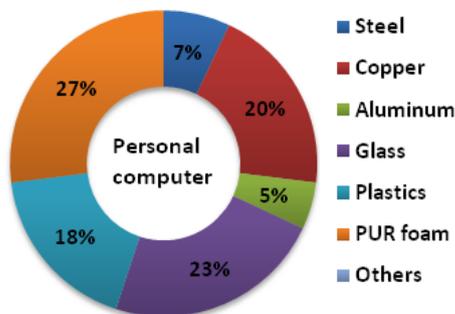
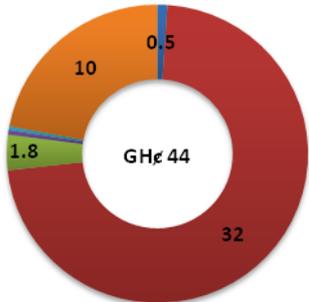


Material Composition



Scrap Value In Agboglobhie



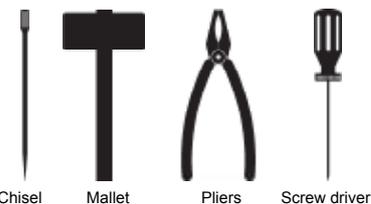
Urban Mining

Copper, aluminium, steel, gold and palladium are found in computers. In the motherboard, the random access memory (RAM), central processing unit (CPU) and peripheral component interconnects (PCIs) consists of some amount of precious metals. The random access memory (RAM) is for data storage and it is a valuable part because its connectors are gold plated (Au) and coated with palladium (Pd). The hard drive composes of aluminium (Al). The heat sink is a covering on central processing unit (CPU) which is made of aluminium (Al) and its alloys. The case of a computer is made of steel and the power supply box with stainless steel. In Agboglobhie, the printed circuit board industry is worth tens of thousands of dollars and is controlled mostly by Nigerian Migrants



Tools For Disassembly

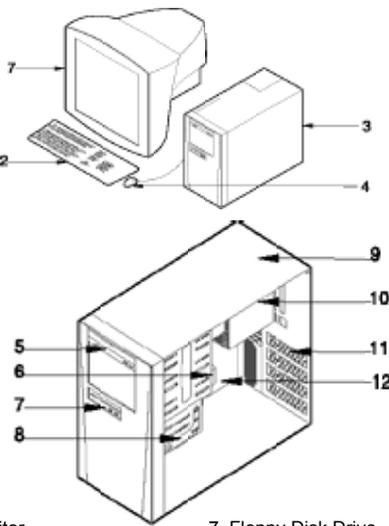
The tools required for processing: chisel, mallet, pliers, screwdriver, and wire cutters.



Tools are essential to the process of disassembly and are the primary means by which industrial activities are carried out. Tools have always represented societal advancement. The lack of proper tooling is a major hindrance to the industrialisation drive. In this case, knowledge of how to use them and make them represents a major cultural breakthrough.

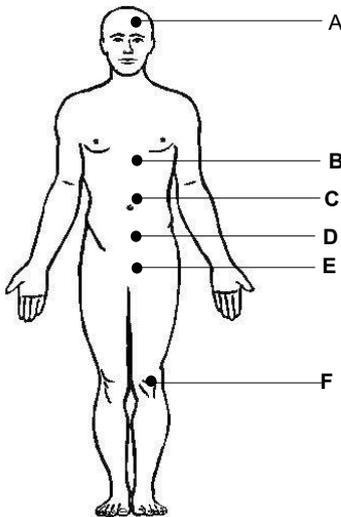
Tools are a potential source of injury. The risk can drastically be minimised by using the right tool for the right job. In the process of disassembling computers, are relatively low risk. Care should however be taken to avoid swallowing of really small screws.

Computer



1. Monitor
2. Central Processing Unit
3. Keyboard
4. Mouse
5. CD ROM
6. Hard Disk
7. Floppy Disk Drive
8. Power Supply
9. Stainless Steel Case
10. Power Pack
11. Vents
12. Mother Board

Health



- A. Nervous System
- B. Respiratory system
- C. Immune system
- D. Urinary system
- E. Reproductive system
- F. Bone

Computer Overview

Common Brands:

Acer, Apple, Asus, Dell, Fujitsu, HP, IBM, Lenovo, Medion, Sony, Toshiba*

Hazardous Materials:

Beryllium oxide (BeO), cadmium (Cd), hexavalent chromium (Cr VI), lead (Pb), sulphur (S)

Key components/parts:

Case, central processing unit (CPU), hard drive, monitor, motherboard, power supply random access memory (RAM)

Primary materials:

Aluminium (Al), copper (Cu), glass, gold (Au), iron (Fe), plastic

Types:

Desktop, Laptop, Notebook, PC

Weight composition (%):

5% Al, 20% Cu, 18% glass, 1000 ppm Au, 23% plastic, 7% steel, [1]



A computer contains several hazardous materials such as mercury. These should be handled with care and precaution.

Hazardous Material

Antimony (Sb) - Lung diseases, heart problems, diarrhoea, severe vomiting and stomach ulcer.

Barium (Ba) - Breathing difficulty, increased blood pressure, stomach irritation, muscle weakness, liver, kidney, heart damage and paralysis.

Cadmium (Cd) - Psychological disorder, cancer, liver & kidney damage. sperm damage, birth defects and headaches.

Safety Gear

The disassembly process exposes the worker to various levels of potential harm. There is a need for protective gear to reduce impact of these practises. Safety gear include gas masks to protect e-waste workers from dust and toxic gases, safety boots, hand gloves and mostly HazMat suits, which are full garments with footwear and masks, worn to protect workers from dangerous chemicals.

Step by Step Disassembly

1. Cut off all the wires and remove all connections between various components.
2. Discharge the capacitor and remove the circuit board.
3. Detach the motherboard by using screw drivers. Carefully pull off the CPU and the random access memory (RAM) from the motherboard.
4. The PCIs are also pulled off by hand since they have been soldered. This part is also valuable because it has some contents of gold.
5. For the monitor, remove the plastic housing, the back cover by removing all the screws.
6. Cut off all the cables to detach the various parts.
7. Disassemble the steering coils if any and carefully dispose off the leaded glasses.
8. Components in the computer such as the memory chips are delicate and should be handled with care, to avoid damage to them.

- 9 After disassembly, components should be documented. See example of this done during AMPQAMP workshop.



Mother board



Hard Disk



Memory Chips



Fan

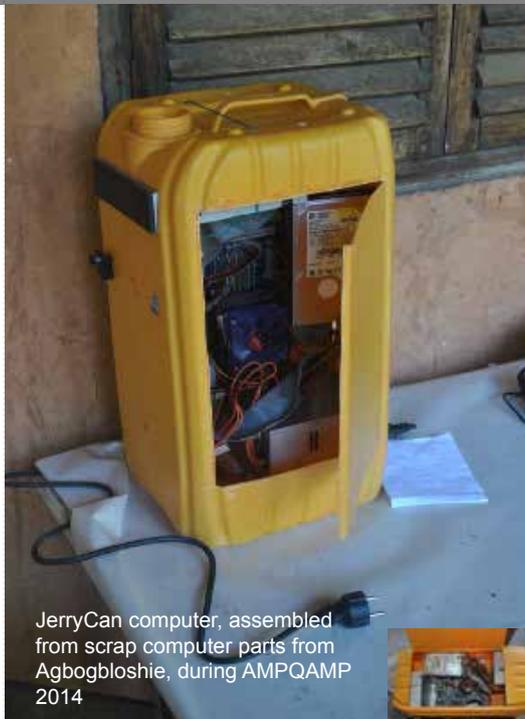


Power Packs

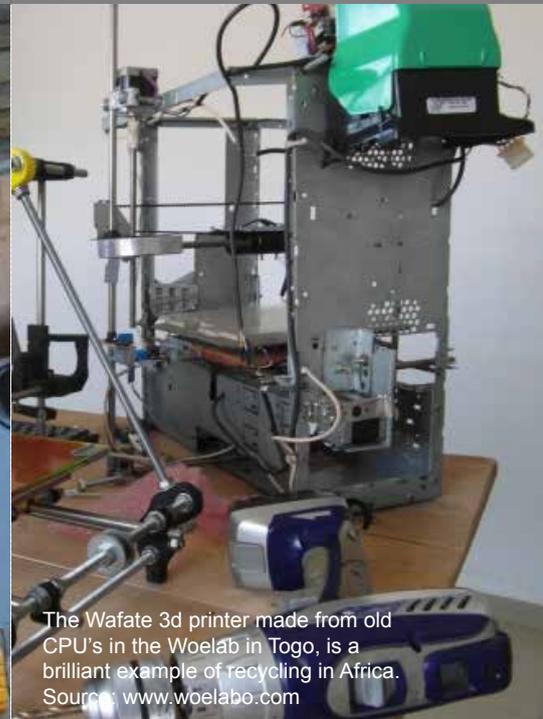
Re-make

Parts of old computers can be reassembled into new components such as the Jerry (a computer made out of parts sourced from waste computer parts and assembled in a jerry-can). In addition, parts like the hard drive, can be used as stand-alone data storage devices.

There is also the possibility of making other machines such as a 3d printer, such as was done by Wafate in the Woelab in Togo (image 2). This 3d printer is the first of its kind on the African continent and in the world.



JerryCan computer, assembled from scrap computer parts from Agbogbloshie, during AMPQAMP 2014



The Wafate 3d printer made from old CPU's in the Woelab in Togo, is a brilliant example of recycling in Africa. Source: www.woelabo.com

Made in Agbogbloshie

Re-use in Agbogbloshie of a computer as a seat in a workshop



References & Notes

1. Hagelukan, Improving metal returns and eco-efficiency in electronics recycling – A holistic approach for interface optimization between pre-processing and integrated metals smelting and refining, IEEE International Symposium on Electronics and the Environment, 2006, page 218–223
2. <http://www.lenntech.com/periodic/periodic-chart.htm>
3. <http://www.epa.gov/ttn/atw/hlthef/vinylchl.html>
4. ewasteguide.info

*Calculation on estimated value:

Prices of materials vary in Agbogbloshie depending on the local market. Also the state of the materials also influences the price, that's the price of burnt copper differs from that of the unburned by 1 Ghana cedis per pound. In Agbogbloshie, copper and aluminium are weighed in pounds (lbs) and iron/steel is weighed in kilograms (kg). The prices we used in this calculation are that charged as at July, 2014.

Calculation inputs:

Total weight of equipment (W): kg
Weight percent of material (W%): %
Weight of material (Wm): $W\% * W$
Price per material = $Wm * \text{amount in GHC per kg}$
(1 kg = 2.204 pounds)

** These types of EEE are mostly found and dismantled in Agbogbloshie.



For more information, visit:
<http://qamp.net/computer>

What is a Computer

A computer is an electronic device which accepts, stores, and processes data. Data is the raw material that comes to a computer. It turns this data into information, according to the desires and commands of the user. This exchange between user and computer, occurs via an interface. External devices that provide input and outputs for a computer are known as computer peripherals.

How it works

The monitor serves as a screen which reflects what the user inputs via a keyboard, computer mouse or other input device. Such inputs serve as commands, which are processed by the system unit linked to the motherboard. Programs can be installed on the hard disk (storage unit) and be used through the above-described process. The diagram of a personal computer and its parts is as shown below.



Computers



Agbogbloshie Makerspace Platform