Workshop Title	**Bits n Bots 2 (Intro to Electronics)**
Workshop developed by	Anna Gerber
Description	In this workshop participants will learn basic electronics and how to wire up sensors and actuators for a NodeBot
Pre-requisites	Participants should have attended the first session and have brought the kit supplied in that session with them
Key learning Outcomes	At the end of this workshop participants will be able to create an electronics circuit using sensors and actuators.
Engagement and Learning Strategies	This is a hands-on workshop – participants will design and construct the electronics for a NodeBot by following the facilitator's example. Slides will be provided describing the theory covered.
Spaces and Equipment required	• Assembled NodeBot for demo • Small screwdriver for servo screws • Scissors / craft knife for cutting cable ties, craft wire or frames • Battery operated drill for drilling holes in frames for wheels • Double sided tape, tape • Hot glue gun • 3D printer and computers in Lab 4 (for printing parts from previous workshop)
Risk Assessment	Danger of injury from scissors, craft knife, drill or hot glue gun – participants should be instructed and supervised in use of tools
Getting set-up	Participants should have brought the kit supplied in the first Bits n Bots session with them and will work at the workbenches. The hot glue gun and drill should be set up in a separate area of the workbenches for safety reasons

Step	Timeline	Activity	Tips for the Facilitator	Instructional Resources
1	00:00 – 0:05	Participants arrive, are greeted by facilitator and invited to open up their kits at the workbenches	While this workshop is running, parts from previous workshop can be printing on 3D printer	

2	00:05 – 00:20	Basic electronics theory • Current voltage and resistance • How breadboards work (breadboard + wires) • Resistors • LEDs (normal and RGB)		Slides
	00:20 – 00:45	Exercise: hooking up an LED to a battery with a resistor • Add another LED • Add a push button		Slides
3	0:45 – 1:20	Designing the electronics for our robots • Control (microcontrollers) • Sensors (photo resistor, ultra sonic sensor, push buttons) • Actuators (LEDs, servos, piezo, LED matrix + shift register) • Digital vs Analog		Slides
4	1:20 - 1:50	Participants start to design / assemble their robots e.g: • Attach servos to frame using cable ties • Attach wheels to servos by screwing through axle and using craft wire to secure wheel spokes to round servo horn • Plan out placement of sensors, claw etc and start to sketch out ideas for how these might look • Attach breadboard(s) to frame and start wiring components to breadboard	Use demo NodeBot as physical example of how to assemble bot. Participants can start to wire up their sensors and actuators to the Arduino but we won't program it until the next session Focus on getting wheels wired up to begin with. Some sensors e.g. ultra sonic sensor may need 3d printed mounts – these may be left off until a later session if parts have not been printed yet.	Sample schematic for how sensors etc should be wired to breadboard
5	1:50 – 2:00	Participants pack up their kits	Participants may leave their kits with facilitator (ensure they are labelled), or take them home if they wish: need to bring them along to every session.	

What next?

Resources	Slides (participants will be provided with electronic copy)
Collaboration	Participants will be able to use their new electronics skills to work on physical computing projects. Participants could join a meetup group like Hack the Evening or a Hackerspace to work on collaborative projects.