



Design for the Community

In Design Thinking and Communication, first-year Northwestern Engineering students work with community partners to address real-world challenges with one-of-a-kind ideas.

Northwestern Engineering undergraduates have been collaborating with neighboring groups and individuals to address human challenges for nearly three decades.

In Design Thinking and Communication (DTC), a two-quarter course required of all first-year Northwestern engineers, students generate practical, one-of-a-kind solutions to improve people's lives. Since DTC's 1997 launch, students have demonstrated empathy and creativity alongside mathematics and scientific principles to tackle structured design challenges submitted by individuals, nonprofits, and industry members from across the Chicago area and around the world.

DTC's intimate, experiential process teaches students how to study a problem from multiple perspectives and properly frame a design challenge, laying a foundation for the remainder of their undergraduate studies.

Jointly taught by faculty from the McCormick School of Engineering and the Weinberg College of Arts and Sciences' Cook Family Writing Program, the course requires listening and observation followed by ideation and iteration. Students also fulfill their writing requirement by learning the value of clear communication as they share their ideas with stakeholders in design reviews, reports, and presentations.

The course shows students how the design process can deliver value and impact. "Before DTC, when I came up with a solution for any problem, I wasn't always thinking about who it affected and how it affected them," says Sahana Vandayar ('24). "But when you're assigned a real project partner, you think more about their experience."

Over the years, DTC students have crafted numerous innovations, from protective sleeping environments and adaptative video game controllers to flexible office arrangements and safer child strollers. Five recent projects grounded in human-centered design principles highlight how students' spirited, creative work has provided peace of mind, advanced quality of life, and enabled independence for Chicago-area community partners hungry for solutions.

"Before DTC, when I came up with a solution for any problem, I wasn't always thinking about who it affected and how it affected them. But when you're assigned a real project partner, you think more about their experience." **Sahana Vandayar '24**

opposite Students present their final projects to clients and community members at the 2025 Design Thinking and Communication Expo.

Photo by Joel Wintermantle

Empowering safe, independent meal prep

PARTNER: NORTH CENTER

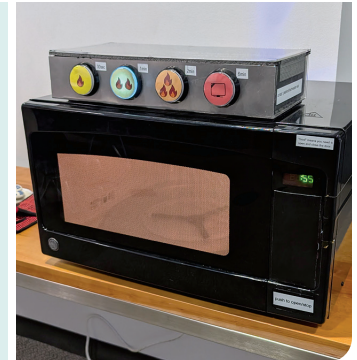
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North Center, a community program that serves adults with developmental disabilities on Chicago's northwest side, believes its clients have a right to privacy and independence. To promote autonomous living, North Center program director Morgan Wilson teamed with DTC students to help clients heat their lunches safely using the in-house microwave.

"Many don't know how many minutes an item needs and pressed multiple buttons on the microwave while waiting, which created a potentially dangerous situation," Wilson says.

"THIS HAS BEEN A BLESSING, AND WE USE IT EVERY DAY AT NORTH CENTER. IT'S A COOL ENGINEERING AND DESIGN IDEA GIVING OUR CLIENTS AUTONOMY AND INDEPENDENCE AS WELL AS ACCESS TO THE NUTRITION THEY NEED."

Morgan Wilson Program Director, North Center

Through conversation with North Center staff and on-site observation, DTC students identified the four most frequently used cooking options. They then designed a simplified, four-button microwave interface linked to different time settings. Three of the buttons feature flame icons—one, two, and three flames related to cooking times of 30, 60, and 120 seconds, respectively. A fourth button with a television icon representing a TV dinner signifies a cooking option of six minutes. Once a user pushes a button, the microwave ignores any subsequent input to ensure safe heating operation.

"This has been a blessing, and we use it every day at North Center," Wilson says of the student-crafted microwave interface. "It's a cool engineering and design idea giving our clients autonomy and independence as well as access to the nutrition they need."

Making learning robotics more engaging and fun

PARTNER: MISERICORDIA

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At Misericordia, a Chicago-based nonprofit, developmental training instructors like Jeremy Wyatt are always seeking accessible, enriching educational tools for the more than 600 children and adults with developmental disabilities it serves on a 37-acre campus.

Misericordia's robotics curriculum, however, was struggling to engage residents and provide sufficient academic depth. The Kids First Coding & Robotics learning tool, for example, taught basic robotics and problem-solving skills, but failed to challenge students as it once did. Wyatt needed a more engrossing, easy-to-use educational tool with the ability to teach additional subjects. A team of five DTC students rose to the challenge with the Kids First Robot-Explorer's Edition, an expanded, multifaceted version of the resource integrating geography with coding and greater sensory engagement for enhanced learning and independence.

Explorer's Edition simulates the experience of flying over a map, providing users dynamic interaction with geographical features to make learning fun and intuitive. Using a 3D-printed adapter, students connect a magnetic toy plane to the base of a robot.

The team also created a transparent box—the so-called “sky platform”—equipped with a map of recognizable geographic locations, a US state map for example, on its floor. After programming a set of directions into the robot, users place the robot on the sky platform and set out on an adventure to discover the world around them.

Impressed with the solution, Wyatt implemented the Kids First Robot-Explorer's Edition into the Misericordia curriculum. He says residents enjoy the expanded abilities of the robots and reports increased participation with the robotics kits.

Improving health and safety in special education

PARTNER: NILES TOWNSHIP DISTRICT FOR SPECIAL EDUCATION

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Michelle Van Acker, an occupational therapist at Niles Township District for Special Education (NTDSE), presented DTC students with a unique challenge. A four-year-old boy attending NTDSE compulsively put his hands in his mouth. The oral fixation led to calluses and skin irritation on the boy's hands and saliva buildup around his torso. Van Acker tasked students to design a safe, nonrestrictive, washable device that would prevent damage to the young boy's hands and minimize the risk of illness.

“We wanted a healthy, developmentally appropriate solution that wouldn't restrict the student's movement or limit his independence,” says Van Acker, adding that existing options, such as mittens, knuckle guards, and hand-splints were inadequate.

“THIS SOLUTION ALLOWED OUR STUDENT TO REMAIN INDEPENDENT AND RETAIN HIS MOVEMENT WHILE STAYING CLEANER, HEALTHIER, AND SAFER.”

Michelle Van Acker Occupational Therapist, NTDSE

The DTC students responded with a two-pronged concept. First, they fashioned a device called the HandyGuard out of a soft, food-safe plastic material. Wrapped around the hand and attached with Velcro, the transparent device—akin to a glove without fingers—includes a ring of absorbent material to block saliva from reaching the hand. It prevents the boy from sucking his hands while still enabling sensory stimulation.

Next, they crafted a protective shield, called ProtectiBib, from incontinence pads and attached it using magnets to cover the boy's upper body. It absorbs saliva coming from the boy's mouth and tracheostomy tube.

“This solution allowed our student to remain independent and retain his movement while staying cleaner, healthier, and safer,” Van Acker says.

Reengineered kickstand improves cyclers' experience

PARTNER: ENVISION UNLIMITED

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At Envision Unlimited, a Chicago-based nonprofit serving adults with intellectual and developmental disabilities, a well-established adaptive cycling program enables participants to interact with the community, build relationships, explore, and enjoy heightened independence. However, a persistent issue with the organization's fleet of 30 tandem bikes proved particularly irksome for users: kickstands were prone to failure and user error.

Convinced that a more intuitive, easy-to-use kickstand would benefit riders and deliver a more pleasant experience, Envision Unlimited program coordinator David Pufundt turned to DTC students to create a more natural, functional option.

Drawing inspiration from more robust motorcycle kickstands, which must handle this vehicle's significant weight, a team of DTC students obtained one before testing different attachment mechanisms, modifications, and placement spots on a tandem bike. Their solution, the prototype Spring Kickstand, maintained structural integrity while avoiding rider interference—just the solution Pufundt needed for Envision Unlimited's riders.

"DTC students brought a perspective we didn't have, and that led to these kickstands that will benefit us on every ride we take moving forward," Pufundt says.

Fixing a flaw to protect valuable tools

PARTNER: SHIRLEY RYAN ABILITYLAB

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For occupational therapists at Shirley Ryan AbilityLab, hand dynamometers—which measure grip strength—provide objective data on an individual patient's recovery. But the frequently used tools broke far too often when dropped due to cases that were not properly latched. With repair and replacement costs mounting, the Chicago-based rehabilitation research hospital asked DTC students for help.

Shirley Ryan AbilityLab occupational therapists imagined the students might create something akin to a smartphone case for the dynamometers. Following extensive questioning, observation, and study, the students instead developed a much different, albeit simple and powerful solution.

The students retrofitted an existing dynamometer case with magnets and an additional handle to prevent the cases from accidentally opening. Through multiple rounds of testing, they discovered the right blend of strength and placement to seal the case without challenging therapists' ability to access the tool when needed.

"The design blew us away," says Joann Prekezes, a former occupational therapist at Shirley Ryan AbilityLab. The hospital's team members immediately began exploring the feasibility of retrofitting all their dynamometer casings to the DTC team's design.

DANIEL P. SMITH

Got a Challenge That Needs Solving?

Design Thinking and Communication invites organizations and individuals to submit challenges any time. Ideal topics could involve:

- Devices that leave users unsatisfied
- Accessibility challenges requiring fresh perspectives and ideas
- Processes that could be more efficient

What's in it for you?

- Dedicated teams of engineering students working with you
- Proof of concept prototypes and documentation
- Compensation for your time and feedback during the process

Time commitment?

Just 5–10 hours over the course of 10 weeks.

**CONTACT THE DTC TEAM
TO LEARN MORE. ➔**

