

## Electronic Appendix 1

### *Supplementary hardware information*

Black-and-white CMOS surveillance cameras were connected to a QUAD-processor, which transmitted the incoming video streams to a video card within a customary personal computer (processor clock of 1.5 GHz and 512 MB DDR main memory). The output video stream of the video card had a frame size of at least 320x240 pixels in PAL/NTSC video format. We used the digital surveillance product Security HW104/SL104 (PCI-Bus card) with four composite input channels and BT878/A chipset. Image files were saved directly to an external storage device. All components ran with a frame rate of at least 5fps (frames per second).

### *Supplementary software information*

Motion-controlled video capture software allowed us to reduce the large volume of raw data usually required in videographic studies. Two separate programmes for data acquisition and analysis were purpose-programmed: The first programme (*iRedstart*) captured images out of the video stream transmitted from the QUAD-processor via a video card. Images were converted into grey-scale and processed on byte level. If a certain quantity of pixels changed its grey-scale value above a defined threshold value, an image was saved to hard disk in JPEG format. The second programme (*iRedstart mapper*) scanned images for the marked bird within a defined area. The sensitivity threshold value of the detection-algorithm was adjusted such that noise resulting from ambient lighting or smaller body movements (head movements or preening) was reduced. The centre of the most contrasting region represented a defined point along the axis of the bird's head. The data gathered during the scanning process was stored in a table and exported in a Comma Separated Values file format (CSV). The generated data set included date and time (CET) of image capture, angle of the position vector relative to geographic North, and length of the position vector relative total cage-radius (see screen shot below).

