

Spring 2026

CMGT 40095/50095: AI in Construction



*Image generation credit: DALL E

Instructor: Ruoxin Xiong, Ph.D., Assistant Professor
Construction Management
College of Architecture and Environmental Design
Kent State University
rxiong3@kent.edu
Ph: 330-672-3080

Class Meetings: Wednesday: 5:30 PM - 8:15 PM

Location: CAED 124

Delivery method: In-person

Office Hours: Monday and Wednesday, 10:30 PM - 12:00 PM

Tuesday and Thursday, 12:15 PM – 1:30 PM

and/or by appointment

Office Location: 210H

Course Information

CANVAS course link and GitHub repo:

40095: <https://kent.instructure.com/courses/107956>

50095: <https://kent.instructure.com/courses/107990>

Some Lecture Notes and code: <https://github.com/ruoxinx/Course-Advanced-Tech-Applications-in-Construction>

Course Description

CMGT 40095/50095 Advanced Technology Applications In Construction explores the fundamentals and applications of emerging construction technologies, including AI/ML, robotics, and advanced sensors in the construction industry.

Course Learning Outcomes (SLO 1, 2, 7, 8)

At the completion of this course, the student should be able to:

1. Create written communications appropriate to the construction discipline
2. Build sensing systems to collect building and construction data for improving construction safety and efficiency
3. Incorporate and evaluate AI and robotics for practical construction engineering and management issues
4. Create oral presentations appropriate to the construction discipline

Learning Materials

The materials will be provided by the instructor on *Canvas and GitHub*.

Student Activities/Projects

There will be assignments and course projects in which the student will learn and put into practice basic tools and methods for the advanced technologies in construction.

Connect with Me

Office Hour

I care about the success of each of you and would love to meet with you or with others during my office hours. You are very welcome to come. If it is more convenient for you to meet with me virtually or request a separate time or even a different location to chat, please just let me know.

Connect by Email

Please use the Kent State Email system to contact me since our mail server will flag your message as external if you use another system. I will do my best to respond to emails within 2 business days and hope that you will do the same. There may be an occasion when life prevents me from reaching this goal, so if you email me and don't hear back from me within 2 days, please know I would welcome a gentle reminder.

CANVAS Discussion Board

If you have any questions, feel free to post them on the CANVAS Discussion Board.

Course Calendar

You should be spending at least one to two hours outside of class for every hour of lecture. Plan your time accordingly. There will possibly be quizzes on the day the reading assignment is discussed to motivate you to be current in reading the textbook.

NOTE: All assignments are due at the time listed for each, and a 25% penalty will be deducted for all assignments turned in late.

HANDOUTS: All handouts and assignments will be located on the course **Canvas site and GitHub**, accessible from any computer on the internet.

Topic(s)
Course Overview
In-class activity: data visualization with Google Colab and Python
Topics 1: AI and sensing technology in construction
In-class activity: data visualization with Google Colab and Python
Intro to Big Data Data Sensing in Construction
In-class activity and assignment: data sensing and collection using Raspberry Pi
Data Processing and Analysis in Construction In-Class Lab: Data preprocessing in construction with Python
In-Class Lab: Data preprocessing in construction with Python Assignment 4: in-class instructions
Introduction to AI/ML/DL In-class activity and Practices: Data analysis with ML methods in construction
Data analysis with deep learning methods in construction In-class activity and Practices: construction equipment identification with deep learning (tentative)
Introduction to Generative AI In-class discussion: Future of Works in Construction
In-class activity: Team project Phase I presentation (Problem statement and Motivation)
Topics 2: Robotics in Construction Topics 3: Simulation Technologies in Construction
Introduction to robot components In-class activity: Guest lecture and Demo
Civil and infrastructure industrial robots In-class activity: Guest lecture and Demo
Digital Twins and Metaverse in Construction

In-class activity: XR Lab Visit
Final Project Open Lab
In-class activity: Team project Phase II presentation (Problem statement, Motivation, Method, Data Collection, Results, and Conclusion)

Evaluation Criteria

Assignments will be evaluated based on completeness and accuracy of estimates. All assignments should look professional. All assignments are due on the posted due date.

Grading System

Assignments/ Quizzes	40%
Attendance	10%
Group Project	50%

Grade Scale

Percentage of Earned Points	Grade	Percentage of Earned Points	Grade
100%- 93%	A	79% - 77%	C+
92%- 90%	A-	76% - 73%	C
89% - 87%	B+	72% - 70%	C-
86% - 83%	B	69% - 67%	D+
82% - 80%	B-	66% - 60%	D
59% - 0%	F		

Information on Missed Assignments, Missed Quizzes, and Golden Tickets

Recognizing that “life happens” each of you will be issued 1 Golden Ticket at the beginning of the semester. Golden ticket may be used to extend a homework assignment or quiz due date by 48 hours.

Attendance Policy

Attendance is measured both by presence in the course and student interaction with course learning materials and assignments. Students are expected to check their Kent State e-mail and to log into their course several times during the week.

Students who anticipate an absence from the course due to medical or other reasons should consult with the instructor individually. An absence due to illness or injury requires verification from a medical professional and should be presented to the instructor.

University Policies

Course Enrollment and Withdrawal

University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be attending classes and will not receive credit or a grade for the course. Each student must confirm CMGT 40095/50095: Advanced Technology Applications In Construction

enrollment by checking his/her class schedule (using Student Tools in FlashLine) prior to the deadline indicated.

If registration errors are not corrected by this date and you continue to attend and participate in classes for which you are not officially enrolled, you are advised now that you will not receive a grade at the conclusion of the semester for any class in which you are not properly registered. For more information, see the "Course Enrollment and Withdrawal" section in the Getting Started in your Online Course page.

Academic Integrity

This course supports an environment of academic openness and honesty. Together we will follow Kent State's Honor pledge which states, "In support of Kent State University's standards of excellence, honesty, integrity and academic accountability, I pledge, on my honor, to conduct myself at all times in accordance with university rules that prohibit cheating, plagiarism, or any other form of academic dishonesty." You have an ethical responsibility to ensure that your work is original or cites appropriate sources (most likely it will be both). Link to the administrative policy regarding student cheating and plagiarism: <https://www.kent.edu/policyreg/administrative-policy-regarding-student-cheating-andplagiarism>

Request for Religious Accommodations

The University welcomes individuals from all different faiths, philosophies, religious traditions, and other systems of belief, and supports their respective practices. In compliance with University policy and the Ohio Revised Code, the University permits students to request class absences for up to three (3) days, per term, in order to participate in organized activities conducted under the auspices of a religious denomination, church, or other religious or spiritual organization. Students will not be penalized as a result of any of these excused absences.

The request for excusal must be made, in writing, during the first fourteen (14) days of the semester and include the date(s) of each proposed absence or request for alternative religious accommodation. The request must clearly state that the proposed absence is to participate in religious activities. The request must also provide the particular accommodation(s) you desire. You will be notified by me if your request is approved, or, if it is approved with modification. I will work with you in an effort to arrange a mutually agreeable alternative arrangement. For more information regarding this Policy, you may contact the Student Ombuds (ombuds@kent.edu).

Student Accessibility Services (SAS)

Kent State University is committed to inclusive and accessible educational experiences for all students. University Policy 3342-3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure equal access to course content. Students with disabilities are encouraged to connect with Student Accessibility Services as early as possible to establish accommodation. If you anticipate or experience academic barriers based on a disability (including mental health, chronic medical conditions, or injuries), please let me know immediately.

Student Accessibility Services (SAS): sas@kent.edu

University Library, Suite 100

Phone: 330-672-3391; VP 330-968-0490; Web: www.kent.edu/sas

[Visit Student Accessibility Services \(SAS\) for more information](#)

Basic Needs Support & Mental Well-being

Kent State University is committed to supporting the overall well-being of our students. This support may take the form of assisting students with basic needs such as food and housing. We recognize that the absence of secure housing and access to food makes it difficult for students to achieve their best in and out of the classroom. If you, or someone you know, are unable to afford groceries or lack a safe, secure, and reliable place to live, please visit the CARES Center basic needs resource website: <https://www.kent.edu/carescenter/basic-needs-resources>

Mental health challenges may also make it difficult for students to reach their full potential. KSU's mental health and wellness resource page provides information on education and awareness, mental health services, and advocacy intervention. To learn more, please visit Kent State's mental health resources and support website at <https://www.kent.edu/mentalhealth>

Kent Campus Academic Support Statement

Kent State recognizes many students face challenges and we are committed to supporting your academic journey when you need help. Whether you are struggling in a course, need help writing a paper or actively working to achieve your goals, use the resources below to start building your support system:

- Where can I get help from another student who earned a good grade in this class?
 - Tutoring (www.kent.edu/asc/tutoring)
- Where can I go if I need assistance with how to study and meet my academic goals?
 - Academic Coaching (www.kent.edu/coaching)
- Who can review my writing and help me properly cite my work?
 - Writing Commons (www.kent.edu/writingcommons)
- Where should I go when I don't know where to go?
 - Academic Advising (www.kent.edu/university-advising)
 - TRIO Student Support Services (www.kent.edu/studentssupportservices)
 - There may be additional resources, just ask!

Diversity, Equity, and Inclusion Statement

Kent State University is committed to the creation and maintenance of equitable and inclusive learning spaces. This course is a learning environment where all will be treated with respect and dignity, and where all individuals will have an equitable opportunity to succeed. The diversity that each student brings to this course is viewed as a strength and a benefit. Dimensions of diversity and their intersections include but are not limited to: race, ethnicity, national origin, primary

language, age, gender identity and expression, sexual orientation, religious affiliation, mental and physical abilities, socio-economic status, family/caregiver status, and veteran status.

Land Acknowledgement Statement

We acknowledge that the lands of Kent State University were the previous homes of people who were removed from this area without their consent by the colonial practices of the United States government. Before removal, these groups created networks that extended from Wyoming to the Florida Coast and Appalachia and to the northern reaches of Lake Superior. These societies included people of the Shawnee, Seneca-Cayuga, Delaware, Wyandots, Ottawa, and Miami. We honor their lives – both past and present – and strive to move beyond remembrance toward reflection and responsibility through honest accounts of the past and the development of cultural knowledge and community.

Subject to Change Statement

The syllabus and course schedule may be subject to change. Changes will be communicated via email and the Announcement tool. It is the responsibility of students to check email messages and course announcements to stay current in their online courses.