

MVG-BVI

Bee Visual Inspector

The BVI (Bee Visual Inspector) is a portable device for the in-field measurements on the beehive's entrance. It captures the bees passing through the device and in future, it will be used for the analysis of their health state.

MVG-MTDL	
OVERALL DIMENSIONS	(200 x 110 x 220) mm
OVERALL WEIGHT	Approx. 2.0 kg
EXTERNAL POWER SUPPLY	12 V
ILLUMINATION POWER	14,4 W/m
ON-BOARD COMPUTING UNIT	Raspberry Pi 4B
OPERATING SYSTEM	Linux
INTERNAL MEMORY	microSD 32GB (USB expandable)

Table 1. MVG-MTDL specifications

It consists of two identical camera modules with the Raspberry Pi HQ camera, internal LED illumination, mirror and measurement window, together with the tunnel module placed between them. For the purpose of an easy camera parameter tuning was one of the rPi cameras changed for the industrial USB3 IS DFK 33UP5000 camera. Internal illumination is arranged with a LED stripe on an aluminium plate and it is powered by 12V.

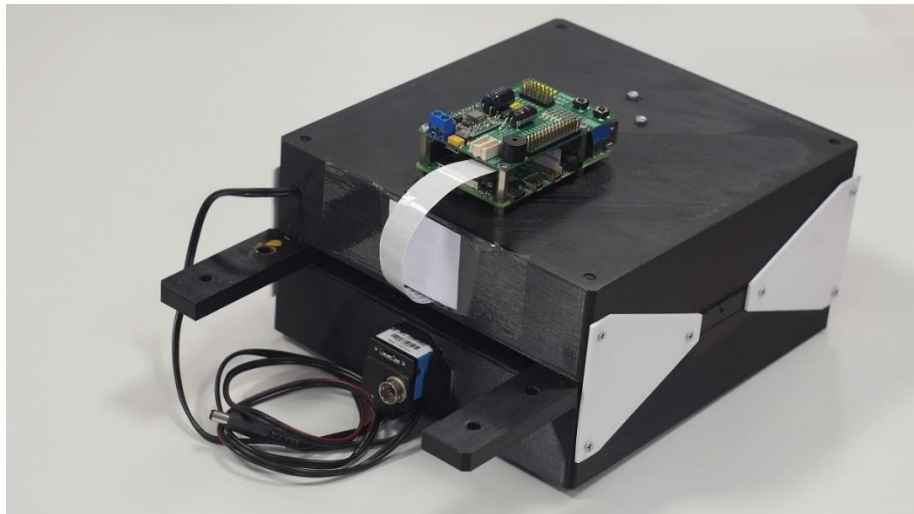


Fig. 1 Detail of the sensing window

On-board processing unit could be powered from the 12V branch used for the illumination because of the extending board with an internal DC/DC converter. Other possibility is to use the internal USB power port of the rPi 4. IS DFK 33UP5000 camera is powered from the connected computer.

The whole device is easily dismantlable for its cleaning and disinfection between the measurements. In future, we plan to use a single rPi with the extension for two cameras in order to make our device easier to operate and to reduce its costs. The BVI was successfully tested in the in-field measurements and it proves it potential for the capturing of individual bees.

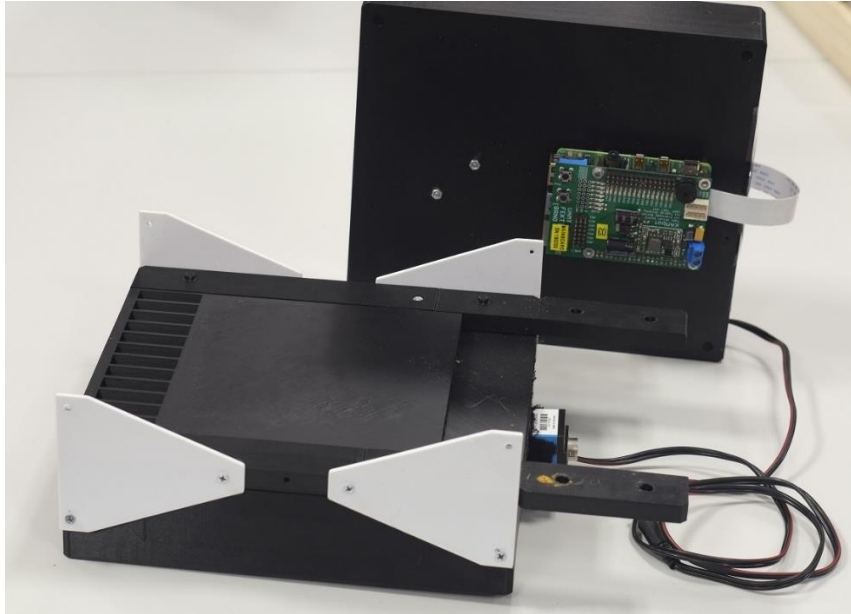


Fig. 2 View on the partially dismantled device

Sensors

In the current form the MVG-BVI includes an Imaging Source DFK 33UP5000 camera and a Raspberry Pi HQ RGB camera, see tables 2 and 3 below for further specifications:

IMAGING SOURCE DFK 33UP5000

SENSOR	On Semiconductor PYTHON 5000
SENSOR TYPE	RGB
SENSOR FORMAT	1/3"
RESOLUTION	5.3MPx
LENS MOUNT	C/CS mount
FILTER	IR cutoff
COMMUNICATION INTERFACE	USB3

Table 2. Imaging Source DFK 33UP5000

RASPBERRY Pi HQ Camera

SENSOR	Sony IMX 477 family
SENSOR TYPE	RGB
SENSOR FORMAT	1/3"
RESOLUTION	12.3MPx
LENS MOUNT	C/CS mount
FILTER	IR cutoff
INTERFACE	50p, 0.5mm, XF3M FPC/FFC

Table 3. Raspberry Pi HQ camera