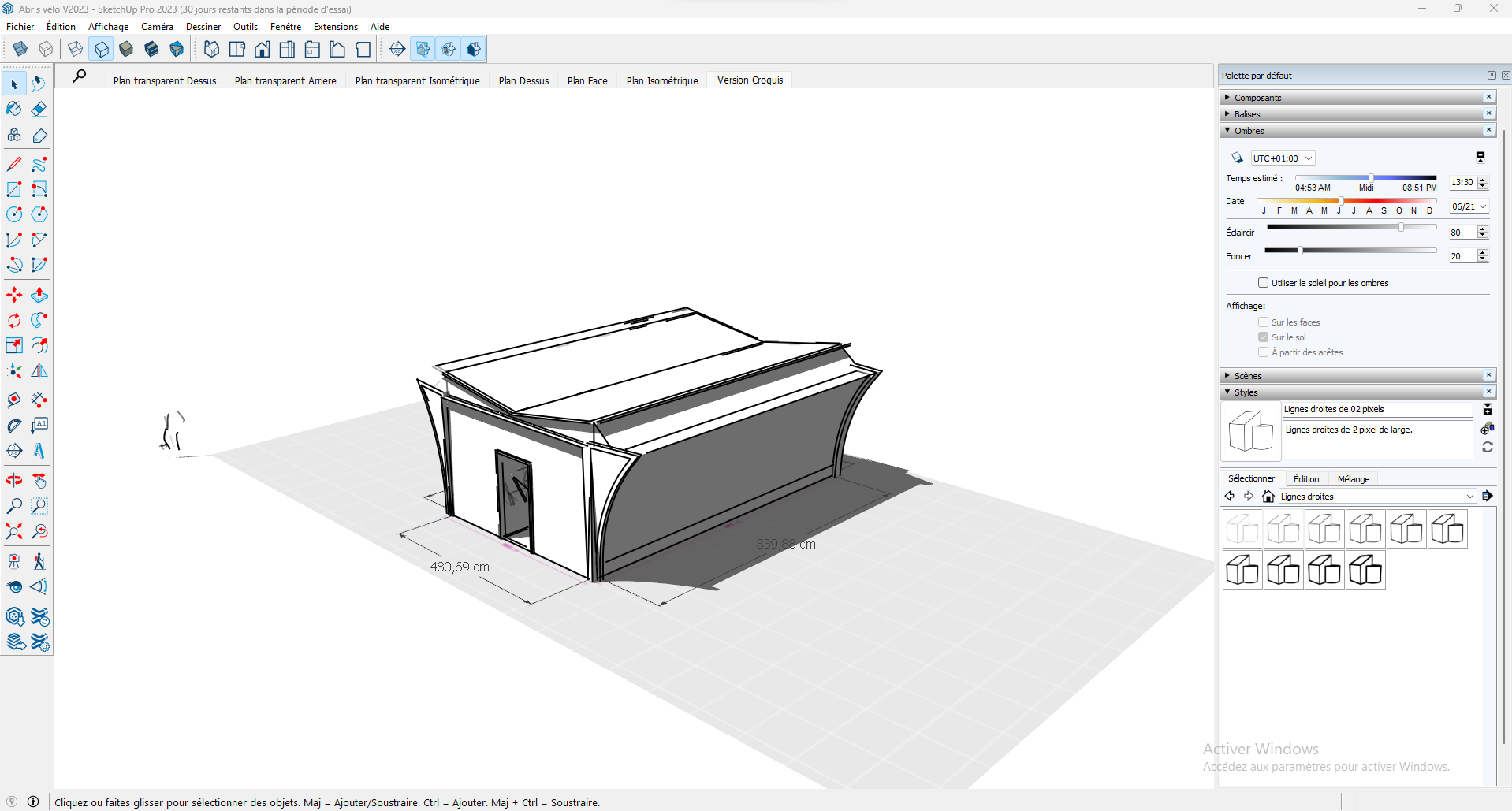
**Projets SN2 2023-2024**

***Abri de recharge Consommation électriques – Gestion de la conso***

*Cahier de bord – Joris HURTEL*



**Sommaire**

[1) Bibliographie : 3](#_heading=h.gjdgxs)

# 1) Bibliographie :

[Trello](https://trello.com/b/XDnRM1jW/projet-final)

[Google Drive](https://drive.google.com/drive/folders/1JvzA8zroyIRZV0kFtwQKsiKQSrOBUEw3)

[Cours Moodle de M. Grémont - Description des cas d'utilisation : Scénario](https://moodle.tspro.fr/mod/lesson/view.php?id=534)

[Vidéo YouTube de M. Langlacé - [UML.01] Cours UseCase Diagramme de Cas d’Utilisation, Apprendre à le construire](https://www.youtube.com/watch?v=CxqbwWKi6jg&t=671s)

[Vidéo YouTube de M. Langlacé - [UML.05] Diagramme de Séquence : Comment le créer ?](https://www.youtube.com/watch?v=AZ4gwy-ZGC4&t=3s)

[Cours Moodle de M. Grémont - Le diagramme de séquence "système"](https://moodle.tspro.fr/mod/lesson/view.php?id=38)

[Convertisseur d'extension de documents - ilovepdf](https://www.ilovepdf.com/fr)

[Calcul de pourcentages](https://www.lememento.fr/calcul-pourcentage)

[Site d’online visual paradigm](https://online.visual-paradigm.com/)

[Documentation arduino R4](https://docs.arduino.cc/tutorials/uno-r4-wifi/wifi-examples/#wi-fi-udp-send-receive-string)

[Recherches sur la communication de la arduino R4](https://chat.openai.com/c/c1bd7768-4a95-4851-baa2-e488cce1b7a1)

[Recherches sur le jaunissement du boîtier](https://chat.openai.com/c/b1364aaa-1d33-418a-9950-9159bf1b169d)

[Arduino Uno R3](https://store.arduino.cc/products/arduino-uno-rev3)

[Arduino Ethernet Shield 2](https://store.arduino.cc/products/arduino-ethernet-shield-2)

[Maquette tinkercad communication capteur de luminosité par radio 2.4GHz](https://www.tinkercad.com/things/6FjZ92Pov1b-exquisite-kasi/editel?tenant=circuits)

[Arduino R4 Wifi](https://store.arduino.cc/products/uno-r4-wifi)

[Boitier](https://fr.aliexpress.com/item/1005003226458951.html)

[Carte E/S ethernet teracom](https://www.teracomsystems.com/ethernet/)

[Teracom TCW241](https://www.adm21.fr/surveillance-et-controle-a-distance/surveillance-a-distance-sur-ethernet/teracom-tcw241)

[IoT Ethernet I/O Modules: ADAM-6000/6200](https://www.advantech.com/en/products/iot-ethernet-i-o-modules-adam-6000-6200/sub_gf-5197)

[Serveur web interface 8 entrées 8 sorties + RS232 CIE-H10A Sollae Systems](https://www.lextronic.fr/convertisseur-tcp-ip-rs232-8-entrees-8-sorties-cie-h10a-59843.html)

[Serveur web interface 8 entrées - 8 sorties + RS232](https://www.lextronic.fr/convertisseur-tcp-ip-rs232-8-entrees-8-sorties-cie-h10g-77887.html?fast_search=fs)

[Interface TCP/IP vers Entrées/Sorties](https://www.lextronic.fr/interfaces-tcpip-vers-es-8452?order=product.position.asc&resultsPerPage=9999999&productListView=grid)

[BeagleBone® Black Industrial](https://www.beagleboard.org/boards/beaglebone-black-industrial)

[SCT-013-000 Fiches technique (PDF) - List of Unclassifed Manufacturers](https://pdf1.alldatasheet.fr/datasheet-pdf/view/1150537/ETC1/SCT-013-000.html)

[SCT013-000 de capteur de courant SCT013 10A 20A 30A 50A 60A 100A 50MA SCT-013 0-100A Non-BREAC Split Core](https://fr.aliexpress.com/item/1005005919432252.html?src=google&src=google&albch=shopping&acnt=494-037-6276&slnk=&plac=&mtctp=&albbt=Google_7_shopping&albagn=888888&isSmbAutoCall=false&needSmbHouyi=false&albcp=19207420692&albag=&trgt=&crea=nl1005005919432252&netw=x&device=c&albpg=&albpd=nl1005005919432252&gad_source=1&gclid=Cj0KCQiAoeGuBhCBARIsAGfKY7zNVLIti5ljHvvLmxTJk7zDIw4VBIv9sS3Krm1ezDyvZAkBplQGLusaAoIFEALw_wcB&gclsrc=aw.ds&aff_fcid=d9eda2e117bd419e9f6413eac0b541d5-1708691296992-02839-UneMJZVf&aff_fsk=UneMJZVf&aff_platform=aaf&sk=UneMJZVf&aff_trace_key=d9eda2e117bd419e9f6413eac0b541d5-1708691296992-02839-UneMJZVf&terminal_id=8bf98c2a6519484893ff944673ed4167&afSmartRedirect=y)

[Transformateur de courant rétractable YHDC 30A 50A 100A SCT013000, 1 pièce](https://fr.aliexpress.com/item/4000497223928.html?src=google&src=google&albch=shopping&acnt=248-630-5778&slnk=&plac=&mtctp=&albbt=Google_7_shopping&gclsrc=aw.ds&albagn=888888&isSmbAutoCall=false&needSmbHouyi=false&src=google&albch=shopping&acnt=248-630-5778&slnk=&plac=&mtctp=&albbt=Google_7_shopping&gclsrc=aw.ds&albagn=888888&ds_e_adid=&ds_e_matchtype=&ds_e_device=c&ds_e_network=x&ds_e_product_group_id=&ds_e_product_id=fr4000497223928&ds_e_product_merchant_id=107690080&ds_e_product_country=FR&ds_e_product_language=fr&ds_e_product_channel=online&ds_e_product_store_id=&ds_url_v=2&albcp=20871206076&albag=&isSmbAutoCall=false&needSmbHouyi=false&gad_source=1&gclid=Cj0KCQiAoeGuBhCBARIsAGfKY7zkdP993jKr7ylZ9HsYfLO3EYW27IwksE865poexYjwG_SQL1qKOB0aAo0xEALw_wcB&aff_fcid=e02cd9fd4cca40bb9f5dfa35a94ae160-1708691237785-03791-UneMJZVf&aff_fsk=UneMJZVf&aff_platform=aaf&sk=UneMJZVf&aff_trace_key=e02cd9fd4cca40bb9f5dfa35a94ae160-1708691237785-03791-UneMJZVf&terminal_id=8bf98c2a6519484893ff944673ed4167&afSmartRedirect=y)

[ADAM-6050-D Module ADAM Entrée/Sortie sur Ethernet Modbus TCP, MQTT et SNMP, 18 voies isolées DI/DO](https://www.integral-system.fr/products/module-adam-entree-sortie-sur-ethernet-modbus-tcp-18-ch-isolated-di-o-module-adam-6050-d-fr#nav-details)

[USB-6008 Multifunction I/O Device](https://www.ni.com/nl-nl/support/model.usb-6008.html)

[Shelly Pro 3EM](https://www.shellyfrance.fr/shelly-pro-3em/)

[QL3D](https://ql3d.fr/185-fixes-sur-ip)

[Ethernet remote monitoring and control](https://www.teracomsystems.com/ethernet/)

[Ethernet IO module TCW241](https://www.teracomsystems.com/ethernet/ethernet-io-module-tcw241/)

[Teracom TCW241](https://delmation.nl/product/teracom-tcw241/)

[Ethernet data logger TCW220](https://www.teracomsystems.com/ethernet/ethernet-data-logger-tcw220/)

[Teracom TCW220](https://delmation.nl/product/teracom-tcw220/)

[1-Wire current sensor TSC200-15](https://www.teracomsystems.com/sensors/1-wire-current-sensor-tsc200-15/)

[Teracom TSC200-15](https://delmation.nl/product/teracom-tsc200-15/)

[Fiche technique](https://www.teracomsystems.com/wp-content/uploads/tsc200/tsc200-15-1-wire-current-sensor-r2.5.pdf)

[SCT-013-000 courant ouvert-fermé du capteur de courant SCT013 non-BREAC de 30A 50A 100A ondulé](https://fr.aliexpress.com/item/1005005944620595.html)

[Vidéo Capteur d'intensité lumineuse BH1750 16 bits I2C](https://www.youtube.com/watch?v=r1pJDV2UYIQ)

[Capteur d'intensité lumineuse BH1750 16 bits I2C](https://www.otronic.nl/fr/capteur-dintensite-lumineuse-bh1750-16-bits-i2c.html)

[Site arduino pro](https://www.arduino.cc/pro/platform-hardware/)

[Site arduino pro/ famille portenta](https://www.arduino.cc/pro/hardware-product-family-portenta-family/)

[Site arduino pro/ famille portenta/ hat carrier](https://www.arduino.cc/pro/hardware-product-portenta-hat-carrier/)

[Arduino shop /Portenta Hat Carrier](https://store.arduino.cc/products/portenta-hat-carrier?_gl=1*1smltca*_ga*NTQ3ODk0NDMuMTcwODA3MDA1MA..*_ga_NEXN8H46L5*MTcxMTA5MjExMS43LjEuMTcxMTA5MjU3NC4wLjAuOTQ0NDI2MzY5*_fplc*Sm4lMkJuVEhpak90aVo2N2JlWEJ5TFFrRU1qY1k1ZjRiRU4lMkI0a0N0REQzJTJCSUtnUjdjTkJ0R0YlMkZyJTJCJTJGQyUyRnN3YUhjbW03UW1kRHAxa1dxRU53NWJxTU16dkltQUJmRWIwTyUyRkhPVFliSnFDV1E1bmxHekFQNU10dThGOHFIQVNaZyUzRCUzRA..&selectedStore=eu)

[Diodes Lextronic](https://www.lextronic.fr/diodes-4066?order=product.position.asc&resultsPerPage=9999999&productListView=list)

[Diode Zener 0,5 W - Tension au choix de 2,4 V à 68 V](https://www.lextronic.fr/diode-zener-13v-0-5w-33666-30972.html#/1512-composants-47_v)

[Résistances Lextronic](https://www.lextronic.fr/resistances-8485)

[Résistances carbones](https://www.lextronic.fr/resistances-carbones-3878)

[Plieur de composants](https://www.lextronic.fr/plieur-de-composants-64460.html)

[10 résistances 1/4W couche carbone](https://www.lextronic.fr/resistance-1-4-w-couche-carbone-46327-2426.html#/1823-resistance_couche_carbone-150_)

Site Advantech

[ADAM-6052](https://www.advantech.com/en/products/a67f7853-013a-4b50-9b20-01798c56b090/adam-6052/mod_8e8d8d87-f30b-4f82-b77e-4e3822dfca5d)

[ADVANTECH ADAM-6052-D (achat)](https://www.westercom.eu/fr/modules-d-e-s-ethernet-adam-6000/2230/advantech-adam-6052-d.html)

[Bestlus Breadboard Jumper Wires 20AWG, Exclusives Premium Male to Male Jumper Cable Wires M/M 4'', 10 Colors, Pack of 120, Square Head 0.1'' for Arduino Raspberry Pi (10CM, Male-Male)](https://www.amazon.fr/gp/aw/d/B09H2TRZHB/?_encoding=UTF8&pd_rd_plhdr=t&aaxitk=bd5b6279a94c0574e56977480ca77364&hsa_cr_id=8838988000802&qid=1711616845&sr=1-1-e0fa1fdd-d857-4087-adda-5bd576b25987&ref_=sbx_be_s_sparkle_lsi4d_asin_0_img&pd_rd_w=7ncy8&content-id=amzn1.sym.fcb06097-6196-4e78-932c-0f6f89d56105%3Aamzn1.sym.fcb06097-6196-4e78-932c-0f6f89d56105&pf_rd_p=fcb06097-6196-4e78-932c-0f6f89d56105&pf_rd_r=AFA1VBS3P427YAEJZZV0&pd_rd_wg=NsRKv&pd_rd_r=0cd2dfee-0ec8-4ae6-9edb-5358568ee389&th=1)

[GTIWUNG 4 Pièces 830 Points Mini Breadboard, Arduino Steckbrett Elektronik, 830 Ties Mini Solderless Breadboard, Prototype Board Lötbares Breadboard für Arduino Jumper Kabel](https://www.amazon.fr/GTIWUNG-Breadboard-Steckbrett-Elektronik-Solderless/dp/B0CFXYP5SF/ref=sr_1_4?crid=2UXQUVPS20PXH&dib=eyJ2IjoiMSJ9.Z7OHmOBZ3wwiD--owLY1_KR38sMJ17iRInztpegWibAxCHj0ZoHU4eK-TQg1wC0JOEZMf_lthSTA060rtVk6V1AWXYpU6oBFN6Wg06BKppKGsSGhxBSw877bH1yKNwEuv_f5l1Cl8QR2hIz9PTZVBO8xvbXHIJ3QGexMHsVSVBPSk15MUVjWy77o4jWSkgkXXY1GOERAlFIz06-vdPUW_N14e2BF_gwAjZtxx1oXsg5UAuKldIUzyD4KMNeW22Eh5vq3IpdRg6ZWajLPy_prEip3pgK9fJ3NdJk988aToZc.c1WjckmswEpdRsigfEXrbXnQfgXcUTmMKZoea9D5scU&dib_tag=se&keywords=breadboard&qid=1711618271&s=industrial&sprefix=bread%2Cindustrial%2C116&sr=1-4&th=1)

[MutecPower 15m CAT 8 Câble Ethernet Super Débit ULTRA PLAT 40Gbps 2000MHz POE Câble Réseau S/FTP RJ45 Câble LAN en Cuivre - Idéal pour Internet, Routeur, Modem, TV, PC, Switch, PS4 PS5-15 mètres Noir](https://www.amazon.fr/MutecPower-Ethernet-40Gbps-2000MHz-R%C3%A9seau/dp/B0BGYCLRWH/ref=sr_1_3?__mk_fr_FR=%C3%85M%C3%85%C5%BD%C3%95%C3%91&crid=BXAZYFXNEZW7&dib=eyJ2IjoiMSJ9.aB1mwTDjKLNb1PrYv6fy8s2z03ix0HmlT3YU-e3SCYuz8DKhUKidBjN-V9LttV_r1D_T15NUfdSiOgvGz3FiozkQ-2l0wL-cCtp8Tg-ArsNJKR0rCJEEbhE-vsCbn0jCysjpaky1dL1uCdKcmZCQj_DjvuKiqW3jwhyHxm-PmZd_ciuPDZHfTS9nbyXz7h95KQav_pWzARGQXbAtbDaMU-fykhuXglnbrZ81uy4NZGXMvZpPGEHRGJ6Ftg9B4bbrD2VuinJv5oMiykAaOfab9Yfzw91y5whWwSZ3Id1bJz8.YNx2traYDPkvzKmT0fRcBbxui5TMY5Llv-atTFwmmpE&dib_tag=se&keywords=MutecPower%2B20m%2BCAT%2B8%2BC%C3%A2ble%2BEthernet%2BSuper%2BD%C3%A9bit%2BULTRA%2BPLAT%2B40Gbps%2B2000MHz%2BPOE%2BC%C3%A2ble%2BR%C3%A9seau%2BS%2FFTP%2BRJ45%2BC%C3%A2ble%2BLAN%2Ben%2BCuivre%2B-%2BId%C3%A9al%2Bpour%2BInternet%2C%2BRouteur%2C%2BModem%2C%2BTV%2C%2BPC%2C%2BSwitch%2C%2BPS4%2BPS5-20%2Bm%C3%A8tres%2BNoir%2B%3A&qid=1711620384&s=industrial&sprefix=mutecpower%2B20m%2Bcat%2B8%2Bc%C3%A2ble%2Bethernet%2Bsuper%2Bd%C3%A9bit%2Bultra%2Bplat%2B40gbps%2B2000mhz%2Bpoe%2Bc%C3%A2ble%2Br%C3%A9seau%2Bs%2Fftp%2Brj45%2Bc%C3%A2ble%2Blan%2Ben%2Bcuivre%2B-%2Bid%C3%A9al%2Bpour%2Binternet%2C%2Brouteur%2C%2Bmodem%2C%2Btv%2C%2Bpc%2C%2Bswitch%2C%2Bps4%2Bps5-20%2Bm%C3%A8tres%2Bnoir%2B%2Cindustrial%2C75&sr=1-3&th=1)

[MutecPower 5m CAT 8 Câble Ethernet à l’extérieur étanche Haut débit 40Gbps 2000MHz POE Gigabit Direct Burial Patch Câble réseau S/FTP RJ45 Câble LAN en cuivre - Pour Internet, Routeur, Modem, TV, PC](https://www.amazon.fr/MutecPower-Ethernet-lext%C3%A9rieur-%C3%A9tanche-2000MHz/dp/B0BGYDKNDK/ref=sr_1_5?__mk_fr_FR=%C3%85M%C3%85%C5%BD%C3%95%C3%91&crid=244Q6C13GCN88&dib=eyJ2IjoiMSJ9.yvsFr0rI6exWb1pBU-EkO0LHDPAv31Aaykv75JyaNblWI3nfWBJmooklZGmf2WLL87nANtATBU7pS2a7eHz8Zrks1Mi46VKXR4EUk_ebPxqLSlqZ00RZa6HYduOEO6mKHtIUZSew1EuzqgjeK315t8tfCFI1xahuErQhxthujUoEb7ZfdEXSfGNTyKS1nI_t6PT-b8MjHhQdGlGHx52JhY6STVxL0Lah0_YzzDrGUJN34NVusQBvELOoZM74Sv_ZJcYPEsBY1aSg6c1tBlXatMf5a_P-Hf_nyyEqdq-g3HM.cKL66VwIaH2qvpPT6TP3OHjvlvRO72LZnZcKu-CygZo&dib_tag=se&keywords=MutecPower+5m+CAT+8+C%C3%A2ble+Ethernet+Super+D%C3%A9bit+ULTRA+PLAT+40Gbps+2000MHz+POE+C%C3%A2ble+R%C3%A9seau+S%2FFTP+RJ45+C%C3%A2ble+LAN+en+Cuivre+-+Id%C3%A9al+pour+Internet%2C+Routeur%2C+Modem%2C+TV%2C+PC%2C+Switch%2C+PS4+PS5-20+m%C3%A8tres+Noir+%3A&qid=1711620299&s=industrial&sprefix=mutecpower+5m+cat+8+c%C3%A2ble+ethernet+super+d%C3%A9bit+ultra+plat+40gbps+2000mhz+poe+c%C3%A2ble+r%C3%A9seau+s%2Fftp+rj45+c%C3%A2ble+lan+en+cuivre+-+id%C3%A9al+pour+internet%2C+routeur%2C+modem%2C+tv%2C+pc%2C+switch%2C+ps4+ps5-20+m%C3%A8tres+noir+%2Cindustrial%2C80&sr=1-5)

[deleyCON 6m Câble Téléphonique RJ11 Câble Modulaire 6P4C Câble Western RJ11-RJ11 Prise Câble Plat Prise Téléphonique Modem Routeur Fax ISDN DSL VDSL Internet Noir](https://www.amazon.fr/deleyCON-T%C3%A9l%C3%A9phonique-Modulaire-RJ11-RJ11-Internet/dp/B08BHLFMR1/ref=sr_1_3?crid=2WIHK0ETG3293&dib=eyJ2IjoiMSJ9.vXMgO1FMSSAfgtRSKd09uzMdJqAPeEOlPBEdZqzLLVfT0i6PwDjqZcLC0Td0v7DZpbuKFZkhrnY-1yAcqYHxNWWDQQZXUdSpWDIQ_bdNG2LOzZHQIcb7FBYShgTP3MBAv4jyabBnUULLNf3ZhKDs0FDvh69kiULTXc4irar_TzlDsJZqRdDBbDZBvOcVgZXrCvrBhVOcUWwQYa3DqmzH_kmIQ2LmdtyCYKXaJU4D2I5CzyZwq5dMRUawriRGsUefXQYj7vpffjKXTO3T2J8IAHqbfPwC0hSWEFq4bKxpkFQ.de6SSBP2NS3DMbP6CodBGZe849PNnvabVV8AuU2HqW4&dib_tag=se&keywords=c%C3%A2ble%2Brj11%2Bvers%2Brj11&qid=1711622218&refinements=p_n_feature_two_browse-bin%3A27177563031&rnid=27177561031&s=computers&sprefix=C%C3%A2bles%2BRJ11%2Bvers%2Caps%2C107&sr=1-3&th=1)

[deleyCON 10m HQ Câble Coaxial Satellite SAT 130dB Blindé 4 Couches DVB-S DVB-S2 DVB-T DVB-C 4K 1080p FULL HD HDTV + 10 Connecteurs F Plaqués Or](https://www.amazon.fr/coaxial-satellite-deleyCON-couches-connecteurs/dp/B01JS9NXE8/ref=sr_1_2_sspa?dib=eyJ2IjoiMSJ9.0U5Nd7rtuTlSjIwNQrrn1PDFgOyObdbbVPo88T1_C04lOYjdfPreAFK_w3fJoh-m3SY_q-AmfFdGGVGMbMUg2lVB2iflvxolfEBkQNIad6Zusw6dDdsXfbi0_BkAlJXEpfqg5cGZ_UnAe0m2seoW3ppXv-3XqEsYh8Q43gkzBjYVVfe0tXqHoMk2tfwVHu25034O74wdSytPsfvoY0wsZ1e-LQbPs55VuQZkyhj9P_3LDb41Q_vyB_rBYVnKghvG0b8s6WJhwUWk7pxWMNgTrE5FNqtb7YqaZSXVworw1lU.eS1XookJwtzUqe7k75NnLVakc4dHQT500Z6_G26VHv4&dib_tag=se&keywords=C%C3%A2ble%2Bcoaxial%2B5M&qid=1711623532&sr=8-2-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&th=1)

[Connecteur BNC Amphenol Femelle à angle droit, raccordement Traversant 50Ω Montage sur CI](https://fr.rs-online.com/web/p/connecteurs-coaxiaux/7009411?cm_mmc=FR-PLA-DS3A-_-google-_-CSS_FR_FR_ePMax_Low-_--_-7009411&matchtype=&&gad_source=1&gclid=Cj0KCQjwqpSwBhClARIsADlZ_TknCC6zTg8it9N4P7MTFxA5UnWJm44bpfUB-G79C2Uqw5Hw10xa4Q0aArY7EALw_wcB&gclsrc=aw.ds)

[Portenta H7](https://store.arduino.cc/products/portenta-h7)

[Portenta Hat Carrier User Manual](https://docs.arduino.cc/tutorials/portenta-hat-carrier/user-manual/)

[Breadboard Jumper Wires 20AWG, Male to Female Jumper Cables Wires Premium 4'' M/F, Bestlus Exclusives, 10 Colors, Pack of 120, Square Head 0.1'' for Arduino Raspberry Pi (10CM, Male-Female)](https://www.amazon.fr/Breadboard-Bestlus-Exclusives-Raspberry-Male-Female/dp/B09H2WGVJ5/ref=sr_1_4?__mk_fr_FR=%C3%85M%C3%85%C5%BD%C3%95%C3%91&crid=39THEG703EVZQ&dib=eyJ2IjoiMSJ9.IaMIz1C7TX5fib9Bg9-pMjj-L9gfWmYPIvZROnOFQNoVMPc_YzlEQ_9beu5iJMX1F8iiVJ7YN_MUBzeXw4fDDPYqh7RqkA-55ZBC4uj3p_-W_u2GHc667-BpCrZws_RKLtoTOYh7PMxOnODvcbZF0K7UJISlovZ3i3Z1yqmOYO5CmDmj16Mp1f97drfir7DgpzzUZxtCXE7tExq4f5DDBK41vQNBe478FPDe6f2e1gK66Q6NTwzKvpZi3TrfPEFCrxalASLA2Au9Ag5ymgkDko5GN1cyKXAWQ4UKs3Iqb18.V2Z0TBNKxBZeh77uvmaDp2gzyq-ED_9gZD2eBuXFTyg&dib_tag=se&keywords=jumper%2Bmale%2Bto%2Bfemale&qid=1711635309&s=computers&sprefix=jamper%2Bmale%2Bto%2Bfemal%2Ccomputers%2C80&sr=1-4&th=1)

[VooGenzek 120 Pièces 2.54mm PCB Carte Femelle Broche Connecteur Socket Connecteur Bande Kit, Femelle Pin Header Socket Connecteur Bande, pour Arduino Empilable Shield (4/6/8/10/12/16/20/40 Pin)](https://www.amazon.fr/VooGenzek-Femelle-Connecteur-Arduino-Empilable/dp/B09NDMVD2C/ref=sr_1_2?dib=eyJ2IjoiMSJ9.q1tCKQpeNZ7VmQoArzAM6uHpDjRSYNuqc11kuwUhm_MDNR0SAMb0EESko6EdHr39uqkh23UKHen01X2yQctR8f0HH8f31ARA470MZJH8BaUjgweJNIFGKJMFhyZSPwWn2lnnygjU0b7tM7J1trHXe5rK1QbfCT8ok-LX9Z_poaIUg8APjBDnKxXVTepbsc7PE__eYvPOxbd_7qbs1fqV3DMZp-S00P1NtiNNxEeb2qyXmS_UImv55AlFeNBZK4_jFnbqhXGNJaJ-msolfjegBSITq6NEWf62RQtObOWGCO0.NuKY9FfA3cu6nVA3k_j1E2s9kQSUjeGHejlkiRiBOfs&dib_tag=se&keywords=arduino+barrette+pin+femelle&qid=1711635895&sr=8-2)

[Bibliothèque Boost pour maquette C++](https://www.boost.org/users/download/)