



Chapter 9 Design Tools

Design Tool 9.1: NAE Grand Challenges Tailored for Middle Level Students

NAE Grand Challenges for Engineering	
The Challenge	What this challenge involves (middle school level)
Advance personalized learning	Design a digital tool that will personalize learning for an individual student.
Make solar energy economical	Engineer ways to improve solar cells, reduce their costs, and/or provide efficient ways to store the energy they produce.
Enhance virtual reality	Create the illusion of actually being in a different space and use it for teaching and learning.
Reverse-engineer the brain	Discover how the brain works and design ways to treat brain disorders, implant materials in our bodies to do the jobs of damaged nerves, allow blind people to see, and permit crippled people to walk.
Engineer better medicines	Design devices to diagnose diseases quickly, combat drug-resistant bacteria, and personalize medical treatments. Design vaccines to treat new diseases.
Advance health informatics	Design devices to obtain, manage, and deliver health information. Improve smart devices that monitor pulse, temperature, heart rate, and release medicines automatically.
Restore and improve urban infrastructure	Improve the systems that support our communities, including transportation systems, water and sewer systems, power and gas grids, and so on.
Secure cyberspace	Develop innovative ways to address a long list of cybersecurity problems, including protecting national security and personal information and identity.
Provide access to clean water	Provide affordable ways to desalinate seawater, recycle wastewater, reduce water usage, and prevent water waste.
Provide energy from fusion	Scale up the fusion process to produce energy efficiently, economically, and in an environmentally safe manner.

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