

WATER 4 LIFE

A safe water source for developing nations – Our great, big life-changing idea

By Veronica Bedingfield & Arabella Hunt

OUR INSPIRATION

The goal in inventing *Water 4 Life* was to find a cheap and simple method to solve the clean water shortage in the developing world. This filtration device sets out to provide a safe, clean water supply for people in poor countries who have few resources.

HOW?

By turning polluting, disused plastic bottles into working parts of the *Water 4 Life* machine.

We used materials that are easy to find in developing countries such as Vietnam, Indonesia, Africa and India. These materials include wood, coat hangers and plastic soft drink bottles.

By using recycled waste such as plastic bottles, *Water 4 Life* also works towards solving the world's pollution crisis.

RESEARCHING THE CONTAMINATED WATER PROBLEM IN DEVELOPING COUNTRIES



Dirty water kills 5000 children a day – sanitation is key to saving millions of lives.

Nearly 2 million children a year die because they do not have clean water and sanitation. 1.1 billion people do not have safe water.

In the world's worst slums, people pay 5-10 times more for clean water than wealthy people in the same city.

Poor people also waste time collecting small amounts of water that is often contaminated and spreads disease.

Source: *The Guardian* on line 11/11/2006 quoting the United Nations Development Program's annual *Human Development Report*.

RECYCLING BOTTLES FIGHTS PLASTIC POLLUTION IN OCEANS



The recycled plastic bottles used in the *Water 4 Life* device also help to fight the environmental damage of pollution.

Most plastic waste ends up in landfill, but as much as 1.3 million tons flow into the sea.

In 2014 researchers found that 269,000 tons of plastic was floating on the surface of the sea. In addition to ocean surface pollution, there is much more plastic beneath the surface which is broken up and then ingested by marine life.

source: *Science* journal via NBC News. Com, 12 February 2015.

COMPONENT PARTS OF *WATER 4 LIFE* –

WHAT IS THIS WATER FILTRATION DEVICE MADE FROM?

There are 3 main sections of *Water 4 Life* which interconnect and work together to form a cheap-to-source, adaptable and environmentally friendly water filtration device.

These 3 main machine elements are:

- 1. Electronics & housing**
- 2. Connector & Archimedes Screw**
- 3. Water filter**

CHEAP EVERYDAY ITEMS MAKE UP *WATER FOR LIFE*

ELECTRONICS & HOUSING:

- Large, recycled plastic soft drink bottle
- Duct Tape
- 9-12V motor
- 9V battery
- Solar panel
- Wires
- Alligator clips
- Light
- 2- way switch

CONNECTOR & ARCHIMEDES SCREW:

- Flexible poly tubing
- Small recycled plastic soft drink bottles joined together as needed to reach the water source.
- PVC pipe & cap
- Duct tape
- Timber dowel
- Screw & Glue
- Flexible clear poly tubing

WATER FILTER:

- Large recycled soft drink bottles
- Sand
- Gravel
- Charcoal
- Recycled stocking

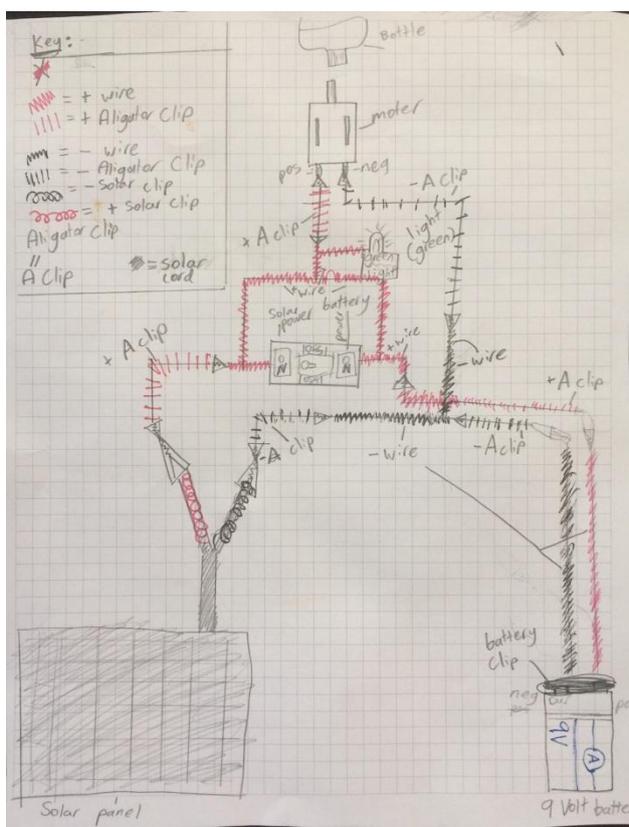
FURTHER POSSIBLE IMPROVEMENTS

A final stage development version of *Water 4 Life* can be operated by two energy sources: either via battery-driven motor or by a solar panel which is environmentally friendly. While a back-up motor can also ensure the clean water filtration device can keep running when there is not enough sunlight.

CIRCUITRY

Wiring *Water 4 Life* correctly was very important to make the machine effective. We worked out the wiring from a *Little Bits* kit.

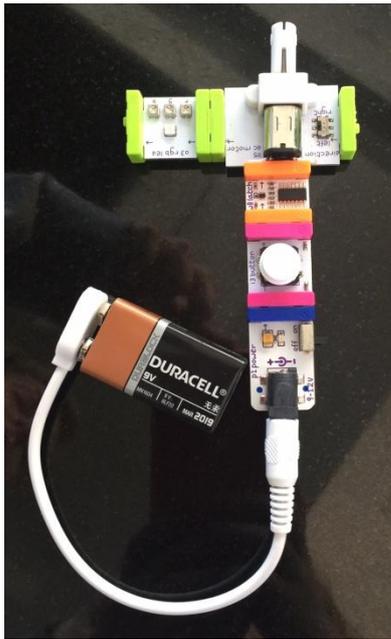
The machine's circuitry problems were inspired and solved by *Little Bits*.



Final Electrical Circuit Diagram (left).

Little Bits Relay:

- 9V Battery
- 9V Cord
- Power
- Button Switch
- Latch
- Motor
- LED light



Our machine has medium/complex wiring. We have used:

- positive wires
- negative wires
- 4 alligator clips
- 9 Volt battery
- motor

The negative and positive wires are connected to the battery. In separate electrical currents, they head up to the motor and are connected to the motor with the alligator clips.

THE FILTER

Water 4 Life uses a natural filtration system. Impurities are removed through 4 stages using either naturally occurring or cheap recycled items.

Layers:

1. GRAVEL
2. SAND
3. CHARCOAL
4. CLOTH STRAINER & REMOVABLE CAP



RECYCLED STOCKINGS SEPARATE EACH FILTER LAYER



FURTHER IMPROVEMENTS – risk assessment

Extra chemical treatments need to be added to make the water safe to drink.

Impurities have been removed by the filter, but additional chemicals are required to destroy germs.

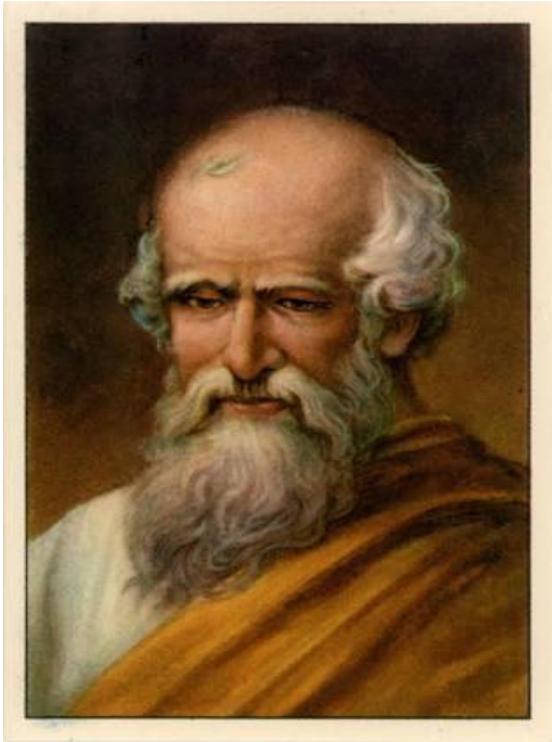
SCIENTIFIC HISTORY RESEARCH

Eureka! How we got the dirty water into the filter

Archimedes (c 287 -212 BC) was a Greek inventor and scientist.

He is famous for leaping from his bath naked and then running through the streets, shouting “eureka” when he made a brilliant discovery about calculating volume.

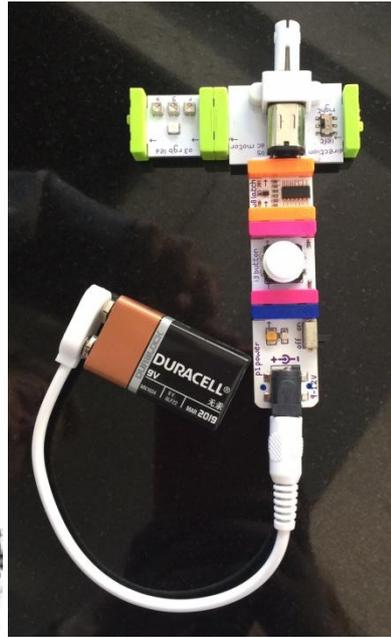
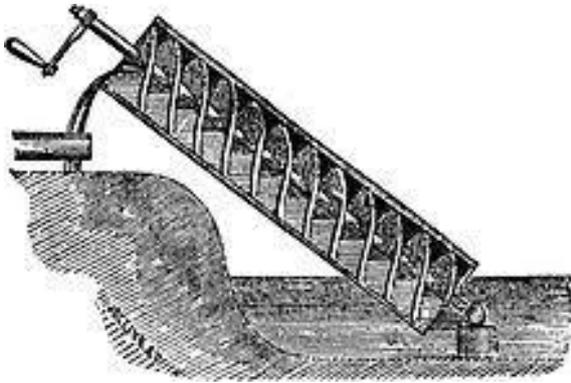
Our Eureka moment was working out that his invention - Archimedes’ Screw - could move dirty water up to the filter.



ARCHIMEDES' SCREW

This screw is an ingenious part of *Water 4 Life's* design. It pushes water up the machine and deposits it into the filter. The Archimedes' Screw is connected to the motor.

The motor is connected to the *Little Bits* circuit board. The screw is turned by the motor into the dirty water. The water is then carried up the transparent tube and is then deposited into the filter where it goes through the stages which clean it.



Water 4 Life

The finished product



ACKNOWLEDGMENTS

The concept, function and design of *Water 4 Life* is our own original work. We made the circuitry and the filter. This report is also our own work. But we would like to acknowledge the assistance we have received in developing this project. Our teacher, Ms Emmi assisted us by shooting our entry video, although the video content was our own work.

Christina Wood (mum) helped us with her tools which were used to cut plastic bottles and drove us to the hardware store. Alison Monaghan (mum) helped us to ensure this report addressed the judging criteria and helped us to edit it.