

## Mobile Application Support for Analog Radio Telemetry Localisation of Bats

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### Zusammenfassung

#### Mobile Anwendung zur Unterstützung der Telemetrie von Fledermäusen

Telemetrieuntersuchungen an Fledermäusen sind ein wesentlicher Bestandteil von umweltplanerischen und ehrenamtlichen Fragestellungen. Je nach Aufgabenstellung ist diese Methode ein adäquates Mittel um z. B. die Raumnutzung oder aber Wochenstuben zu ermitteln. Die Herausforderung ist es, einen effektiven Telemetrieablauf und zuverlässige Ergebnisse zu gewährleisten. Bis heute werden alle Messungen, z. B. bei einer Kreuzpeilung, manuell aufgeschrieben. Die Koordinierung der einzelnen Telemetrie-Teams ist meist mühsam und die Verfolgung des Tieres ist je nach Fledermausart unterschiedlich anspruchsvoll. Diese Ausgangssituation war Grundlage für die Idee zur Entwicklung einer mobilen Anwendung. Das dafür notwendige Know-how liegt bei den Informatikern. Studenten der Technischen Universität Prag konnten im Sommersemester 2014 einen entsprechenden Prototyp entwickeln, welcher auf dem mobilen Betriebssystem Android läuft. Bei kleineren Tests konnte die Funktionalität und der Mehrwert dieser Anwendung unter Beweis gestellt werden. Auf den mobilen Geräten der einzelnen Teammitglieder werden deren aktuelle Positionen und die entstandenen Schnittpunkte aus der Kreuzpeilung dargestellt. Aufgrund der Echtzeitdarstellung auf dem Display ist für alle Teilnehmer eine Einschätzung der vorliegenden Situation möglich und somit auch ein besseres Vorgehen bei der Verfolgung der Fledermaus.

### Abstract

Telemetry studies are an essential component within environmental planning issues, but also in the voluntary sector. Depending on the task, this method is an adequate means to for instance gain knowledge of the use of home ranges or to determine nursery roosts. The challenge is to ensure an effective workflow of the telemetry and reliable results. Until now, all measurements are manually written, for example, at a cross bearing. The coordination of individual telemetry teams is usually painstaking and the following of the animal is sophisticated and varies depending on the kind of bat. This initial situation was the basis of the idea to develop a mobile application. Only compu-

ter scientists have the necessary know-how. Students of the Czech Technical University (CTU) in Prague were able to develop a corresponding prototype in the summer semester 2014, which runs on the mobile operating system Android. In smaller tests the functionality and the added value of this application have been demonstrated. The user's current position and the resulting intersecting points of the cross bearing can be displayed on the mobile devices of the individual team members. Through the real-time display on the screen an assessment of the present situation is possible for all participants, and thus a better approach in following of the bat.

### Keywords

Bats, radio telemetry, radio tracking, android, mobile application, tag, cross bearing.

### Introduction

The ability to localize and track animals in the wild was always a basic requirement to study the behavior of a particular species. Initially, animals were localized and tracked visually, but such an approach was not practical due to the inability to follow the animal without being detected and therefore disturbing the natural process of animal behavior. The radio-tracking of wild animals was one of the first methods used, followed by others like GPS technology. In the case of bats, specific questions about the home range, flight routes or about the roosts, detecting nursery colonies or finding an individual bat can be done using a transmitter (a tag) attached to a bat and a receiver that can detect the location of the bat. But with the development of more advanced technologies, radio-tracking has raised considerable interest from the scientific community again.

most of the required functionality. As the application is still in the development phase, we hope to continue the work on it and provide stability in the running of the application. However, the initial evaluation showed that the potential provided by current mobile technologies can be successfully implemented to improve the process of bat localization.

For future work, we are thinking about the implementation of new features to improve the user experience. We are planning to reorganize data collection tables and make them more informative and comfortable. Also we are trying to fix bugs, which were found during real measurements, especially the run of application when an internet connection is not stable. This way we will eliminate most of the known disadvantages.

<sup>1</sup> <http://www.for-bats.de/>

<sup>2</sup> <http://www.locusmap.eu>

<sup>3</sup> <http://www.tracker.fi/en>

The development team is also thinking about an offline mode when other teams are not available. Besides that, we would like to improve the design of the app in order to make it more presentable and user-friendly.

### Literature:

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