Drone ohjeet

Tekninen erittely:

* Luettelo komponenteista siten, että ne on selkeästi yksilöitävissä ja tunnistettavissa (hankintakanava kannattaa liittää myös tähän listaan).

Components

HolyBro PX4 Development Kit V2. (<https://www.mybotshop.de/Holybro-X500-V2-ARF-Kit_5>)

Following components included in the development kit:

* 4x Motors: Holybro 2216 KV920 motor (<https://www.flyingtech.co.uk/electronics/holybro-brushless-motor-2216-920kv-cw-ccw>)
* 4x Electronic Speed Controllers: BLHeli controller
* 6x 1045 propeller
* Body: Full carbon top and bottom plate (144x144 mm, 2mm thick)
* Arm: 16mm carbon fiber tubes
* Chassis: 16 mm and 10 mm carbon fiber tubes
* Battery holder with 2 battery straps
* Power distribution board (PDB), XT30 connectors for ESCs, XT60 for battery.
* 433MHz 100mW Telemetry module (<https://holybro.com/products/sik-telemetry-radio-v3>)
  + Adjustable output power (maximum 100mW)
  + Manual <https://docs.holybro.com/telemetry-radio/sik-telemetry-radio-v3>
* M8N GPS module (<https://holybro.com/products/m8n-gps>)
  + Manual <https://docs.holybro.com/gps-and-rtk-system/m8n-and-m9n-gps-module/standard-m8n-and-m9n-gps/overview>
* Pixhawk 6C flight controller
  + PX4 Autopilot software
  + Manual <https://docs.holybro.com/autopilot/pixhawk-6c/overview>
  + Technical specification: <https://docs.holybro.com/autopilot/pixhawk-6c/technical-specification>
  + Ports and descriptions: <https://docs.holybro.com/autopilot/pixhawk-6c/pixhawk-6c-ports>
  + Firmware: <https://docs.holybro.com/autopilot/pixhawk-6c/supported-firmware>

Other onboard components:

* Holybro H-RTK F9P Rover lite (<https://www.mybotshop.de/Holybro-H-RTK-F9P-Rover-Lite_1>)
  + RTK GPS rover module
  + Manual <https://docs.holybro.com/gps-and-rtk-system/f9p-h-rtk-series/standard-f9p/f9p-rover-lite>
* Holybro H-RTK F9P Helical (<https://www.mybotshop.de/Holybro-H-RTK-F9P-Helical_1>)
  + RTK GPS rover/base module
  + Mostly used as base station, but can be mounted to a drone and used as a rover
  + Manual <https://docs.holybro.com/gps-and-rtk-system/f9p-h-rtk-series/standard-f9p/f9p-helical>
  + Specification (Helical and rover lite) <https://docs.holybro.com/gps-and-rtk-system/f9p-h-rtk-series/standard-f9p/specification-and-comparison>
* Nvidia Jetson Nano 4GB developer kit (<https://www.siliconhighwaydirect.com/product-p/945-13450-0000-100.htm>)
  + Companion computer for a drone
  + Manual <https://developer.download.nvidia.com/assets/embedded/secure/jetson/Nano/docs/NV_Jetson_Nano_Developer_Kit_User_Guide.pdf?Q3J7d268ojFDsGnGN0kSXYfVCzEiv2vkL5l4zH77YHgsLRgBWv0GUQAGuS9hWhpBr60pOtqGNPWbgfq0LYlw3WfNVN7DQW7MN-DbZjyd-tt8Q6-OMXHJdRo2PSKShcTxO8_8qmUmV21laj1ecQhRorHGP0bMYobktgEm1KlL_smxjHBG2oT-df8WIAirD7yBy94=&t=eyJscyI6ImdzZW8iLCJsc2QiOiJodHRwczovL3d3dy5nb29nbGUuY29tLyIsIm5jaWQiOiJlbS1uZXdzLTE5NTY4My12dDQ4In0=>
  + Datasheet <https://developer.download.nvidia.com/assets/embedded/secure/jetson/Nano/docs/JetsonNano_DataSheet_DS09366001v1.1.pdf?GDGI_EwD7Zng6sqTbb-pH7Hp9F8SipO0bOezYEIswzNT0Xe4tyMsvJNsBnp5NhcxfD9rUqqzZy3FfJfoVdk2MHm7JliTWQt5zHm-vMLDzUwK1Wt__SyBJfrDdH3oSXLy1JUBJ5I_dNa7uvirs63Hv-jR0ltD6ADtfcDwS9ejYjYjjor-0ZZH22HkGB9Abg==&t=eyJscyI6ImdzZW8iLCJsc2QiOiJodHRwczovL3d3dy5nb29nbGUuY29tLyIsIm5jaWQiOiJlbS1uZXdzLTE5NTY4My12dDQ4In0=>
  + Product design guide <https://developer.download.nvidia.com/assets/embedded/secure/jetson/Nano/docs/Jetson_Nano_Product_Design_Guide_DG-09502-001_v2.4.pdf?lyHBT9LCXvjzoRBfIvySKtgKaf2swmKID_1AxTEBlGcIu3XdJ0dcSNNVcwXPhADCYt1G4zL6C-YXRu7Kp-Vg7eFInDKLbgEA5Gx9HVNdOujU5OJXkfM7-BAtsZHL5gmF4puv3ggLmOEwAYZO8bx_d-XE-Q9ON90cxQdeOtiwtMngOfPLouM-yMeSdCk1nkvSA9w-X-Tg628nJ3cJrw==&t=eyJscyI6ImdzZW8iLCJsc2QiOiJodHRwczovL3d3dy5nb29nbGUuY29tLyIsIm5jaWQiOiJlbS1uZXdzLTE5NTY4My12dDQ4In0=>
  + Thermal design guide <https://developer.download.nvidia.com/assets/embedded/secure/jetson/Nano/docs/Jetson_Nano_Thermal_Design_Guide.pdf?LSRm7DZ2XLYAvQC_XJr9c6YPO_ZSgkrG3VD_7n6GRzSpZ5tEghVZ_iW_dVGnKCzihaT7bZKAzl7-7g3HpWMIcarQCNGUzn9inEgavWkn5mNT_5P6of9unovOE_CFPLnKjY-EQ_9YxojvemvoMUyrnUX-55GG2qv2FdfWfeK9Ua9Mh1EqkDLeUDUoGg==&t=eyJscyI6ImdzZW8iLCJsc2QiOiJodHRwczovL3d3dy5nb29nbGUuY29tLyIsIm5jaWQiOiJlbS1uZXdzLTE5NTY4My12dDQ4In0=>
* Radiolink AT9s pro transmitter and receiver (<https://www.mybotshop.de/Radiolink-AT9S-Pro_1>)
  + Transmitter battery: 8x AA battery
  + Manual <https://www.mybotshop.de/Datasheet/Radiolink_AT9S_Pro.pdf>
  + Specifications <https://www.radiolink.com/at9spro_specifications>
* Luxonis DepthAI OAK-D Lite auto-focus camera (<https://www.mybotshop.de/Luxonis-DepthAI-OAK-D-Lite-Auto-Focus_1>)
  + 20 computer vision processors, 4K RGB camera, several computer vision features implemented.
  + Manual <https://docs.luxonis.com/projects/hardware/en/latest/pages/DM9095/>
  + Datasheet: <https://github.com/luxonis/depthai-hardware/blob/master/DM9095_OAK-D-LITE_DepthAI_USB3C/Datasheet/OAK-D-Lite_Datasheet.pdf>
* Drone battery: Admiral 5000mAH 4S 14.8V 40C LiPo Battery with XT60 connector (<https://www.motionrc.eu/collections/lipo-batteries/products/admiral-5000mah-4s-14-8v-40c-lipo-battery-with-xt60-connector-epr50004x6>)

Components needed to fly the drone:

* LiPo Charger
* Komponenttien datalehdet tai linkit niihin
* Ohjelmistot ja niiden versiot (linkit), itse kirjoitettujen ohjelmien source tai linkki siihen, parametriasetukset

Firmware:

Software:

* QGroundControl
* Ardupilot mission planner
* Jetson Nano develoepr kit operating system Linux4Tegra, based on ubuntu 18.04 <https://developer.nvidia.com/embedded/linux-tegra-r321>
* DepthAI API for OAK-D Camera features <https://docs.luxonis.com/projects/api/en/latest/>
* Kaaviot ja tekniset piirustukset

Käyttö- ja huolto-ohje:

* Miten käynnistät, miten lennät, miten sammutat
* Autonomisten ja avustettujen toimintojen selostukset (esim. palaa kotiin -toiminta yms.)
* Luettelo erityisesti huomioon otettavista asioista käytettäessä
* MTOW, hyötykuorma jne
* Rajoitukset (tuuli, sade yms.)
* Huolto- ja tarkastuskohteet sekä huolto-/tarkastusvälit (esim. ennen joka lentoa, viiden lennon välein, kerran vuodessa)