

# Capstone Project Ideas for STEM Students (150+, by Category)

All 150+ ideas below are numbered continuously (1–150) across categories, so you can reference or shortlist any idea by its number.

## Simple Capstone Project Ideas for STEM Students

Well-scoped builds achievable in one semester with basic tools and no lab access:

1. A low-cost water quality testing kit using household indicators
2. A mobile app that tracks personal water and electricity usage
3. A solar-powered phone charger built from repurposed materials
4. A community recycling tracker with a simple web dashboard
5. A line-following robot built with basic sensors and a microcontroller
6. A weather-alert system using open API data and a Raspberry Pi
7. A budget-friendly air quality monitor for classrooms
8. A plant-growth tracking app using time-lapse photos
9. A first-aid training kit with QR-linked video guides
10. A calculator that estimates a household's carbon footprint
11. A campus lost-and-found tracker with photo tagging
12. A noise-level logger for library study zones
13. A simple app that splits shared hostel expenses fairly
14. A DIY rainwater collection gauge with a mobile readout
15. A study-timer app that blocks distracting apps during sessions

## Environmental & Sustainability Capstone Project Ideas

Projects addressing conservation, waste, and climate at a local scale:

16. A beach- or riverbank-cleaning robot for small litter
17. A sand-based water filtration unit for rural households
18. A neighborhood recycling-participation tracking app
19. A tabletop wind-power charger for small devices
20. A vertical garden system built from repurposed plastic bottles
21. A wearable air-quality badge for outdoor workers
22. A school composting system that converts food scraps to soil
23. A rain-collection irrigation setup for a community garden
24. A pollinator-friendly insect shelter design for local gardens
25. A solar-oven prototype using cardboard and reflective foil
26. A low-energy housing model demonstrating passive cooling
27. A biodegradable seed-starter pot made from food waste
28. A citizen app that maps illegal dumping sites
29. A small-scale hydroelectric model for a local stream
30. A carbon-tracking tool tailored for college campuses

## Robotics & Automation Capstone Project Ideas

Hands-on builds combining sensors, actuators, and control logic:

31. A voice-responsive robot assistant for simple household tasks
32. An obstacle-avoiding robot using ultrasonic sensors
33. A low-cost robotic arm built from recycled materials
34. A tree-planting drone prototype for reforestation drives
35. A hand-gesture-controlled robotic vehicle
36. A maze-solving robot using basic pathfinding logic
37. A color-sorting robot for recyclables
38. A garden-watering robot that responds to soil moisture
39. A home-monitoring robot that logs temperature and motion
40. A remotely operated rescue-robot prototype for tight spaces
41. A robot that mimics simple animal locomotion patterns
42. A robotic fish for shallow-water inspection
43. A sign-language-interpreting robotic hand
44. A robot that assists with basic warehouse sorting tasks
45. A small autonomous rover for indoor mapping demos

## Capstone Project Ideas for IT Students

Projects that solve an operational problem a business, school, or community could realistically deploy:

46. A blockchain-based system for verifying academic certificates
47. An AI chatbot that handles first-line student support queries
48. A cybersecurity awareness platform with simulated phishing tests
49. A smart inventory management system using barcode/RFID scanning
50. A privacy-first attendance system using local face recognition (no cloud upload)
51. A decentralized file-sharing tool for classroom collaboration
52. A network intrusion detection dashboard using open-source datasets
53. A cloud-cost optimization tool for small businesses
54. A low-bandwidth e-learning platform for rural connectivity
55. An automated code-review assistant for beginner programmers
56. A password-hygiene auditing tool for small organizations
57. A ticketing system for campus IT help desks
58. A phishing-email detector using natural language features
59. A student-project portfolio platform with version history
60. A local-network file-backup automation tool

### IT Capstone Tip

Panels usually ask about scalability and security decisions — document your architecture choices as you build, not after.

## Capstone Project Ideas for STEM Students — Technology

Broader technology projects blending software, data, and emerging tools:

61. A quantum computing concept simulator for classroom teaching
62. A real-time multilingual translation tool for local dialects
63. A federated learning demo that trains models without centralizing data
64. A smart contract system for transparent donation tracking
65. An edge-computing prototype for low-latency IoT devices
66. A neural network visualizer that explains how a model "thinks"
67. A digital voting system with cryptographic vote verification
68. An AI tool that flags misinformation in short-form video captions
69. A decentralized storage prototype for personal backups
70. A code-to-diagram generator for documenting legacy software
71. An AI-assisted résumé screener with bias-checking built in
72. A smart-contract-based freelance escrow platform
73. A speech-to-text tool tuned for regional accents
74. An AR app for visualizing furniture before purchase
75. A recommendation engine for local skill-based volunteering

## **Biomedical & Health Capstone Project Ideas**

Projects connecting engineering or software skills to healthcare access and outcomes:

76. A wearable heart-rate and posture tracker for desk workers
77. A smartphone-based anemia screening tool using camera analysis
78. A medication-reminder device for elderly patients
79. A low-cost prosthetic hand prototype with adjustable grip
80. An app that tracks and visualizes sleep-quality trends
81. A wearable allergy-alert bracelet with symptom logging
82. A tool that checks noise exposure risk from headphone use
83. A digital first-aid guide app with offline access
84. A portable device for basic vital-sign monitoring
85. A system that tracks childhood vaccination schedules for clinics
86. A mental-health check-in app using simple mood tracking
87. A wound-healing progress tracker using photo comparison
88. An emergency medical-information card with QR-linked records
89. A telehealth scheduling tool built for low-connectivity areas
90. A physiotherapy exercise tracker with form-check reminders

## **Capstone Project Ideas for STEM Students — Biology**

Projects that connect lab technique to a real-world question in public health, agriculture, or the environment:

91. A CRISPR-based concept study on drought-resistant crop traits
92. A biosensor prototype for rapid detection of waterborne pathogens
93. A study on how gut microbiome diversity affects stress response
94. A low-cost anemia detection method using smartphone camera analysis
95. A model comparing microplastic exposure and marine larval development

96. A citizen-science app for tracking local pollinator populations
97. A bioplastic prototype made from agricultural waste
98. A machine-learning model predicting antibiotic resistance patterns
99. A wound-healing tracker using image analysis for infection markers
100. A study on soil microbial diversity in urban vs. rural farmland
101. A DNA-barcoding method for identifying local plant species
102. A study on probiotic effects on gut-bacteria diversity
103. A model estimating disease risk from genetic markers
104. A low-cost bioreactor for small-scale algae cultivation
105. A study tracking pesticide resistance in local insect populations

## Capstone Project Ideas for STEM Students — Engineering

Projects that reward a working prototype backed by solid testing data:

106. A structural health-monitoring system for small bridges using vibration sensors
107. A self-balancing electric scooter with stability control
108. A solar desalination unit optimized for coastal villages
109. A smart irrigation controller that adjusts to real-time soil moisture
110. An earthquake-resistant model structure using shape-memory materials
111. A drone-based system for inspecting rooftop solar panels
112. A noise-reduction barrier design for urban traffic corridors
113. A predictive-maintenance sensor kit for factory machinery
114. A rainwater harvesting system with automated filtration
115. A wind-turbine blade redesign tested for efficiency at low wind speeds
116. A smart streetlight system that dims based on foot traffic
117. A water-leak detection system for municipal pipelines
118. A sustainable concrete mix using recycled construction waste
119. A geothermal heating prototype for small buildings
120. A smart parking-space detector using low-cost cameras

## Space & Astronomy Capstone Project Ideas

Projects for students exploring aerospace, planetary science, or astronomy:

121. A mobile app that tracks visible satellites from a given location
122. A DIY telescope built from low-cost optical components
123. A scale model demonstrating solar system orbital mechanics
124. A simulator mimicking basic Mars-rover navigation challenges
125. A calculator estimating near-Earth asteroid impact risk
126. A model comparing atmospheric composition across planets
127. A small-scale, safely tested model rocket with recorded flight data
128. A tool visualizing real-time space debris tracking data
129. An app that gamifies basic astronaut-training concepts
130. A model demonstrating how galaxies form and evolve
131. A kit simulating meteorite impact craters for teaching
132. A tool estimating travel time and cost for interplanetary missions
133. A device measuring light pollution levels in a local area

134. A model exploring radiation-shielding materials for spacecraft
135. A guide-style app documenting the history of space exploration

### **Creative Capstone Project Ideas (Stand Out From the Usual List)**

Original directions beyond the standard "robot that avoids obstacles" template:

136. A wearable device that translates sign language into speech in real time
137. An AI tool that composes music based on a user's heart rate
138. A game that teaches disaster-preparedness through simulated scenarios
139. A digital time-capsule platform preserving oral histories of local elders
140. An app that maps safe, well-lit walking routes for a campus at night
141. A robotic art installation that reacts to ambient sound
142. A tool that converts old handwritten family recipes into a searchable digital archive
143. A VR module for practicing public speaking in front of a simulated audience
144. A smart mirror that tracks posture during long study sessions
145. A device that turns everyday hand gestures into home-automation commands
146. An interactive museum-guide app that adapts to visitor interests
147. A generative-art tool that turns local weather data into visuals
148. A board game teaching basic cybersecurity concepts to teens
149. A soundscape app that recreates the acoustics of historical sites
150. A collaborative storytelling app co-written with an AI assistant