



MICA
Management of Invasive Coypu
and muskrAt in Europe



Smart Life Trap manual

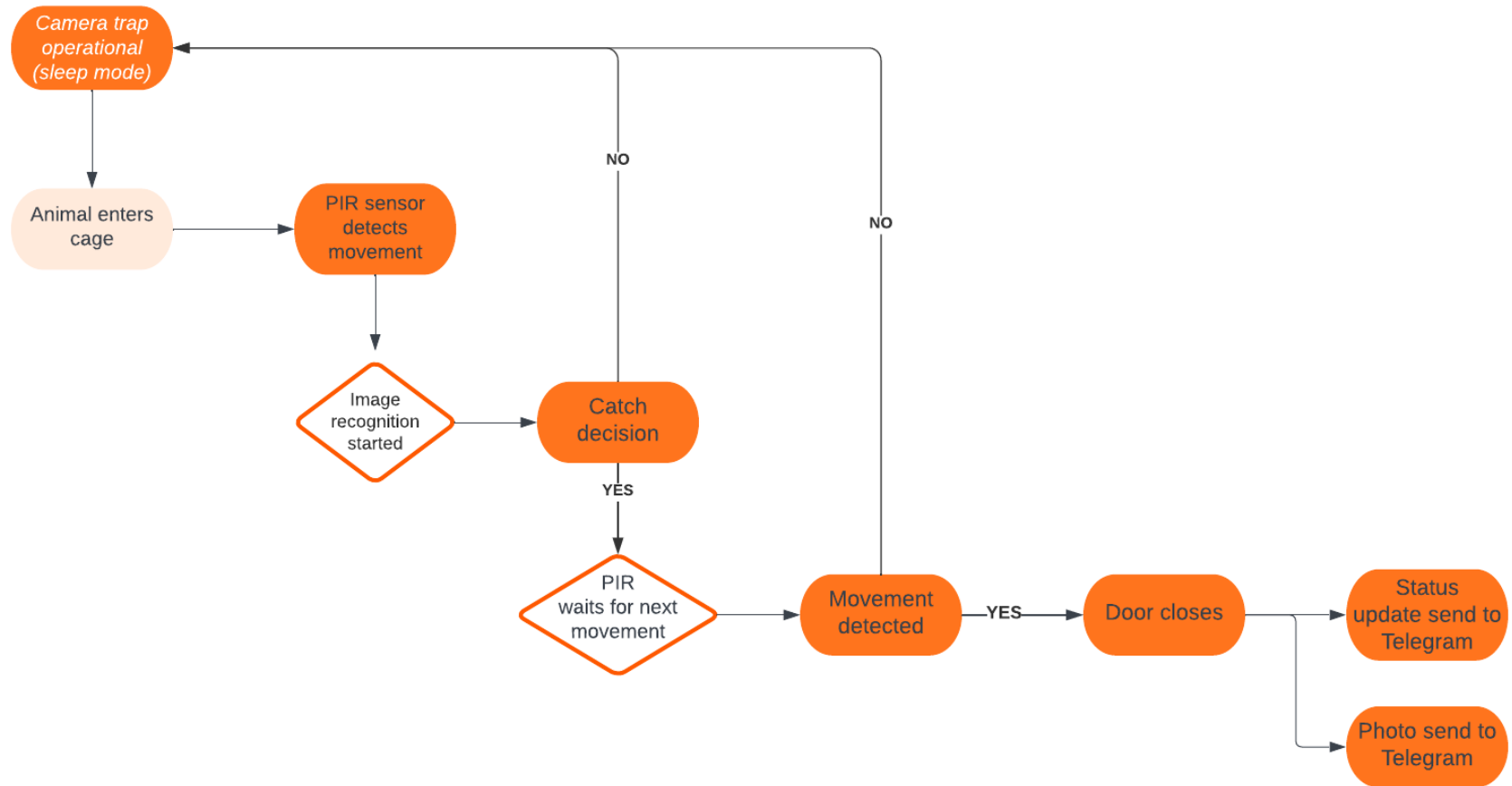
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Introduction

This manual explains the workflow, overview, functionality and troubleshooting for the Smart Life Trap used in the *Life Mica* project. The Smart Life Trap is a combination of hardware- and software developed including AI for trapping coypu and muskrats.

Workflow Smart Life Trap



Smart Life Trap system overview - external



1. Magnet / Actuator
2. LED
3. PIR
4. Camera
5. IR lighting

Smart Life Trap system overview - internal



1. SD-card slot
2. USB connector
3. Dipswitch
4. Antenna
5. GPS module
6. AA batteries

Dipswitches

There is a small 8-fold dipswitch inside the device where settings can be changed to the system.



Dipswitch 1: is used to select the device that is programmed by the USB connector. When it is switched ON the AI module is selected. When switched to OFF the STM32 microcontroller is selected.

Dipswitch 2: serves to select between open (mesh) and closed (black plastic) cage. In ON position, IR light is continuously emitted during the analysis. When switched to OFF, it intermits between IR lightning and no IR lightning. (We advise to leave the switch in ON position).

Dipswitch 3: is connected to the AI module and serves no purpose at the moment.

Dipswitch 4: is connected to the AI module and serves no purpose at the moment.

Dipswitch 5: is connected to the AI module and serves no purpose at the moment.

Dipswitch 6: is connected to the main controller and controls the setting of the modem protocol. If this switch is turned to ON position the device will be forced into 2G mode.

Dipswitch 7: activates (or de-activates) GPS/GNSS reception. When in OFF position, the GPS/GNSS routine is skipped. In ON position, the GPS/GNSS routine is done before modem transmission to get a geo-location.

Dipswitch 8: serves to disable the modem routine. In ON position, the modem routine is DISABLED. So no modem communication is done. Please leave this switch to OFF. (Normal operation)

Hardware installation

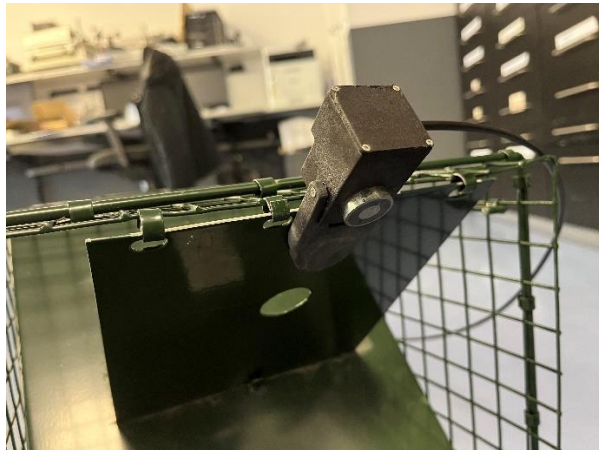
1. Place the camera on the outside at the back



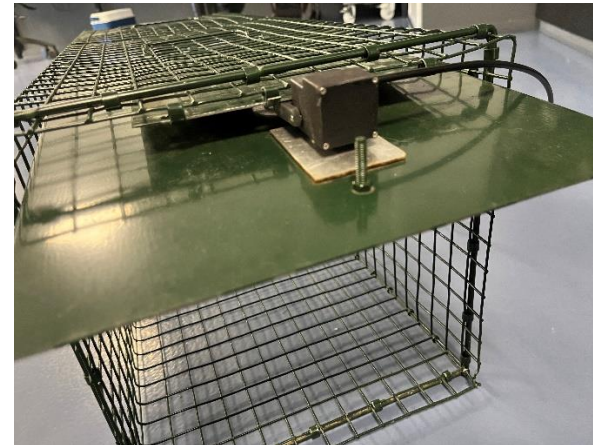
2. Fasten the camera with the elastic band



3. Place the actuator with the magnet on the metal flap



4. Open the door and attach to the magnet



Getting started (1)

By holding the magnet by the small LED at the side you can switch the device on and off.



Switch on:

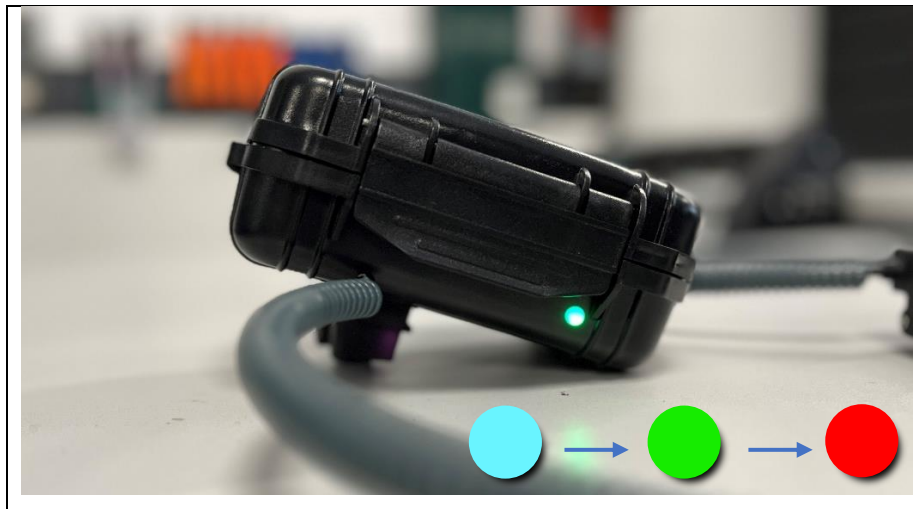

Upon holding the magnet to the LED, the device will switch on.
You can see that the color of the LED will initially be white.
You can remove the magnet again.



Switch off:

By holding the magnet again next to the LED you'll see the LED light up in RED.
You can remove the magnet.
The device is switched off now.

Getting started (2)

	<p>Searching GPS:</p> <p>After switching on, the device will begin searching for a GPS signal to find its geo-coordinates. The LED will turn to light blue-green (Cyan) color. This can take up to 2 minutes. When the GPS is starting to find signal the LED will first turn Green and then Red for short time.</p> <p>After this the GPS coordinates are found.</p> <p>If the device does not go to Green and then Red, no valid GPS data was found within the timespan.</p>
	<p>Connect to Cloud:</p> <p>When GPS routine is ready or when a desired animal is caught the modem will start up. The LED will turn to blue during the modem routine. In normal circumstances data-transmission will be ready in 10-30 seconds. When an image is transmitted, it might take a little longer. But normally no longer than a minute.</p> <p>If you don't get an update message on telegram, you can try to change dipswitch 6 in order to change the communication protocol.</p>

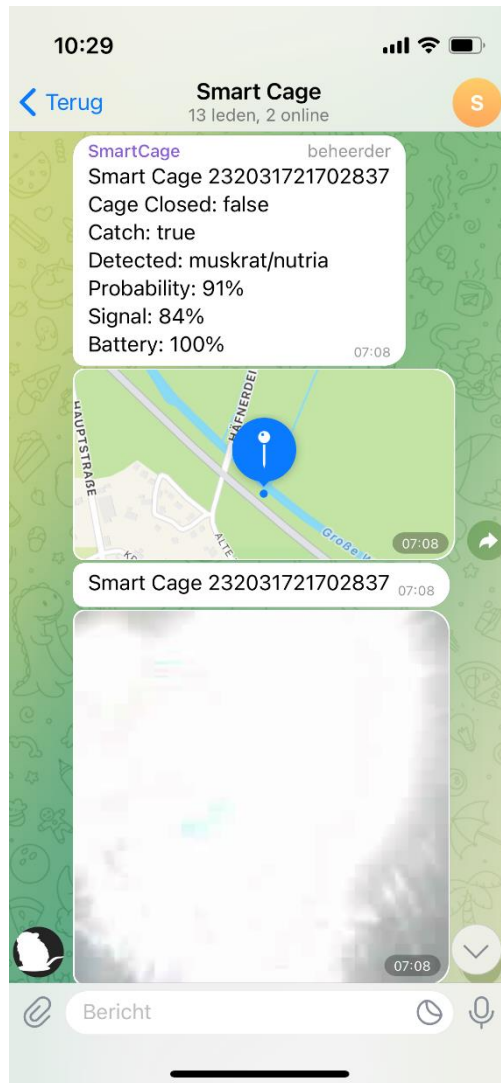
Testing

In order to test the cage:

1. Open the cage by putting the door onto the magnet.
2. Hold an image of a desired species in front of the camera, preferably about 30cm distance from the camera.
3. By holding the image in front of the camera the PIR sensor will notice movement in the cage and the device starts the image recognition process. During the recognition process the LED will turn to a yellowish-green color. If the camera successfully recognizes the animal and decides to catch it the LED will turn green.
4. The Smart Life Trap is now fully active and any movement will close the cage immediately. Hereafter the device will send a status update to telegram and it will also send a photo.

NOTE: When in practice an animal is caught the device will only send a photo again if a new photo is made with a higher probability score.

Explanation Telegram notifications



Smart Cage	ID of the specific Smart Life Trap
Cage Closed	“true” = cage closed / “false” = cage open
Catch	“true” = decided to catch / “false” = no catch (probability too low)
Detected	Species category (label) / 24hour heartbeat signal (active cage status)
Probability	Certainty of species by the AI model
Signal	Device signal strength – reception
Battery	Device battery level

Troubleshooting

Problem	Solution
<p>During the test (holding a photo before the camera) the yellowish-green color turns off (LED off). The animal is not recognized.</p>	<ul style="list-style-type: none"> • Please make sure the camera lens is not dirty • Check if the SD-card is put into the SD-slot up to the end.
<p>The modem transmission fails (no message received in telegram)</p>	<p>Try to change the setting of dipswitch 6. In Germany the setting dipswitch 6 = ON is probably the best setting. (Forced 2G)</p>
<p>Smart Life Trap can not find GPS</p>	<p>Try to restart the system by turning the device off and back on</p>