

NAE Grand Challenges for Engineering*
(adapted for middle school by Anne Jolly)

The Challenge	What this challenge involves
Advance personalized learning	Design teaching methods that will enhance learning by personalizing the learning for individual students.
Make solar energy economical	Engineer ways to improve solar cells, reduce their costs, and/or provide efficient ways to store the energy they produce efficiently.
Enhance virtual reality	Engineer the illusion of actually being in a different space, and use it for training, treatment, and communication.
Reverse-engineer the brain	Discover how the brain works and design ways to treat brain disorders, wire materials into our bodies to replace damaged nerves, help blind people see, and enable crippled people to walk.
Engineer better medicines	Design vaccines to detect and treat new diseases, diagnose diseases rapidly, target drugs more effectively, combat drug-resistant pathogens, and personalize medical treatment.
Advance health informatics	Design programs to acquire, manage, and use information in health. Improve devices to monitor pulse, temperature, heart rate, and trigger medicine release 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 banking, national security, and personal information and identity.
Provide access to clean water	Provide affordable ways to desalinate seawater, recycle wastewater, reduce water use, and prevent water waste.
Provide energy from fusion	Scale up the fusion process to commercial levels to produce energy efficiently, economically, and in an environmentally safe manner.
Prevent nuclear terror	Engineer ways to secure materials; detect oncoming attacks, and render a nuclear device harmless; respond, cleanup, and communicate rapidly.
Manage the nitrogen cycle	Design ways to maintain a sustainable food supply including making fertilizer, applying it efficiently, and recycling food wastes.
Develop carbon sequestration methods	Engineer ways to capture and store excess carbon dioxide.
Engineer the tools for scientific discovery	Design tools and instruments to help us gain new knowledge about the physical world and the biological world.

* [Source](#)