**Student Project Challenge – Software Ideas**

**Project idea: The MOSFET Transistor**

Create basic simulation software that can plot the I-V characteristic of a MOSFET transistor in linear and saturation regions given input Vgs and Vds voltages. Ignore capacitance effects. Make it capable of predicting the device’s Ids behavior as both a switch and as a voltage amplifier. Advanced Credit: allow your simulations to create input and output waveforms. Note: there are now more MOSFET transistors in the world than ants!

Resource:

<https://en.wikipedia.org/wiki/MOSFET>

**Project idea: Into Orbit**

Create a simplified 2D simulation with graphics that demonstrates Newton’s Laws as applied to a rocket attempting to be launched into orbit around the earth. Let the rocket be fired with an initial velocity and angle that can be selected, but once launched, its motion is affected only by the earth’s gravity. Feel free to assume the rocket has constant mass and ignore air resistance and the earth’s rotation. Advanced Credit: include the Moon’s gravitation into your simulation by considering the Moon at a fixed location. See if your simulation is accurate enough to launch your rocket from earth into orbit around the Moon!

Resources:

<https://www.grc.nasa.gov/www/k-12/rocket/newton.html>
<https://en.wikipedia.org/wiki/Trans-lunar_injection>

**Project idea: Computer Comm Link**

Write software that allows two computers to communicate with a simple common terminal where ASCII text keystrokes entered from either computer will appear on the common terminal of both (similar to text messaging). You can use point-to-point communications with both computers on a trusted network or more advanced approaches. Advanced Credit: pass data between the two computers via a unique interface, such as a sound link using the computers’ microphones and speakers.

Resource:

<https://en.wikipedia.org/wiki/Pseudoterminal>

**General Software Resources (Free):**

<https://en.wikipedia.org/wiki/List_of_GNU_packages>

<https://www.python.org/about/>

<https://visualstudio.microsoft.com/free-developer-offers/>