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# Using Internet of Things for Wildlife Tracking

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## Abstract

This paper provides a comprehensive examination of the utilization of Internet of Things (IoT) devices in wildlife management and tracking, their evolutionary trajectory, and practical implementation in data acquisition. Central to the discussion are key components of IoT networks, including Sigfox, Wi-Fi-enabled devices, and IoT-based wireless sensor networks, each analyzed for their role and efficacy. Communication modalities within IoT frameworks, coupled with an evaluation of protocol performance are evaluated.

Furthermore, this seminar also addresses challenges inherent in wildlife data collection methodologies, such as memory constraints, battery life, transmission range and rate, and security vulnerabilities within IoT ecosystems. By delving into potential solutions and technological advancements, this paper aims to contribute to the refinement of wildlife monitoring practices, fostering a more robust and effective approach to conservation efforts.

This is a preliminary abstract, I mainly added it just so I had something.

**Keywords:** IoT, networking, Wi-Fi, data transmission, data collection, animal trackers, Sigfox, WildFi, Biologging, ecology

## 1 Introduction

## 2 Background

I'm not sure whether or not this is the right place for background information on what biologging is and its history or if that sort of stuff belongs in the introduction, I will include it for now

Comprehending the foundational technology behind the Internet of Things (IoT) is paramount in grasping its applications in wildlife tracking. This section aims to furnish a concise overview of biologging, the IoT, and their intersection in wildlife tracking. Additionally, it will explore current and past technologies employed in biologging, shedding light on their operational mechanisms and comparative advantages. By delving into the workings of traditional wildlife tracking technologies, we can evaluate their merits and demerits, thereby establishing a framework for evaluating the suitability of IoT solutions for wildlife tracking.

### 2.1 What is Biologging?

Biologging is a concept that gained popularity in the early 2000's and has continued to play a pivotal role in understanding animal behavior and ecology. Biologging can be defined as

The investigation of phenomena in or around free-ranging organisms that are beyond the boundary of our visibility or experience. [1]

It is a method of tracking animals in the wild using electronic devices that are attached to the animal. These devices can be used to track the animal's movements, monitor its behavior, and collect data on its environment. Biologging emerged as a powerful tool in ecology the same way genomics did for the study of cellular and organ function. The primary difference being that biologging provides insights into the behavior and functions of various organisms in environments that can be hostile or difficult to reach for the observer [1]. The ability to track animals in their natural environment has provided researchers with a wealth of data that was previously unattainable. This data has been used to study animal behavior, migration patterns, and the effects of climate change on various species[2]. The data collected from biologging devices has also been used to inform conservation efforts and to help protect endangered species [3]. It is important to understand that biologging is simply the collection of data from animals in the wild, and it is then up to scientists or conservationists to use the data to answer questions about the animals or to inform conservation efforts.

### 2.2 What is the Internet of Things?

The Internet of Things (IoT) represents a transformative shift in the realm of technology, encompassing a vast array of physical objects empowered with sensors and software to interact autonomously. These objects collect and exchange data through network connectivity. In essence, IoT devices, ranging from commonplace gadgets to sophisticated systems, have the capability to interface with the internet or communicate wirelessly, thereby facilitating seamless integration into various facets of daily life. The IoT has been applied to a wide range of fields, including healthcare, agriculture, manufacturing, and most important to this paper, wildlife monitoring. The fundamental operational mechanism of the IoT hinges upon established protocols such as Internet Protocol (IP) and Transmission Control Protocol (TCP), which

serve as the foundational infrastructure for enabling connectivity among sensors, devices, and networks. Data generated by IoT devices are processed and transmitted across a myriad of wired and wireless communication channels, encompassing Ethernet, Wi-Fi, Bluetooth, cellular networks like 5G and LTE, radio frequency identification (RFID), and near field communication (NFC)[4].

This source is a book, but there is a britannica page where I found the info I used, same author and everything, but the britannica page is not the book. is citing the book but using the britannica info ok?

There are two primary types of IoT devices, digital-first and physical-first. Digital-first devices are designed and built with connectivity in mind, and encompass a diverse range of machines and gadgets capable of generating and transmitting data. Conversely, physical-first devices incorporate microchips or sensors retrofitted with communication capabilities, thereby imbuing conventional objects with newfound functionality and traceability [4].

## 2.3 What are the Other Biologging Methods?

## 3 Components

## 4 Data Transmission

## 5 Networking Protocols

## 6 Challenges to Overcome

## Acknowledgments

This is where you thank those who helped you better understand the material and gave you helpful feedback on the paper, usually including your adviser. This is not a place to thank your family, your significant other or your best friend, or anyone else for moral support or yummy cookies.

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