Roach2 Software Team – Rover processor

The previously planned Xilinx Zynq processor option was rejected due to high costs and increased development effort. Therefore, the Zynq board will be replaced by a comparable Nano Pi board. After some search, the following two boards have been considered. In contrast to other Pi boards, especially the Pi Zero (6x3cm), these boards are tiny (4x4cm) and have more options (in terms of processing power, RAM, GPIO). A special highlight is the WLAN/Bluetooth chip, which is already onboard. The idea is to use this interface during tests and final rocket integration.

Vendor of both is the Chinese company FriendlyArm.

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|  | NanoPi NEO Air | NanoPi Neo Plus2 |
| Processing system | | |
| CPU | Allwinner H3 ARM Cortex-A7 | Allwinner H5 ARM Cortex-A53 |
| Number of cores | 4 | 4 |
| Clock frequency | 1,2GHz | 1,5GHz |
| RAM | 512MB DDR3 | 1GB DDR3 |
| Flash/eMMC (non-volatile memory) | 8 or 32 GB eMMC | 8GB eMMC |
| Connectivity | | |
| Wireless | WLAN b/g/n, Bluetooth 4 | WLAN b/g/n, Bluetooth 4 |
| Wired | No Ethernet | 1Gbit/s Ethernet |
| GPIO | | |
| GPIO Pins total | 36 | 36 |
| USB (v2.0) | 1 (+2 through GPIO pins) | 2 (+2 through GPIO pins) |
| UART (serial) | 1 (+2 through GPIO pins) | 2 through GPIO pins |
| microSD | 1 | 1 |
| Camera | 24pin FPC (DVP CI) | - |
| I2C | 1 | 1 |
| SPI | 1 | 1 |
| Mechanics | | |
| Size (mm) | 40x40mm | 40x52mm |
| Temperature grade |  |  |
| Temperature grade | -20 to +70°C | not specified |
| Weight | 9,7g | not specified (>9,7g) |
| Price | $39 | $42 |

If these boards are compared to standard Raspberry Pi (e.g: Pi3 Model B), it is clear that they are smaller while equipped with more modern ICs (DDR3 RAM compared to DDR2 and eMMC instead of SD card). But the number of GPIO pins (36 compared to 40) is reduced, this should be observed.

In terms of speed, it should be noted that eMMC is not as fast as solid state drives (SSD) but significant faster than SD card. Example: Panasonic states their eMMC devices with 280MB/s read rate compared to 104MB/s SD card (also from the same company). Many smartphones have eMMC memory and some tablets (e.g. smaller versions of Microsoft Surface).

The full schematics for FriendlyArm boards are online available (<http://wiki.friendlyarm.com/wiki/images/b/bf/Schematic_NanoPi_NEO_Plus2-v1.1-1805.pdf>, <http://wiki.friendlyarm.com/wiki/images/0/00/Nanopi-neo-air-v1.1_1708.pdf> ). The original Raspberry Pi hardware schematics are only partially available. This might be useful for the electronic development.