Intelligent Camera Surveillance with MBa8MP-RAS314

Something is happening – using motion detection with SBC

Technology
in Quality

Video surveillance that almost always delivers the same image unnecessarily consumes infrastructure bandwidth and people's attention. It makes much more sense for people to receive images only when something actually happens, such as when a pet leaves its sleeping area or the garage is opened. Intelligent video surveillance does not require complex installation and does not need to be permanently installed in one location. Material costs should also be kept to a minimum.

One solution is to connect a USB camera to a suitable single board computer (SBC), such as the MBa8MP-RAS314 from TQ. The SBC also provides an access point (AP) for sending the camera images via WLAN to the user's own smartphone, where they can be visualized using a browser. With the right software on the SBC, it can react to movements and inform people about ongoing changes.

The first step is to provide a dedicated access point for the video connection between the camera and the smartphone. This means that an existing WLAN does not have to be burdened with the monitoring data

stream, and it also simplifies data protection issues as everything remains clearly separated from each other. The MBa8MP-RAS314 has a built-in Wi-Fi module, so all you need to do is connect the antenna and install the software. Thanks to the Armbian operating system, all the necessary software components are already available, so it only needs to be configured/installed rather than time-consuming programming.
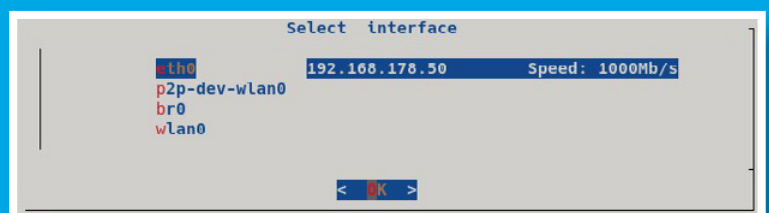
Setting up a hotspot

1.

In the configuration tool "armbian-config" a script is started via the menu item "Network->Hotspot", which executes all necessary steps to create an access point.
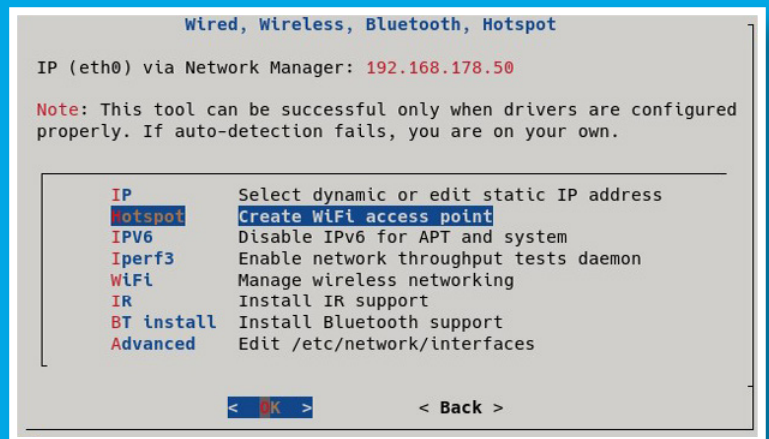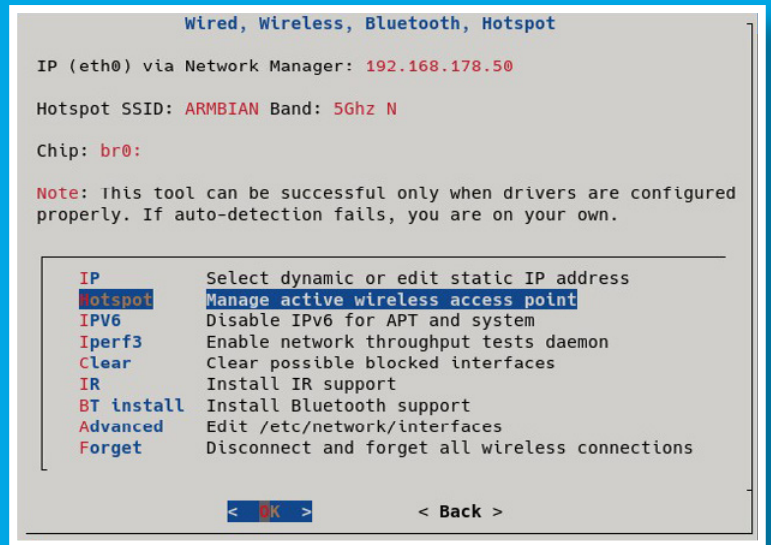

2.

There are still a few questions to be answered, e.g. which interface should be used to provide Internet access.
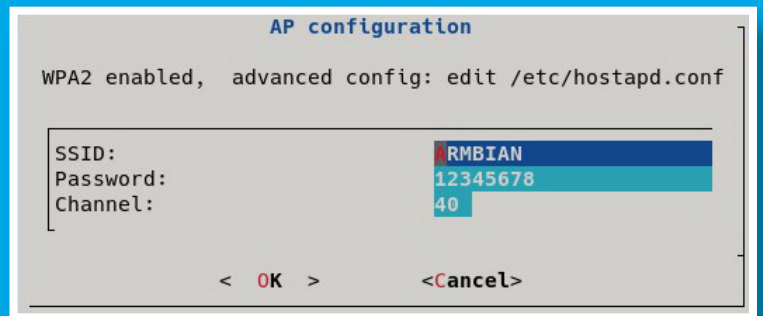
3.

Once the access point functions have been provided, they are configured again using "armbian-config" and the menu item "Network->Hotspot", which now takes on a new task:



```
        Wired, Wireless, Bluetooth, Hotspot

IP (eth0) via Network Manager: 192.168.178.50

Hotspot SSID: ARMBIAN Band: 5Ghz N

Chip: br0:

Note: This tool can be successful only when drivers are configured
properly. If auto-detection fails, you are on your own.

    IP           Select dynamic or edit static IP address
    Hotspot      Manage active wireless access point
    IPV6         Disable IPv6 for APT and system
    Iperf3       Enable network throughput tests daemon
    Clear        Clear possible blocked interfaces
    IR           Install IR support
    BT install   Install Bluetooth support
    Advanced     Edit /etc/network/interfaces
    Forget       Disconnect and forget all wireless connections


        <  OK  >              < Back >
```

4.

The setting options also include the important security functions, including password assignment:


```
                    AP configuration

WPA2 enabled,  advanced config: edit /etc/hostapd.conf

  SSID:                        ARMBIAN
  Password:                    12345678
  Channel:                     40


        <  OK  >          <Cancel>
```

5.

The only thing left to do is to test if the Wi-Fi works. To do this, the smartphone must be logged into the new Wi-Fi with the security key. If this is successful (and you can access the Internet, if necessary), you are ready for the next step.
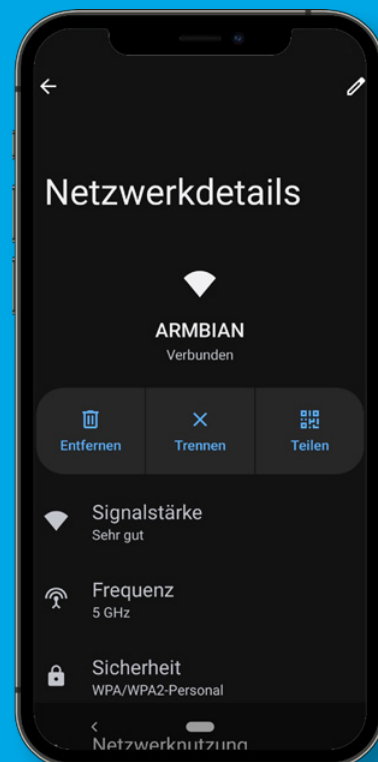
Setting up the camera

1.

We recommend using a commercially available webcam on one of the four USB ports of the MBa8MP-RAS314. It will be detected as soon as it is plugged in. It helps to have all USB devices listed here.

```
root@mba8mpxl-ras314:~# lsusb
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 004: ID 095d:9296 Polycom, Inc. Poly Studio P5 webcam
Bus 001 Device 003: ID 058f:6254 Alcor Micro Corp. USB Hub
Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

2.

As a test, you can now read out the camera information with the Linux tool "v4l2-ctl" after installing it with:

```
root@mba8mpxl-ras314:~# apt install v4l-utils
```

```
root@mba8mpxl-ras314:~# v4l2-ctl -V
Format Video Capture:
        Width/Height      : 640/480
        Pixel Format      : 'YUYV' (YUYV 4:2:2)
        Field             : None
        Bytes per Line    : 1280
        Size Image        : 460800
        Colorspace        : sRGB
        Transfer Function : Rec. 709
        YCbCr/HSV Encoding: ITU-R 601
        Quantization      : Default (maps to Limited Range)
        Flags             :
root@mba8mpxl-ras314:~#
```

Setting up Motion

The heart of the software solution is the Motion package. Motion is a highly configurable program that can monitor video signals and, depending on the configuration, even perform actions when motion is detected. The application offers the following options, among others

- › Create videos or save images of the activity

- › Call scripts when activities occur

- › Log activities to various types of databases

- › Support for many types of cameras

1.

```
root@mba8mpxl-ras314:~# mkdir /var/log/motion
root@mba8mpxl-ras314:~# chown motion:motion /var/log/motion,
root@mba8mpxl-ras314:~# systemctl restart motion.service
```

Motion is installed using "apt install motion". If the log folders are not created automatically, they can be created manually:

2.

```
root@mba8mpxl-ras314:~# nano /etc/motion/motion.con
```

Motion's flexibility allows for many configuration options. To get started, we recommend checking the image size, reducing the frame rate, and adjusting the text overlay:

3.

```
############################################################
# Image Processing configuration parameters
############################################################

# Image width in pixels.
width 640

# Image height in pixels.
height 480

# Maximum number of frames to be captured per second.
framerate 1

# Text to be overlayed in the lower left corner of images
text_left ARMBIAN_CAM
```

The following settings are appropriate to keep the amount of data low for testing purposes:

4.

```
############################################################
# Live stream configuration parameters
############################################################

# The port number for the live stream.
stream_port 8081

# Restrict stream connections to the localhost.
stream_localhost off
```

It is important to allow streaming outwards so that you can see something on your smartphone:

5.

Now it's time for the final test or "transition" to regular operation. Connect the smartphone to the WLAN of the MBa8MP-RAS314, start the browser and enter the IP address/URL. The browser will then display the responses to the previously configured events.
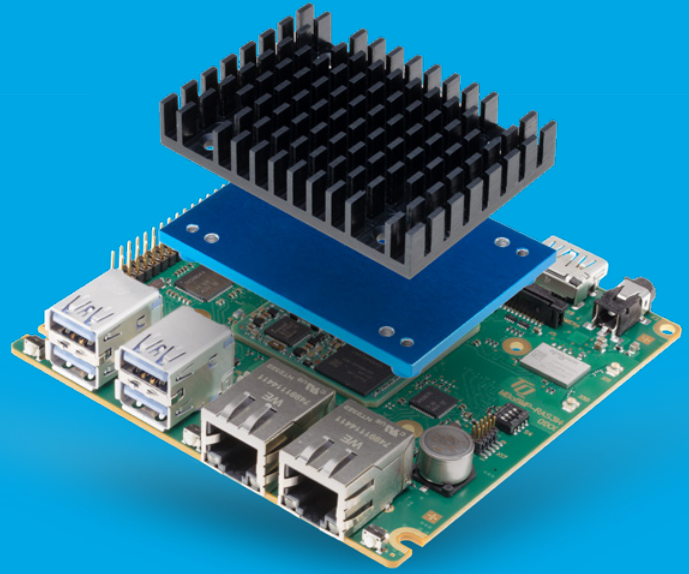
Conclusion

With just a few steps, the basic framework for video surveillance is now up and running. However, the MBa8MP-RAS314 SBC, the Armbian operating system and the "Motion" software still have a lot of potential for functional extensions and new projects – two Ethernet ports, an AI accelerator, three graphics interfaces and a fanless cooling concept make all the difference.
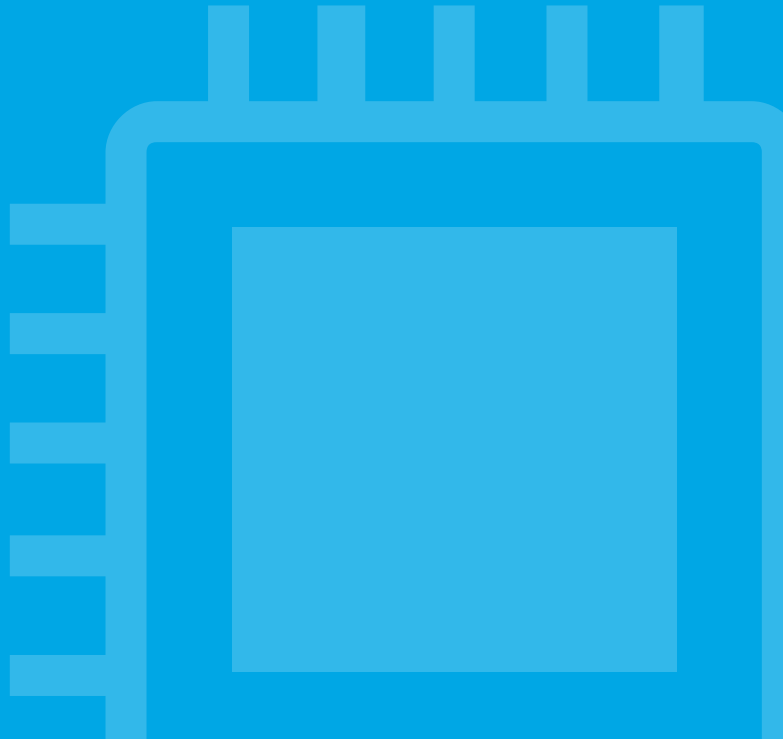
Your Contact

Zöpf, Konrad
product management
Deputy Director TQ-Embedded

T +49 8153 9308–190
W tq-embedded.com
@ Konrad.Zoepf@tq-group.com

Contact Now

Liedmann, Tim
EMB-TVA-technology-
and-support

T +49 8153 9308 490
W tq-embedded.com
@ Tim.Liedmann@tq-group.com

Contact Now

**Technology
in Quality**

TQ-Systems GmbH | TQ-Embedded
Gut Delling | Mühlstraße 2 | 82229 Seefeld | Germany