



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Patrick Leiser</b>	<b>Project Number</b> <b>J0913</b>
<b>Project Title</b> <b>Homemade Computer: Creating an Affordable Computer Using Unconventional Computer Components</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Computers are expensive. It would be good to have computers that are affordable for everyone. Two methods to make them more affordable are to use less expensive, non-computer components, and to make them yourself while customizing the components and writing software to fit your needs.</p> <p>It will be possible to construct a computer (non-IBM PC compatible) using non-computer components (such as a \$7.00 microcontroller for the CPU), and to write an operating system for the required functions, including word processing, calculations, and games.</p> <p><b>Methods/Materials</b> Identify the requirements; design the electronics and identify needed components; design the circuit; solder the components; program the tests; and write the complete program (the operating system (OS)).</p> <p>Materials: serial 20x4 OLED display \$30.00; picaxe 28X2 microcontroller (2) \$6.80 ea.; plain stripboards (perfboard) (3 - 4) \$1.50 ea.; single AA battery holder (3) \$1.09 ea.; Alfat SD card reader \$44.95; resistors (22k (2), 10k (2), 4.7k (2) negligible (\$10.00 for 500 pieces); various wires (negligible); ps2 keyboard \$5.00; ps2 stripboard adaptor \$.95; power switch \$1.00; sd card (up to 32 GB) (lower capacity acceptable) \$6.95 for 2 GB \$15.00 for 16 GB; programming adapter (headphone jack) \$0.10.</p> <p><b>Results</b> (see conclusion/discussion)</p> <p><b>Conclusions/Discussion</b> In conclusion it is possible to construct a computer and write an operating system using cheap, non-computer components (totaling \$129 for all features) that I designed, built, and programmed myself. The PICAXE 28X2 microcontroller worked well as an inexpensive CPU. I successfully programmed it to support a word processor (that I named Wordedit), full reading and writing of .txt (plain text) files from the SD card (including files added to the SD card by other computers). It also has a calculator allowing addition, subtraction, multiplication, division and square rooting. It has an I2C bus that acts like the PCI and PCIe busses on normal computers.</p>	
<b>Summary Statement</b> Creating an affordable computer by using unconventional computer components and building/programming it yourself.	
<b>Help Received</b> mother helped with display board.	