Module 5
Recover Your Bricked Board

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Recover Your Bricked Board

This document will briefly define what a bricked board is. It will go over different approaches one may take in order to quickly determine the cause and troubleshoot any quick fixes. This document can be used as both a precautionary measure as well as a helpful tool to fix a board that is not working because of a known or unknown reason.

Name: Recover Your Bricked Board

Project Description: Students will be required to watch all videos and do some research on the meaning of a bricked board when it relates to a micro-controller. Students will use this Module's videos, and this document as a reference to proactively care for, and to help avoid bricking their DragonBoard™ 410c. Students will learn helpful ways to care for and protect their DragonBoard™ 410c from shorts and irreversible hardware damages. Students will also learn how to fix many software brick issues by incorporating things they have learned in previous Modules.

Project Difficulty:
Estimated Time: hour/s
HW Difficulty: 1/10
SW Difficulty: 3/10

Needed Materials: See Bill of Materials

Note:
- Ensure the DragonBoard™ 410c is connected to a display
- Ensure the correct power source is connected to the device (DC 6.5 - 18V, 2A)
    - **WARNING**: Exceeding the recommended power could damage the device
- Ensure the device has USB debugging enabled (Android users only)
- Ensure the DragonBoard™ 410c is connected to a computer

Parts List:

a. DragonBoard™ 410c
b. HDMI to HDMI or HDMI to DSI cable
c. Monitor
d. Keyboard with USB capability
e. Mouse with USB capability
a. MicroSD Card with at least 8GB of space.
b. USB to Micro USB cable
c. Basic Multimeter

1 - Bricked Board

From a technology standpoint, to use the term "brick" is rather strange. This term, however, when used to speak about a particular electronic device that is no longer working as it should, serves its purpose very well.

1.1 - Defining a Bricked Board

More information on Bricked electronics can be found [here](#) on the Brick (Electronics) WIKI page

Technologically speaking a "brick" is essentially useless. Seeing as though a brick serves no technological purpose we would refer to an electronic device that no longer serves a technological purpose in the same way. Thus, if your DragonBoard™ 410c is no longer working as it should, then it is as useful, to us (the user), technologically as much as a brick would be, which is useless. In the world of "bricked" electronic devices (let us consider the DragonBoard™ 410c) there are several ways to define the kind of brick you are dealing with. In general you find bricked devices are either soft-bricked or hard-bricked.

Soft-Brick
A soft-brick means there is something wrong with the software on the board. This could mean the OS was not installed properly or something was modified and now your board no longer starts up (anything software related).

Hard-Brick
On the other hand, a hard-brick is the scenario in which something is wrong with the hardware on the board. Some examples could be a shorted circuit or some kind of damage on the board.

1.2 - What to do if Your Board does not Turn On

If your board does not turn on, you should begin by diagnosing what kind of problem it could be. This is a better approach than trying out random fixes, hooping one will work. Note that you should be very careful when trying to figure out the problem as you do not want to create new ones.

You can begin by narrowing down the possibilities by determining if you board is soft-bricked or hard-bricked. Usually, soft-bricked boards have some flashing LEDs but nothing is appearing on

the screen or something shows on the screen but there are missing items. Hard-bricked boards tend to be unresponsive(nothing lighting up on the board and nothing on the monitor).

You can also utilize the forums as someone could have a similar problem you are facing and there could be a solution posted. Remember, use your resources to pinpoint the issue you are facing to find the ideal solution without ruining anything else!

1.3 - Possible Quick Fixes

Aside from the usual restart (power down and then power up), here are some possible solutions:

Soft-Brick	**Hard-Brick**
● Reflash OS 　○ SD card/fastboot	● let the capacitors drain 　○ unplug the board and leave it alone for a few hours or overnight, then try powering the board

Note: If you might have a hard-bricked board, reflashing the OS might work.

You could also go out and buy a new board if all else fails.

2 - Recovering Your Board

This section will try to help you recover your bricked board using some of the resources on the [96boards website](#).

2.1 - Download Recovery Image

This section will show you where to go to download the recovery image.

To download the Linaro recovery image, traverse the following link paths (we also walk you through this in the videos):
96boards.org → click on the DragonBoard™ 410c image on the right → Click on documentations tab → Scroll down to "For the software" section → Click on the green link that says "DragonBoard™ 410c Linux User Guide" and download the pdf file. → Go to section 3.2 of the pdf and you will see a link. That link will be your download link for the recovery image.

You may also click [here](#) to directly download the image.

To download the Android recovery image, traverse the following link paths (we also walk you through this in the videos):

96boards.org → click on the DragonBoard™ 410c image on the right → Click on documentations tab → Scroll down to "For the software" section → Click on the green link that says "DragonBoard™ 410c Android User Guide" and download the pdf file. → Go to section 3.2 of the pdf and you will see a link. That link will be your download link for the recovery image.

You may also click [here](#) to directly download the image.

After you have downloaded your desired recovery image, unzip it and remember where you've saved it.

2.2 - Flash SD Card

Once you have the appropriate image downloaded on your computer, you may flash the recovery image the way you would flash a regular operating system with a SD card on the DragonBoard™ 410c.

The process for flashing with a SD card differs between a MAC and a Windows system (terminal vs. win32diskimager). We go over this in extensive detail in Module 4. So please refer to the procedure documents and videos of module 4.

2.3 - Reflash OS

Once your SD card has the image flashed onto it, you are ready to reflash your OS and recover your board.

Make sure the following things are plugged in:
- **HDMI for monitor**
- **USB cable to your computer**
- **A mouse**
- **micro-SD card (remove from adapter)**

Make sure all these things are plugged in and then plug in the power adapter. You may now use the regular fastboot method to reflash an OS. Refer to module 4 to find out how to fastboot an OS.

Note: This is different from regular flashing of an OS. In regular fastboot flashing, you should not have an SD card plugged in. However, when trying to recover a bricked board, plug in the SD card AND the USB. The SD card allows your board to be recognized by your computer when it is bricked. The SD card does NOT carry the operating system like in usual SD card flashing.

3 - Brick Prevention

This section will teach different ways to hard brick (often irreparable) and soft brick (reparable) your board. We will also mention ways to prevent this and solutions if the problem occurs.

3.1 - Shorting Board

Shorting your board is one of the worst ways to brick your board. Often times, this damage is irreplaceable. Here are some common causes of shorting your board and ways to prevent them.
1. Abrupt shutdown
    a. To prevent this, make sure you shutdown the board properly from the operating system.
    b. Do not just pull the power jack on the board to shut it down!
2. Higher than recommended voltage in DC jack
    a. This board's power jack can handle 6.5 - 18 volts. Do not supply any more than this recommended amount. Supplying less will also prevent the board from functioning at optimal capabilities.

3.2 - Disconnecting DC without Proper Shutdown

Here, we will go over, in more detail, why it is bad to just disconnect the power without proper shutdown and how to power down the board properly.

The board is constantly writing information onto the IC chip carrying out functions. This evidently requires power. If you were to suddenly pull out the power, a file might not have been written to completion, etc, and this can result in a corrupted file or damaged OS. Like we mentioned earlier, this is known as a soft brick, which can be fixed by reflashing the OS. However, it is best to avoid this error.

3.3 - Turning on Random GPIO Pins

This section will go over precautionary steps to turning on random GPIO pins on the expansion header. This is important because voltage can be sent in and out from these pins. So sending the wrong amount of voltage to these pins or sucking out too much voltage can cause the board to short.

To prevent this from happening, be cautious and only use pins that you know the functions of. There are almost 500 pins available via the virtual file system, and some pins are not meant to

be flipped and can cause system crash. So exercise extreme precaution and make sure you know the function of each pin you are using.

3.4 - Deleting Partition Tables and Flashing

In this section, we will talk about deleting partition tables and flashing different OS on your board.

Deleting a partition table is a soft brick, as it corrupts your boot. Sometimes you are given access to internals of your device. So when you do so, make sure you do not delete any partition tables or it can prevent you from doing future tasks such as using fastboot.

This where the recovery image plays a vital role. The recovery image actually fixes these partitions and repairs the board. However, we still want to avoid deleting important files and information. Take extra effort to make sure that when you are doing operations on your board, you are not doing anything that you are not aware of, especially when it comes to deleting system files.

When flashing, it is extremely important to remember to not cut the flashing process in the middle of the operation. Do not just flash certain files of the operating system and not others. All the files are interdependent and excluding any one of the files can cause the board to no longer boot up. These are also very easy ways to soft brick your board, so be careful!

References

More information on Bricked electronics can be found [here](#) on the Brick (Electronics) WIKI page

Link to locate the PDF which will contain links to whichever recovery image you need.
https://www.96boards.org/products/ce/dragonboard410c/

DragonBoard™ 410c Android User Guide

DragonBoard™ 410c Linux User Guide