Forest Department, and other stakeholders. Common questions address the night time visibility, the placement of the signs, and the response time to visual notifications. The feedback from readers is greatly appreciated and will be considered in future iterations of the electronic elephant signage.

References

Karanth, K.K. & P. Ranganathan (2018). Assessing human-wildlife interactions in a forest settlement in sathyamangalam and mudumalai tiger reserves. *Tropical Conservation Science* 11(1): 1–14. https://doi.org/10.1177/1940082918802758

Nath, N.K., B.P. Lahkar, N. Brahma, S. Dey, J.P. Das, P.K. Sarma & B.K. Talukdar (2009). An assessment of human-elephant conflict in Manas National Park, Assam, India. *Journal of Threatened Taxa* 1(6): 309–316. https://doi.org/10.11609/JoTT.o1821.309-16

Panda, P.P., T. Noyal & S. Dasgupta (2020). Best Practices of Human-Elephant Conflict Management in India. Published by Elephant Cell, Wildlife Institute of India, Dehradun, Uttarakhand, 41 pp. https://static.pib.gov.in/WriteReadData/userfiles/HEC-Brochure-%20Version%208-min.pdf

Shaffer, L.J., K.K. Khadka, J. van den Hoek & K.J. Naithani (2019). Human-elephant conflict: a review of current management strategies and future directions. *Frontiers in Ecology and Evolution* 6: 235. https://doi.org/10.3389/fevo.2018.00235

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