Assembly of the Connected Smart Box

Connected Task board with Robot Arm.

Parts List

Item	Quantity	Part number	Description
20	2		Ethernet Passthrough
19	1		Ethernet Plug
18	1		Battery Housing
17	1		Weigh Unit
16	2		SHCS M5x12mm
15	1		Load Cell Stand (Printed)
14	1		Load Cell Adapter (Printed)
13	1		Load Cell 10kg
12	1		Key
11	6		SHCS M2.5x8mm
10	2		SHCS M4x16mm
9	12		SHCS M4x12mm
8	1		Button Cover (Printed)
7	2		Velcro Strip
6	1		Key Switch
5	2		Dual Button Unit
4	1		PbHub Unit
3	1		Key Holder Insert (Printed)
2	1		M5StickCPlus Microcontroller
1	1		Enclosure

Task Boarding Starting Position

Robothon 2021 Competition Task Board
- 5 distinct manipulation tasks are represented on the board surface. Button Push, Plug Insertion, Key Turn, Lid Removal, Battery Insertion.
- Users must place board on flat table within reach of their robot system.
- Teams must program their robot sytem to autonomously move the task board from the initial configuration to the goal configuration.
- Configure the network connection for automatic scoring and grading of trials SSID: "AutoConnectAP-task-board".
- USB plugs were swapped for Ethernet plugs by request of event sponsor, challenge remains the same.
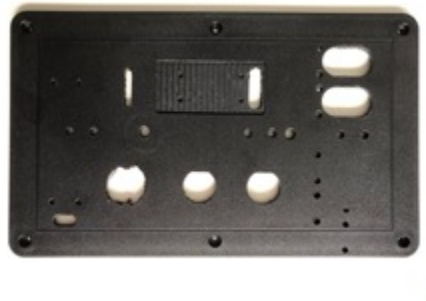
ROBOTHON 2021

Connected Task Board
MSRM

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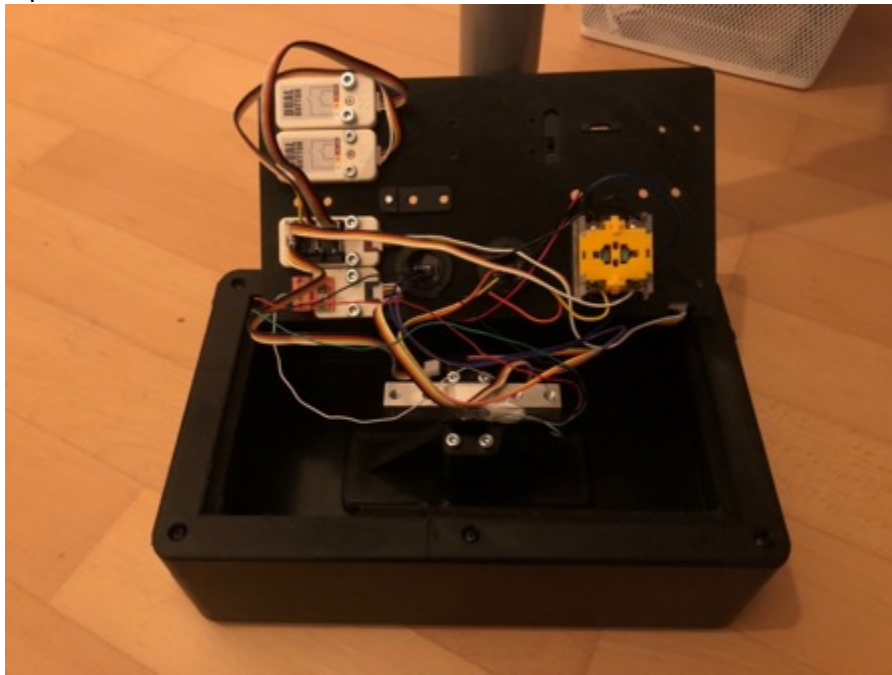
Parts laid out on table prior to assembly.

Procedure

1. Cut lid in CNC.
   1.1. DXF File. CU-3286-MB parts - Cutout Template v3.dxf

2. Print out parts in 3D Printer. Quantities are per task board.
   2.1. LC Stand 1x,
   2.2. Print out LC Mount 1x,
   2.3. Key Holder 1x,
   2.4. Button Cover 1x,
   2.5. Lid Standoff 1x
3. Assemble the load cell column. Quantities are per task board.
   3.1. Box-Stand (4x M3x8mm BHCS "Self-tapping" screw)
   3.2. Load Cell Mount-Load Cell (2x M5x16mm SHCS)
   3.3. Stand-Load Cell Mount (4x M4x16mm SHCS)

4. Mount components to lid.

    4.1. M5StickCPlus (2x M2x8mm SHCS)
    4.2. Key Switch (Included with key switch). Key slot tip facing outward and cross the length of the task board.
    4.3. RJ45 Port x2 (Included with port)
    4.4. Dual Button Unit 2pcs (2x M4x12mm SHCS)
    4.5. Weigh Unit (2x M4x12mm SHCS)
    4.6. PbHub Unit (2x M4x12mm SHCS)
    4.7. Battery Holder (2x M3x8mm FHCS). Slide open the lid and drill a countersink hole in the battery holder to match the pre-drilled holes in the box lid.

5. Wiring – Key Switch
    5.1. Add wire jumper across terminals 12 and 24.
    5.2. Trim off one connector of the grove cable and strip wires BLACK, YELLOW, WHITE.
    5.3. Terminate grove cable on key switch. BLACK = 24, WHITE = 11, YELLOW = 23.
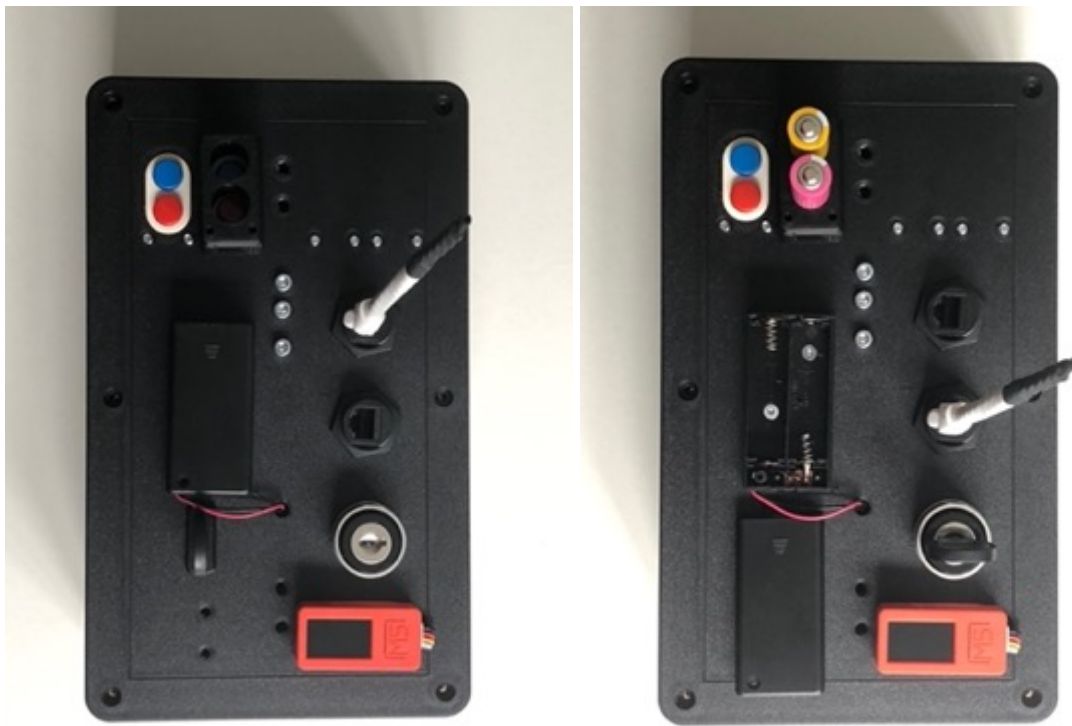
6. Wiring – Soldering for the RJ45 Ports

6.1. Terminate Grove Port Cables for the ethernet port Pins 2 and 7. See picture for pin identification and orientation.

6.2. Make Ethernet Dongle with shorted data wires BLUE and BLUE/WHITE and seal with heat shrink over solder joint and over entire cable.

7. Wiring – Connect Grove port cables to hub.

    7.1. Hub Port Assignments

        7.1.1. Port 0 – Dual Button Unit

        7.1.2. Port 1 – Dual Button Unit (Covered)

        7.1.3. Port 2 – Key switch

        7.1.4. Port 3 – Ethernet Port

        7.1.5. Port 4 – Empty (Reserved for Weigh Unit)

        7.1.6. Port 5 – Empty

8. Upload Program to the M5StickC. <TODO provide final firmware>

    8.1. Still need to figure out the

        8.1.1. WiFi greeter feature

        8.1.2. OTA software update feature

9. Test <TODO Insert Test Protocol>
    9.1. Power up in local mode
    9.2. Power up in access point mode and connect to WiFi.
    9.3. Start experiment and verify data is being sent to the web dashboard

Fully Assembled Task Board.

Initial and Goal State of Competition Task Board