**Solar Car tutorials**

*The electrical tutorials offered by Solar Car are aimed toward beginners who are interested in electronics design. They will not teach you everything required to design practical electronic circuits, but will provide you with a fundamental understanding of the process of designing and building circuits and set you in the right direction. The tutorials will cover: electronic components, component selection and sampling, Soldering, Breadboard prototyping, design and simulation, Printed Circuit Board design and manufacturing, Control systems using an Arduino and a PIC microcontroller.*

**Note:**

* Soldering tutorials are held at the solar car office (JHE B116) anytime an electrical manager is at the office, emails will be sent out.
* **Only** students who have soldered a **working** PicKit2 board will be able to practice control systems using a PIC microcontroller.
* PicKit2 Boards are used for debugging and programming microcontrollers
* There are a maximum of four (6) soldering irons at the solar car office, so you must sign up to let us know organize a schedule.
* Individuals who have never soldered before regularly take up to 4 hours to complete a PicKit2 board
* A PicKit2 board is sold (at cost – no profit) for $15, students get to keep the board they make
* Watch these videos before coming to the soldering tutorials:

<http://www.youtube.com/watch?v=I_NU2ruzyc4>

<http://www.youtube.com/watch?v=3NN7UGWYmBY>

**Tuesday, September 17 (room and time TBD)**

Components - basics

* RLC, package types, then using Falstad java app
* Voltage dividers, potentiometers
* Switches and relays
* Diodes and LEDs
* Breadboards, PCBs, DIP and SMD packages, resistor color codes
* Single Line diagrams, and conventional schematic layouts

**Wednesday, September 18 (room and time TBD)**

Components - moderate

* Chips:, 7 segment displays, LDO, ADC, 555 timer (using falstad)
* Microcontrollers, crystals, connectors
* Pull up and pull down resistors
* How to sample from TI, TE, Microchip

**Tuesday, September 24 (room and time TBD)**

Control systems Basics using an Arduino

* Downloading software
* I/O
* Blinking LED
* PWM
* Analog inputs
* Serial RX/TX

**Wednesday, September 25 (room and time TBD)**

Control systems Basics using an Arduino

* I2c using a temperature sensor
* SPI using an LED driver

**Tuesday, October 1st (room and time TBD)**

* Eagle CAD download
* Schematic design, shortcuts
* PCB Routing
* Shortcuts, rules, general standards (Bottom plane is GND, Top plane Power, etc)
* OSH park – manufacturing your PCBs