Our project focuses on methods for different distributed systems of constrained devices. Namely, such devices have a small amount of available energy and/or memory. A network of cellular phones can be an example here. Naturally, batteries of such devices can be recharged, but there are devices that cannot be effectively recharged. For instance, one can consider a network of sensors placed on a very vast territory for detecting some evenets like earthquakes, fire or movements of enemy's soldiers. In such case replacing batteries after deployment of the network can be simply impossible. In such case to perform given duties constantly for a long time, the devices have to economize on energy - especially to transmit less messages and (in the case of mobile devices) to limit their movements. Another type of systems considered in our project is a team of robots exploring unknown terrain or patrolling it. Such robots have limited memory and cannot transmit all collected data to the base station. Almost the same group of problems appears in seemingly different systems of so called agents crawling the Internet to "collect" information about various sites in the Internet.

Yet another systems we want to address in our project are radio networks (e.g., popular WiFi), wherein an adversary tries to prevent communication by jamming the channel. Such blocked messages can be transmitted again, but that makes the communication slower and increases expenditure of energy. It turns out that all these issues and adequate countermeasures require creating a well thought-out algorithms. Within the framework of our project we construct and analyse such algorithms by simulations and, above all, formal analysis. Only this approach guarantees reaching the assumed goals. Formal analysis requires however the use of advanced mathematical methods from different fields -including at first place probabilistic methods and graph theory.

We believe that the results of our research may cause that such a wide class of systems work faster and longer - without replacing batteries. At the same time they should be immune against adversary jamming the communication. Our project is mainly theoretical and for that reason, except constructing useful algorithms, we would like to solve problems related to the nature of investigated systems. For example, we would like to find out how fast can be an algorithm for solving a given problem in the presence of adversary jamming the communication channel for half of the time (so called lower bounds).

Despite a well developed body of literature devoted to system of that kinds is available, many vital questions are left unanswered. In particular, we know very little about performance of systems with limited energy running in presence of an adversary. It seems that analysis of such (quite realistic) cases needs a different approach then used in previous papers.