The story of the origin of this device is a little complicated. As I remember, I got the main board of the device as a compensation for some auxiliary work that I did.

So, the board already contained ATMega128 microcontroller, SIM900D GSM module and all the necessary components. All I did is to connect PIR sensor and write a firmware. And packed the stuff into a suitable container, of course.

To start, I ordered SEN32357 PIR Motion sensor. It should be familiar to Arduino developers. It just has a motion sensor based on Fresnel lens, BISS0001 PIR motion detector microchip and two potentiometers which are used to adjust the detecting distance and the holding time.

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out.

PIRs are basically made of a pyroelectric sensor, which can detect levels of infrared radiation. Everything emits some low level radiation, and the hotter something is, the more radiation is emitted. The sensor in a motion detector is actually split in two halves. The reason for that is that we are looking to detect motion (change) not average IR levels. The two halves are wired up so that they cancel each other out. If one half sees more or less IR radiation than the other, the output will swing high or low.

Along with the pyroelectic sensor is a bunch of supporting circuitry, resistors and capacitors. It seems that most small hobbyist sensors use the BISS0001, undoubtedly a very inexpensive chip. This chip takes the output of the sensor and does some minor processing on it to emit a digital output pulse from the analog sensor.

The rest was easy: I had to detect this pulse on the microcontroller, init SIM900D and send a message to a phone number to notify that someone entered the territory. The code of the firmware is available.

The demonstration of how it all works may be seen on the video below.

P.S. if you have to update your SIM900D firmware follow the tutorial, because I encountered some problems using the old firmware.