

## ***A Design for Early Warning System to Minimize Wild Elephant-Train Collisions in Sri Lanka***

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Wild elephant-train collision is a significant aspect of the Human-Elephant Conflict (HEC), which is on the rise in Sri Lanka. These incidents often result in the death or disfigurement of elephants. Moreover, these incidents also result in significant losses to railway services. The majority of elephant-train collisions result from drivers is due to, not having enough time to respond. This recurring problem was identified by secondary research including daily news. According to preliminary findings it has been found out that many collisions are concentrated to specific geographic “hotspots”. Taking these things into account, this paper suggests a design to protect this precious biodiversity using Convolutional Neural Network (CNN). This design was created by deciding the optimal solution of each part of the setup from the knowledge obtained through secondary research. The camera that best fits, data collection, suitable algorithm and other necessary parts were done accordingly. Current advancement in CNN is used to identify elephants near recognized hotspots over the RGB/infrared spectrum using an Internet Protocol camera. Carefully selected image data of elephants collected during trips to wildlife parks in Sri Lanka can be further used to train pre-trained elephant detection model. A prototype of early warning system unit has been designed here using this vision-based detection technology as its central component to solve problem of elephant-train collisions. A warning goes to the locomotive operator, and he will be able to take a decision by watching the live footage of the incident while he is no more than 1Km distant to the hotspot. Overview of the ecosystem, flow chart of the process and the sequence diagram system have been elaborated to show the system functions and how it works. The final design was evaluated at railway stations near the “hotspot” and positive feedback were able to receive through interviews.

**Keywords:** Elephant-Train Collisions, Human-Elephant Conflict, Convolutional Neural Networks (CNNs), Vision-based detection.