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| **Workshop Title** | Nite Kites |
| **Workshop developed by** | Peter Musk |
| **Description** | Combine e-waste recycling and simple electronics with old-fashioned crafting to make a kite that uses wind power to light decorative LEDs as it glides through the night sky. |
| **Pre-requisites** | Soldering skills would be helpful, but not essential. A basic knowledge of electrical circuits will assist in troubleshooting and crash recovery. |
| **Key learning Outcomes** | Principles of kite design for maximum ease of flight and low cost manufacture.  An understanding of how to create simple circuits that include LEDs.  Knowledge of how electric motors work, and how they are related to electrical generators. |
| **Engagement and Learning Strategies** | Participants will begin by harvesting useful elements from e-waste, and in particular small electric motors found in cooling fans. Safety issues will be addressed, as well as potential for re-use and recycling of various parts. As the motors are disassembled, the principles of electric motor construction will be demonstrated, and specific elements and their uses identified and explained.  Using similar, but pre-wired fan driven motors (to avoid the need for soldering expertise), participants will be guided to link the motors into a simple electrical circuit containing an LED, and assisted to troubleshoot the construct until they can get the LED to glow as the fan is driven by a hair drier. Concepts of parallel and series circuits will be briefly introduced, and additional LEDs added to determine the limits of the generating capacity of their device. This information will then form the basis of their decorative design for the kite.  The variety and attribute of various kite designs will be introduced, and participants will choose from a selected few basic models (with examples provided to assist construction). Using bamboo stakes, polythene film cut from garbage bags, wire and gaffer tape, each participant will then build a basic kite, assisted by step-by-step instructional diagrams.  Finally, the motors and circuits containing LEDs will be attached to the kites, along with sufficient line for their use. Weather permitting, the workshop will conclude outdoors with a test-flight. |
| **Spaces and Equipment required** | * Workshop space for 15, with access to work tables and tools for disassembling e-waste (pliers, screwdrivers, wire strippers, hammers, punches). * Sufficient e-waste (power supplies, CD drives) for each participant. – one for each participant. Bins for rubbish. * Pre-wired motors with fans (preferably tested for suitability) – one for each kite * Wire and LEDs sufficient to build two circuits per participant (per kite: approx. 2m hook up wire (or recycled equivalent), 10 LEDs in a variety of colours, hair drier or fan for testing) * Kite making supplies (bamboo stakes, polythene film, aluminium wire, gaffer, electrical tape, scissors, pliers, craft knives, marking pens) |

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| **Risk Assessment** | Personal injury from use of tools and sharp edges in waste – minimised by instruction and supervision.  Potential for injury to others and property while flying kites – minimised by conducting flights in an open, level and obstruction-free area. |
| **Getting set-up** | * Facilitators should complete all aspects of the activity prior to delivery * Review theoretical aspects of electric motors, generators and circuits * Ensure sufficient prepared, working motors are available * Examine kite-flying area for safety considerations, if this is to be part of the workshop |

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| **Step** | **Timeline** | **Activity** | **Tips for the Facilitator** | **Instructional Resources** |
| 1 | 0:00 – 0:05  (5 min) | Outline workshop elements and assess participant skills and experience with circuitry and kite making.  Identify potential safety issues, and waste management strategy. |  |  |
| 2 | 0:05 – 0:35  (30 min) | Disassemble e-waste and harvest useful elements (motors, fans, wire, LEDs etc).  Examine motors and identify components.  Explain how the motors work, and how they can be converted into generators. | Ensure bins are available for recovered items and e-waste | Animation showing principles of electric motor function |
| 3 | 0:35 – 0:50  (15 min) | Use prepared fan-driven motors and LEDs to build a working circuit by twisting and taping wires.  Add LEDs in parallel to test generating capacity | Have a working model ready to demonstrate success |  |
| 4 | 0:50 – 1:20  (30 min) | Introduce kite designs, and choose one to construct.  Build a kite. | Have some prepared kites for participants to copy | Kite design instructions |
| 5 | 1:20 – 1:50  (30 min) | Construct a second circuit containing LEDs, if necessary.  Attach circuits containing fans, motors and LEDS to kites. |  |  |
| 6 | 1:50 – 2:00  (or longer) | Test fly kites | Have a safe area planned |  |

**What next?**

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| **Resources** |  |
| **Collaboration** |  |