Water Ninja Turtle

A 3D-printed self-designed turtle connected to a PCB that allows a LED light to switch on whenever the water tank which the turtle model rests on requires more water. This ensures regular water treatment to elongate the lives of living creatures in the water tank.

Nadeem Said

Table of Content:

Production Plan:

Steps	Process	Required Resources (Tools)	Materials	Time to Complete
1.	Insure the PCB (Printed Circuit Board) is on the table ready to add on it.	N/A	Printed Circuit Board (5cm x 5cm)	1 Minute
2.	Cut and strip one coated wire carefully (10cm) to be able to fit in the 1mm hole drilled on each terminal on the PCB. This wire is for the red LED light output that will be the only component not connected directly to the PCB.	Ruler, Wire Stripper	Wire	3 Minutes
3.	Attach needed components to PCB (the side where there is no copper so that the legs come out from the side where there is copper). Attaching the red LED light only with an extended wire outside the PCB. While connecting and attaching components, bend each component's leg before attaching the next one to prevent components from falling.	N/A	Red LED Light Resistor with LED Light Moister Sensor Variable Resistor Battery Clip Fixed Resistor Transistor Stripped Wires (10cm)	30 Minutes
4.	Permanently fix the components by soldering them. Place the solder wire consisting of tin and lead and has a low melting point close to the intended component's hole on the PCB, place the heated solder gun or pen next to the wire and PCB melting the wire into the hole	Solder Gun / Solder Pen	Solder Wire	25 Minutes

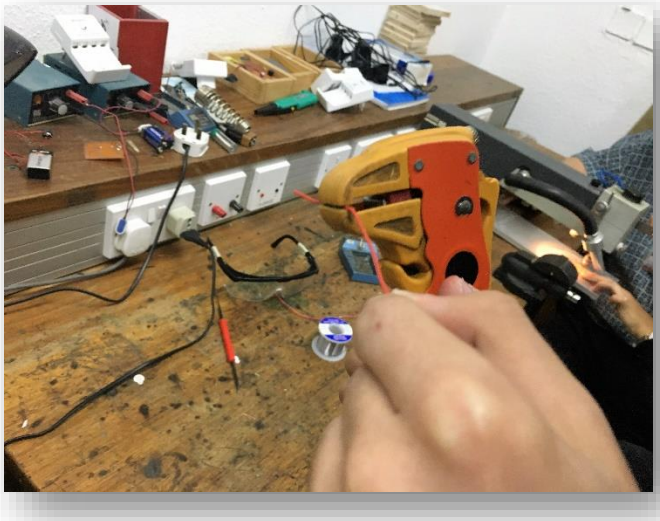
	and causing a permanent joint. Do this for each component attached carefully to avoid getting burnt from the hot solder gun and to insure quality.			
5.	Clip out the extra wire from the PCB to have a clean and neat joint and test if circuit works.	Wire Cutter	The Components in the Circuit	5 Minutes
6.	Transfer complete model of Turtle figure onto the computer in the electronics room and fill out a form to 3D print the model. Clean out the turtle once done printing.	3D Printer Google Sketch Up Portable USB	Green PLA Plastic Model (14cm x 12cm x 3cm)	15 Minutes to transfer the model and fill out the dimensions. More than 3 Hours of printing where the printer prints alone.
7.	Fill out another form to itch out the turtle's shell with acrylic, empty from inside to fit the circuit in and assemble it onto the turtle model.	CNC Laser	Brown Acrylic (3cm thickness)	15 Minutes to start the machine and fill out the dimensions. Roughly 1 Hour of itching done by CNC alone.
8.	Fill out another form to print the 22 small circle designs on the turtle's legs with the sign maker and brown contact paper.	Sign Maker	Brown Contact Paper (around 1cm diameter of each circle, but some differ in size)	15 Minutes to start the machine and fill out the dimensions.

				Roughly 1 Hour of cutting done by sign maker alone.
9.	Fill out the last form to itch out the brown triangular design on the turtle's head on the CNC laser.	CNC Laser	Brown Acrylic (2cm thickness)	15 Minutes to start the machine and fill out the dimensions. Roughly 30 Minutes of itching done by CNC alone.
10.	Draw arc shaped mouth using paint on turtle's face and stick two readymade eyes on turtle's face (model made by 3D printer).	Paint Brush PVA Glue	Pink Paint 2 Readymade Eyes	10 Minutes
11.	Finalize product by checking on quality control, how strong it is and reflect on safety and health considerations carried out during the process of creating. In addition, stick everything together (Turtle shell onto turtle model, Circuit onto turtle shell which is stuck onto turtle model, triangular design of acrylic on turtle's head and small circle designs on turtle's legs which are made of contact paper thus no glue is needed)	PVA Glue	All Small parts created: Circuit Turtle Shell Turtle model Small Circle Designs Triangular Design Eyes and Mouth (Already stuck to model)	35 Minutes

Technical Skills:

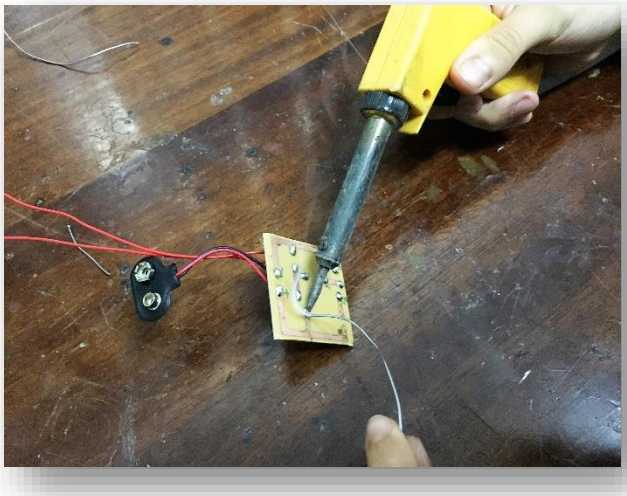
1- Drilling with the 1mm drill bit in the electronics room is a process of wasting. The 1mm drill is used to drill holes on the PCB (Printed Circuit Board) at the end of each terminal and the purpose of the holes are to places the legs of the components inside the holes where they are then secured.

2- Wire stripping is a process of wasting because the coating part of the wire is stripped to make sure it fits in the hole in the PCB. The wire stripper is a friendly tool that offers quality work. The picture shows a wire being stripped with the wire stripper.

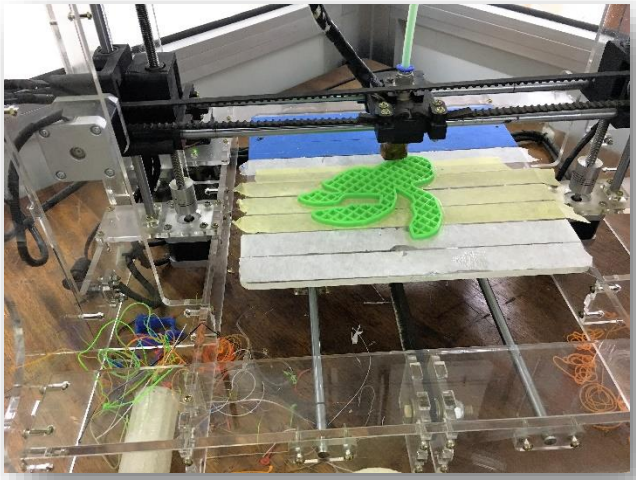


3- Wire cutting is also a process of wasting where extra wires of the components are cut off after soldering. Wire cutting is done to prevent components extra wires from touching each other and causing a shock after the completion of the circuit.

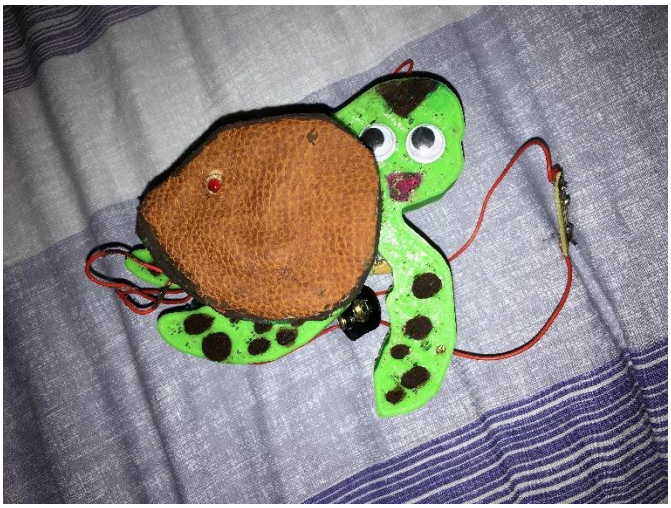
4- Soldering is a process of joining because it joins components to the PCB using a solder wire and gun, it is used to permanently fix the components legs in the PCB to prevent them from falling, to do this you should use an ideal amount of solder to assure quality work. The solder wire has a very low melting point.

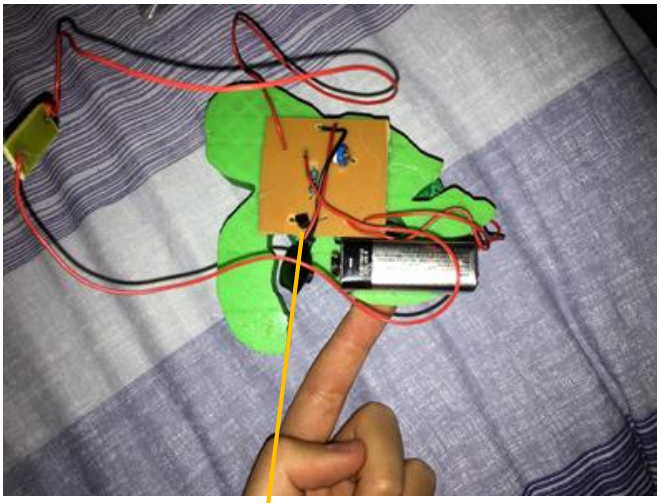


5- 3D printing is a forming process that prints the product designed on the CAD system. The 3D printer works with applying a filament of PLA plastic or wood of desired color where it melts it and forms the product required. I used green PLA plastic to form my turtle through the 3D printer. It offers very clean, neat and high quality work. The product was created on an Auto-CAD software called SketchUp. The picture shown, shows the turtle product in the process of being printed.

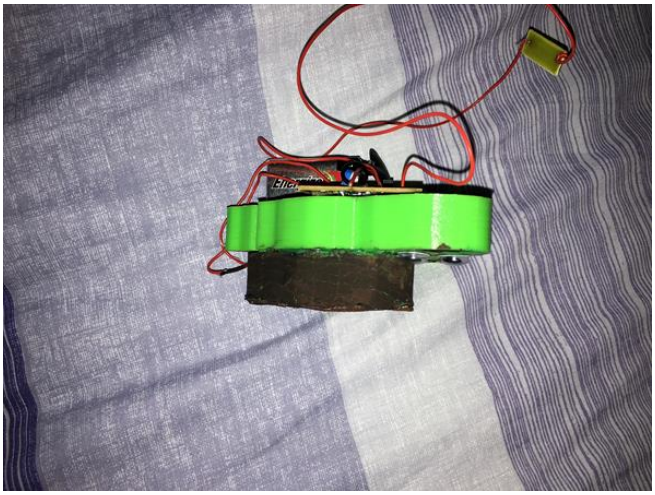


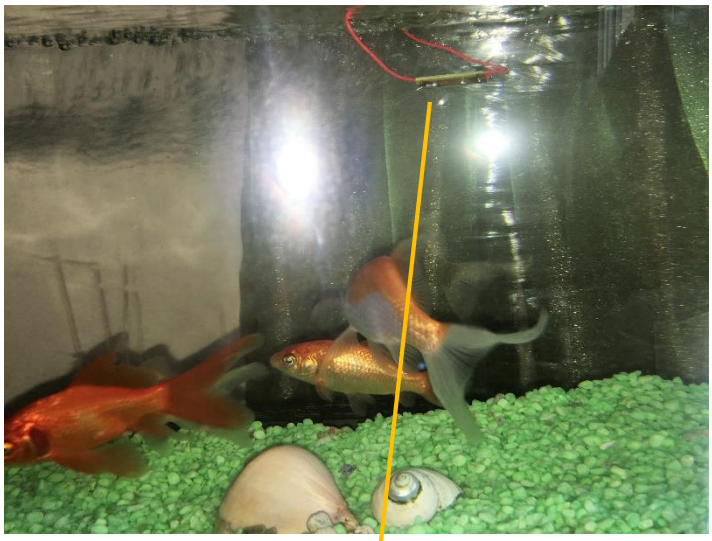
Presenting the Product:





Back of product with the PCB and battery glued to the product





This is the moister sensor used

This is the circuit that was built