

DATA COLLAR

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INTRODUCTION

Context

Studying primate behavior in their natural environment is key to understanding how they live and interact. Direct observation is difficult and often affected by the surroundings. The nRF Monkey data collar, developed by the ECS research group at HES-SO Valais/Wallis, aims to monitor Vervet monkeys in South Africa to analyze their vocal communication and social structure. The collar can record for 12 days straight and then be released using a mobile app.



Fig. 1 - nRF Monkey collar

Problem

The first prototype recorded audio continuously, leading to critical issues:

- **High power consumption** : Battery life is limited.
- **Data overload** : More than 90% is garbage recording, which leads to only 12 days of autonomy before the memory is full.
- **Lack of context** : No data on social interaction between individuals.

Objectives

Develop a V2 prototype focusing on energy efficiency and smart features :

- Hardware update (microcontroller + microphone)
- Firmware update
 - Intelligent audio level triggering
 - Monkey proximity detection via BLE
 - Power consumption optimization

SYSTEM OVERVIEW

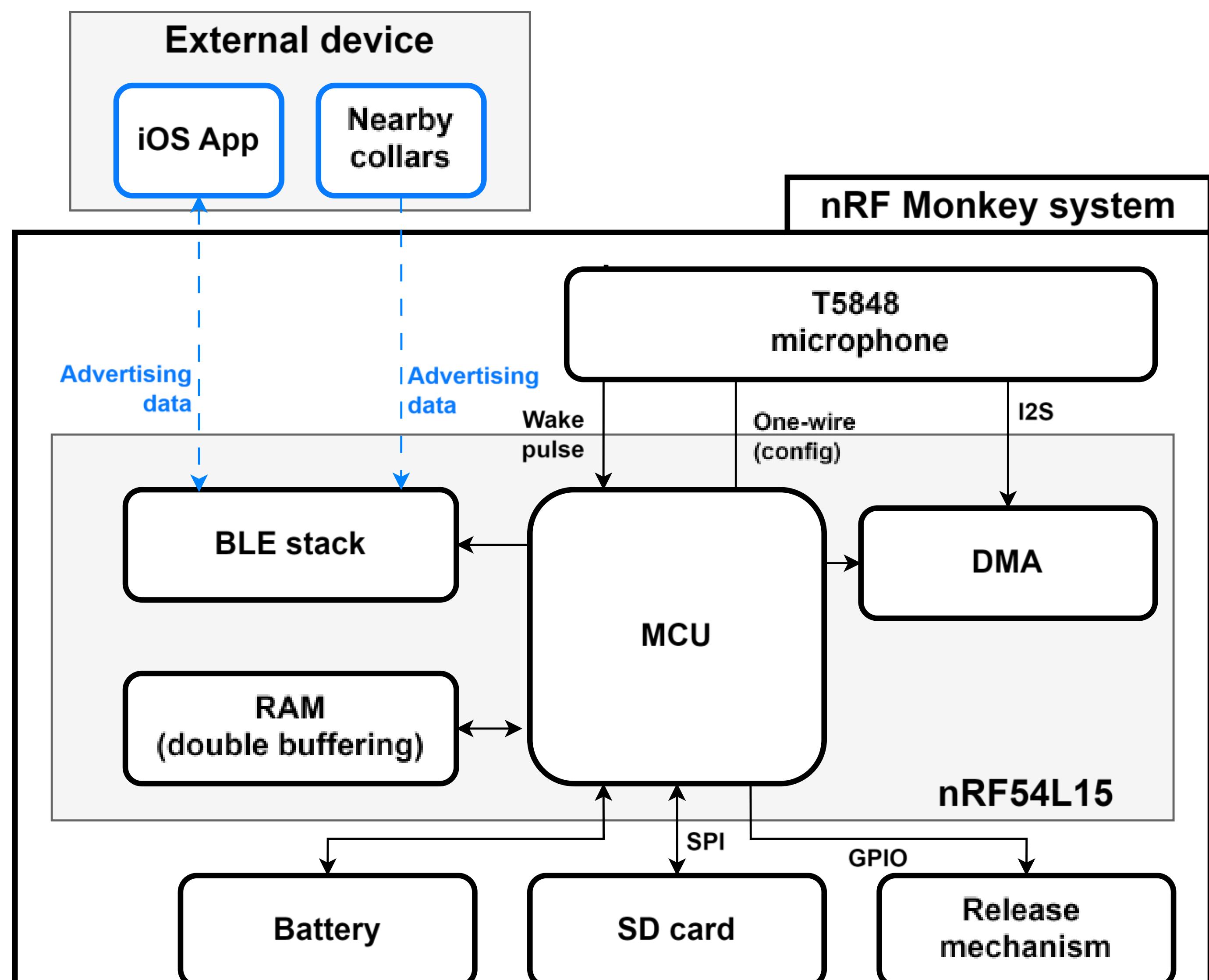


Fig. 2 - nRF Monkey system overview

SYSTEM USE CASE DIAGRAM

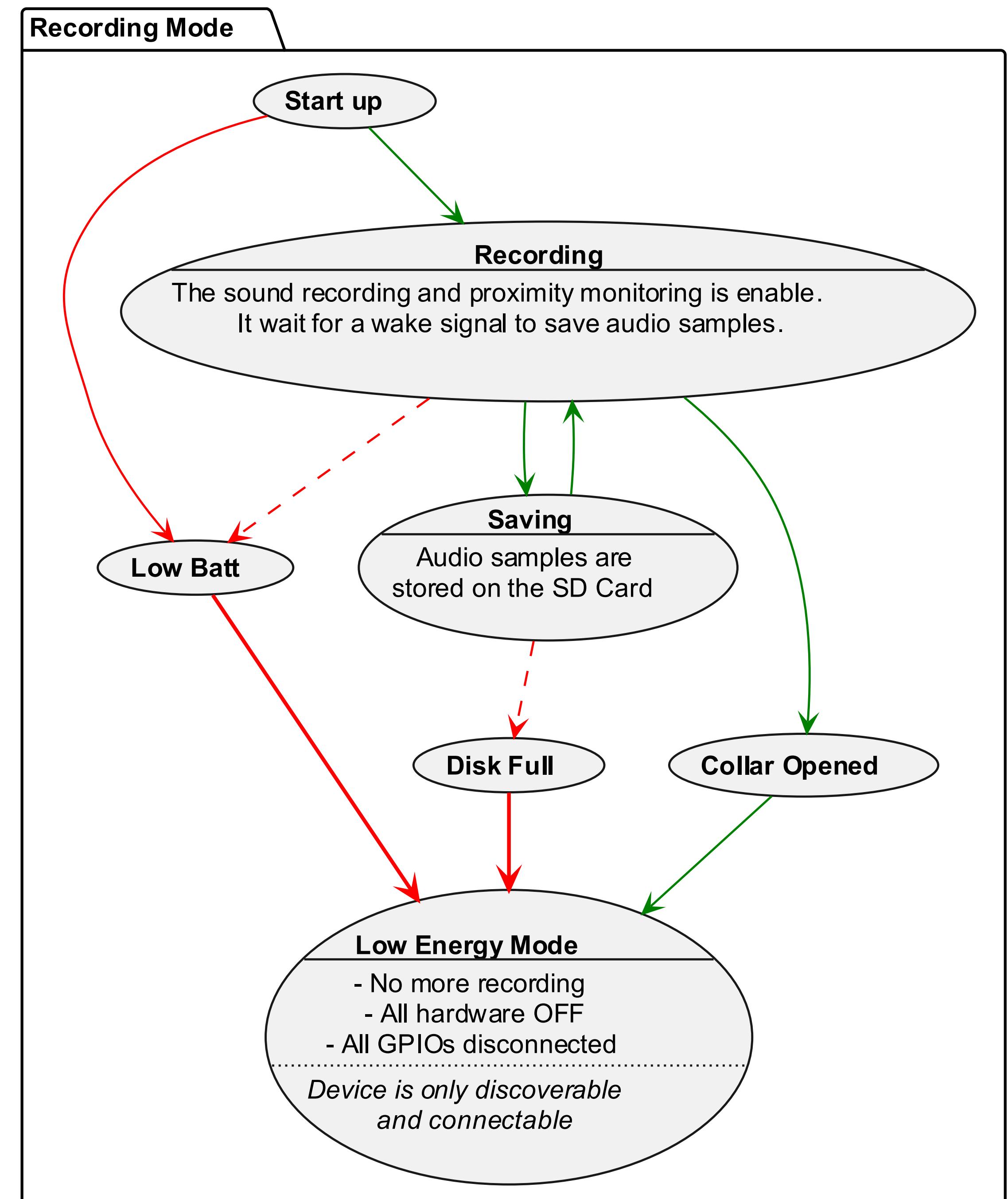


Fig. 3 - nRF Monkey use case diagram

FIRMWARE ARCHITECTURE

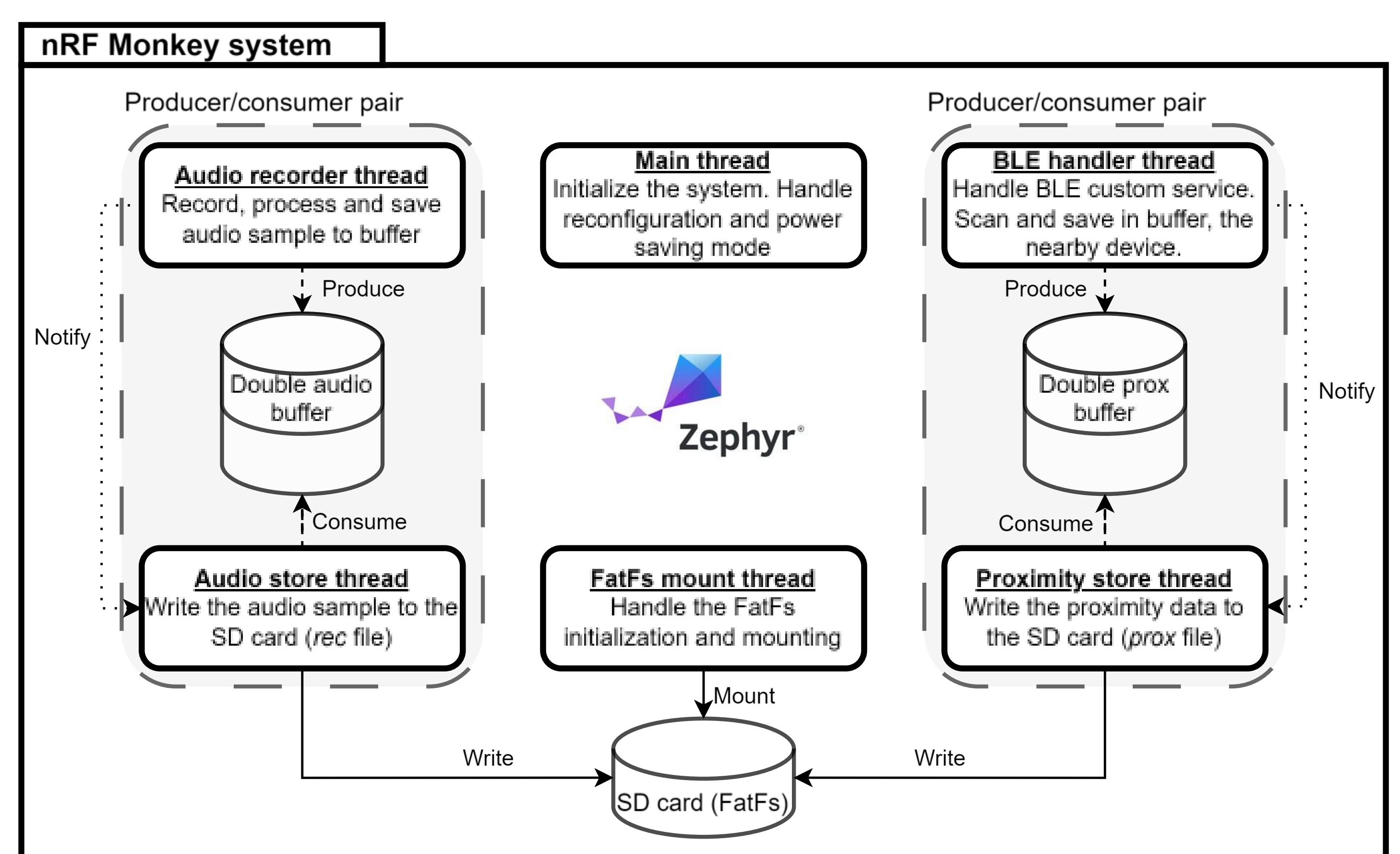


Fig. 3 - nRF Monkey firmware architecture

RESULTS & CONCLUSIONS

Feature	V1	V2	Improvement
Standby current	4.01mA	0.39mA	~10x reduction
Recording current	4.01mA	2.13mA	~2x reduction
Battery life	22days	218days	~10x augmentation
Social context	None	BLE prox.	New social mapping feature

The V2 prototype implements an intelligent architecture that achieves a consequent increase in autonomy. By combining sound triggering with BLE proximity detection, it provides an efficient and reliable platform for primate behavioral research.