Description:
This bachelor thesis complements our work on the BATS project. The goal of the project is to support biologists with their studies by monitoring the group dynamics of bats in their natural habitat. The idea is to equip bats with ultra-low power sensor nodes that monitor contacts between individuals and to track their routes with the help of a stationary ground network. Among others, the dynamic reconfiguration of the mobile nodes is of high importance in order to change the application behavior depending on system state (e.g., energy, memory) and experiment design goals (e.g., change of monitoring frequency). Furthermore, even software updates “on the fly” may become necessary, e.g., to correct software bugs or to install additional code that is needed for a change in experiment design goals. This bachelor thesis is focusing on the software update mechanism with focus on the network communication using Fountain Codes for considering the characteristics of the underlying ultra-low power system design.

Tasks:
The goal of this thesis is the transmission of code segments from a base station to the embedded sensor nodes. We assume an inherently failure prone channel, unpredictable contact times to the base station, as well as very short communication cycles due to the used duty cycling scheme. Fountain codes are expected to suite well for this scenario. First, the student has to get familiar with the theoretical concepts of Fountain Codes. In a second step, selected implementations have to be evaluated for the base station running Linux. Finally, an implementation of the decoder for the TelosB/Contiki system has to be realized. Within the course of this bachelor thesis, the developed solution has to be validated and evaluated in a small testbed.

Requirements:
Proficient in C++, basic knowledge of Linux are helpful

Advisors:
Bastian Bloessl <bloessl@ccs-labs.org>
Johannes Blobel <blobel@ccs-labs.org>
Falko Dressler <dressler@ccs-labs.org>