Don Braun's Job Functions at NASA Glenn Research Center

1. Preparation for the job: education just prior to being hired at NASA GRC in 1976
    a. Lutheran elementary school and Lutheran high school in the Cleveland area
    b. 4 years for Bachelor of Science (B.S.) degree in Electrical Engineering at CWRU
    c. 2 years for Master of Science (M.S.) degree in Computer Engineering at CWRU
    d. 2 ½ years for doctorate (Ph.D.) in Computer Engineering at CWRU

2. Dynamic data acquisition and digital signal processing (DSP)

3. Scientific computer programming
    a. SmaggIce (in C; aircraft safety in case ice builds up on an aircraft wing)
    b. gasplus (in FORTRAN; aircraft engine simulation to improve efficiency & safety)

4. NASA Inventions and Contributions Board (give innovators ~$2M/year for great ideas)
    a. Radio Frequency Telemetry System for Implantable Bio-MEMS Pressure Sensor (1 mm by 1 mm; no battery; continuously monitor pressure in human blood or abdomen or eye of an astronaut or a person at home; battery-powered reader held in hand or strapped to body; developed at GRC)
    b. Intrinsically Safe Optic Gas Vapor Sensor for Aircraft Fuel Tank Fire Safety (quickly measure concentrations of jet fuel, oxygen, and nitrogen; uses Raman scattering of laser light, so no electricity is needed in fuel tank; developed at GRC)
    c. A method of measuring distance to within 10 to 20 picometers (= 10 to 20×10^{-12} meter $\approx$ $1/10^{th}$ the diameter of a hydrogen atom) between 3 LISA (Laser Interferometer Space Antenna) satellites which are about 5×10^6 km ($\approx$ 3×10^6 miles) apart and which orbit the Sun 19° ($\approx$ 50×10^6 km) ahead of Earth along its orbit, to look for gravitational waves emanating from colliding stars
    d. From the floor of a rainforest, measure chlorophyll in leaves of the canopy by reflecting laser light of 2 different wavelengths and detecting how much is absorbed, rather than climbing trees and shining light through leaves with a handheld device
    e. Supercomputer simulations of blood flow to improve the DeBakey miniature implantable heart assist pump, using NASA software that can also model rocket fluid flow; simulate pump designs to reduce damage to red blood cells

5. Math consulting and writing the book *Mathematical Fundamentals and Digital Signal Processing*