Detect Wild Animals and Alerts in Mountain Regions

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Abstract: *Wildlife populations throughout mountainous environments cause frequent human-wildlife confrontations which endanger human safety as well as animal well-being. An intelligent alert system detects wild animals in the area to enhance safety standards. This system utilizes Arduino UNO microcontroller as its central processing unit to implement various sensors and communication interfaces which enable quick real-time monitoring and responsive capabilities. The system incorporates six main components that consist of an ultrasonic sensor together with an ESP32 CAM and a DF Mini player and speaker and LCD display and a Node MCU module with SMS and GPS capabilities. The ultrasonic sensor maintains constant operations as it conducts surveys of the environment for any movement. After the detection, the ESP32 CAM system takes images that an analysis process verifies the presence of wild animals. The Arduino UNO functions to start the alert process if data verification is completed successfully. The LCD panel shows current device statuses which enable user monitoring. The DF Mini player operates through a speaker to warn away animals as it detects them with its sensor input. Node MCU modules perform two tasks by simultaneously delivering SMS alerts containing GPS data to authorities who can respond quickly. A dedicated power supply operates this system to maintain continuous functionality irrespective of remote settings. The system demonstrates efficiency in detection and notification functions which gives it reliability as a solution to minimize human-wildlife confrontation, Monitoring technology acts as an early warning system which supports the safe tracking detection of hikers and forest officials and creates better conditions for wildlife human coexistence. Multiple technology applications within this system create an efficient and cost- effective implementation for wildlife monitoring alongside mountain region conservation.*

Keywords: Animal detection, Wild animal monitoring, Alert system, ESP32 camera, Ultrasonic sensor, NodeMCU, Arduino UNO