J Aeronaut Aerospace Eng 2015, 4:2
http://dx.doi.org/10.4172/2168-9792.C1.011

OMICS International
conferenceseries.com

3rd International Conference and Exhibition on
Mechanical & Aerospace Engineering

October 05-07, 2015 San Francisco, USA

Design of a constant-voltage-source to array of sensors to optimize heart beat detection

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This work presents the design of a circuit to capture the signal from the skin-like heart beat sensor and convert it to an electrical signal. The circuit is one part of the optical heart beat detection system which also includes the skin-like optical sensor array and the laser source and data processing unit. The circuit will be connected with the sensor array which will be able to detect the sensing signal at each element of the array. The sensor system could also be applied to contact form detection in other biomedical system. The sensing element of the sensor system is realized through the measurement of the change of the resistance. The circuit will power the circuit system with a sequence of pulses and the output is distinguishable corresponding to each pulse. The circuit can handle single input and multiple outputs. Testing results showed that the prototype of our circuit built on a breadboard can meet the design criteria with the defect of non-zero offset at the output when the circuit is not powered. Based on the breadboard circuit, the final circuit will be fabricated through CMOS technology on a 3 mm×3 mm silicon chip in order to accommodate the real application of the sensor.

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Best practices for developing models for rapid prototyping/3D printing

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3D printing (or Additive Manufacturing, AM) is any of the various processes used to make a three-dimensional object. In 3D printing, additive processes are used, in which successive layers of material are laid down under computer control. These objects can be of almost any shape or geometry, and are produced from a 3D model or other electronic data source. A 3D printer is a type of industrial robot. 3D printable models may be created with a Computer Aided Design (CAD) package or via a 3D scanner or via a plain digital camera and photogrammetry software. Regardless of the 3D modeling software used, the 3D model then needs to be converted into an '.stl' format, to allow the printing software to be able to read it. Up to 80% of the files sent to 3D prints result in poor or defective objects. This is a waste of time, material, and money. This presentation ennumerates and summarizes the best practices in the industry to ensure a good outcome for at least 90% of the time. You will see examples of 3D prints gone wrong. Tips on how to correct the CAD model and troubleshoot the model for a better '.stl' export will be presented as well as methods used to create a visually appealing prototype will be discussed.

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