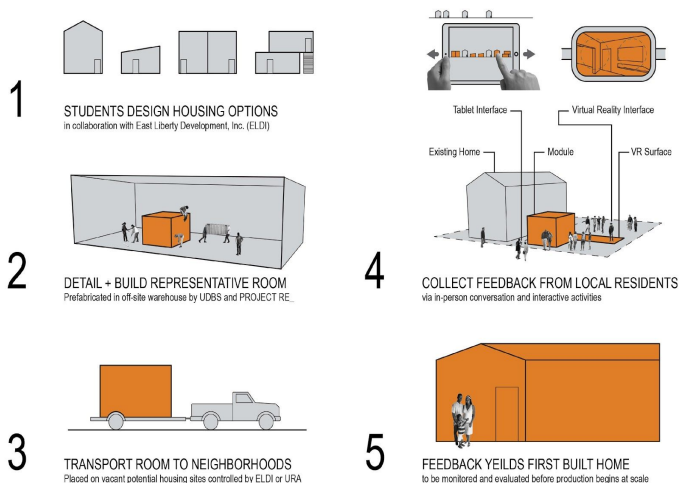CARNEGIE MELLON UNIVERSITY, IDeATe

HOME

RE_CONSIDERED

16-456 / 48-558 REALITY COMPUTING STUDIO

FALL 2017 COURSE SYLLABUS

PROFESSORS: JOHN FOLAN, TOM CORBETT
HUNT LIBRARY, A10 | M-W 1:30-3:20PM
WEBSITE: https://courses.ideate.cmu.edu/16-456/f2017

1 STUDENTS DESIGN HOUSING OPTIONS
in collaboration with East Liberty Development, Inc. (ELDI)

2 DETAIL + BUILD REPRESENTATIVE ROOM
Prefabricated in off-site warehouse by UDBS and PROJECT RE_

3 TRANSPORT ROOM TO NEIGHBORHOODS
Placed on vacant potential housing sites controlled by ELDI or URA

4 COLLECT FEEDBACK FROM LOCAL RESIDENTS
via in-person conversation and interactive activities

5 FEEDBACK YEILDS FIRST BUILT HOME
to be monitored and evaluated before production begins at scale

REALITY COMPUTING encompasses a constellation of technologies focused around capturing reality (laser scanning, photogrammetry), working with spatial data (CAD, physical modeling, simulation), and using data to interact with and influence the physical world (augmented / virtual reality, projector systems, 3d printing, robotics). Taught in collaboration with the school of architecture, this studio asks students to apply these technologies to real world problems such as residential design, sustainability, and infrastructure monitoring.

▌PROJECT BACKGROUND

The 2017/2018 Urban Design Build Studio (UDBS) will focus on affordable housing and the development of experiential tools for enhanced resident engagement through Public Interest Design (PID) processes. The aspiration of the year-long studio sequence will be the implementation/construction of an affordable housing prototype. The design and production of the housing prototype will be influenced by three considerations; 1) necessity/need, 2) social justice, 3) opportunity for proactive, systemic change. At present, availability of affordable housing is failing to meet demand in Pittsburgh, Pennsylvania. Expansive change to the urban landscape perpetuated by recent development activity has displaced many under-represented populations and exacerbated socio-economically biased trust issues within communities; reinforcing a regional culture marred by segregation and exclusion. Contrary to public perception, displacement is not by design. Policy, funding, and financially unsustainable construction practices influence the behavior of the development community and undermine potential for change. Production models in allied manufacturing disciplines suggest an opportunity to exploit traditional and advanced technologies as a mechanism for impacting positive social change by increasing the affordability of all construction; not just a small sector of the industry tied to financial subsidy.

HOME RE_CONSIDERED will utilize this constellation of considerations and opportunities as a platform to initiate a year-long design-build sequence in the implementation/realization of an affordable housing prototype, *RE_CON 01*, and demonstrative/experiential design tool, the *HOME Inc.UBATOR*. Extending a collaboration with the IDeATe Reality Computing program, the studio will explore the potential for augmented and adaptive reality computing applications to enhance analysis, pre-fabrication practices, and social/public engagement methodologies. Divided into a sequence of four modules, the UDBS will utilize 1) Data Capture via Lidar Scanning to enhance understanding of physical place, 2) Data Sets to enhance understanding of demographic/socio-economic condition, 3) Virtual Reality applications to enhance understanding of spatial potential, and 4) Physical prototyping to advance work on *RE_CON 01* and the *HOME Inc.UBATOR*. As proposals for housing prototypes are developed and systems explored they will be tested at full scale utilizing construction facilities at PROJECT RE_. This work will form the core foundation for the *HOME Inc.UBATOR*, a portable residential housing module prototype equipped with reality computing and advanced virtual reality visualization technology that aspires to enhance the efficacy of community engagement in the development of affordable housing for all. With a compliment of physical and virtual components/experiences, the incubator will help residents experience and understand housing proposals developed in collaboration with the non-profit entity, East Liberty Development Corporation (ELDI). As a physical building module temporarily installed on sites within neighborhoods, residents will be able to tangibly experience and understand spatial qualities, materials, and sustainable building strategies first hand. Interactive VR Goggle and tablet based interfaces will enable residents to manipulate representations of the interior environments and exterior shell of proposed designs in real time. Feedback collected will develop community ownership of, and foster trust in, the affordable for-sale housing prototype to be produced through PROJECT RE_

The *HOME RE_CONSIDERED* studio is a component of a broader Public Interest Design continuum established by the UDBS and PROJECT RE_. This studio provides a pre-text for work in the Spring 2018 UDBS ASOS, *HOME RE_DEFINED* and anticipated opportunity for subsequent Summer 2018 UDBS Paid Internship. Enrollment in *HOME RE_CONSIDERED* implies a one year commitment from students to fulfill construction/implementation responsibilities. Skill sets and sensibilities developed in each UDBS ASOS and Co-requisite courses are intended to inform subsequent studios and the implementation of work through jurisdictional review processes. Taking a project from initial concept through the completion of construction requires commitment over the entire one year projected timeline. UDBS summer internships are reserved for students who have completed a sequence of two (fall and spring) Urban Design Build Studios, and are offered based on demonstrated ability to accept responsibility. The structure of the UDBS sequence is designed to afford students an opportunity to participate in a one year long sequence in the fulfillment of a Public Interest Design agenda. The focus of each UDBS sequence evolves with issues of regional and global significance. The studio is open to MArch students, 4th and 5th year undergraduate BArch students, AECM Synthesis students, and affiliated IDeATe students at graduate and undergraduate levels. Undergraduate 4th year BArch students enrolling in the UDBS, interested in developing an expertise/focus in Public Interest Design may elect to continue to work with the UDBS in the 5th year of the program, completing a two year study focus.

COURSE STRUCTURE

The completion of the *RE_CON 01* Housing Prototype and *HOME Inc.UBATOR* projects and components of work in support of those objectives will be executed in recursive cycles. Individuals, groups of individuals, and the studio at large will produce bodies of work, critically analyze the work, and refine work in iterative cycles. As objectives of work become increasingly clear through this process, students and stakeholders will be required to adjust processes in developing regionally authentic, appropriate, affordable, and replicable solutions.

Recursive cycles will be influenced by overlapping spheres of influence associated with expertise. MArch and BArch students will be responsible for design and production responsibilities (precedent analysis, data collection, cultural context/relevance assessment, schematic design, design development, construction documentation, and physical making); from ergonomic to urban scale. AECM students will be responsible for comprehensive implementation scheduling, budget projections, value assessment (precedent analysis, appropriateness of design proposals, statistical probability of schedule viability, financial feasibility/budget definition, and cultural significance), and logistics planning for all proposed work. IDeATe Reality Computing students will be responsible for development of visualization tools for enhanced public engagement. Throughout the process, teams will be provided access to consultants, craftsmen, and professional advisors who will give additional guidance on technical aspects of the reality computing technologies that are being employed. Seemingly dissociative, each of these three fields of work ensures the vitality of the other – they are interdependent. And, while domains of primary responsibility will reside with specific academic cohorts, cross disciplinary work will be utilized to enhance understanding and skill development throughout the creative process.

To meet the objectives articulated, the studio/course employs a four component methodological framework. The first component, *CONTEXT*, focuses on establishing a fundamental understanding of physical and social conditions that will inform the development of work. Data Capture will be utilized to understand the physical environments where both the *Home Inc.UBATOR* might be deployed, and where the *RECON 01* Housing Prototype might be sited. Data Sets will be utilized to understand demographic characteristics and their relationship to physical and socio-economic environments. Data Capture will be utilized to create accurate three dimensional depictions of sites/spaces as a mechanism understand nuanced characteristics of the physical environment as it is experienced. Captures will be utilized as the canvas for the creation of virtual reality and tablet based interactive experiences for community engagement.

The second component, *DEFINITION*, utilizes information collected and content generated in *CONTEXT*. MArch and BArch students will develop conceptual designs for *RE_CON 01*. AECM students will explore financial and logistical strategies consistent with architectural designs and evaluate efficiencies that can facilitate implementation. Reality Computing students will prototype virtual experiences enabling the design team an ability to understand developmental work. All student cohorts will focus on the collaborative development of digital workflows. The work will be utilized as a platform for the identification of, and refinement of scope in programming both *RE_CON 01* and the *HOME Inc.UBATOR.*

ARTICULATION will focus on refinement of work across all domains. Reality Computing students will work on graduating representational tools and virtual experiences from design process relevance to publicly accessible decision

making tools. AECM students will elevate the clarity of metric based project parameters in the context of construction/implementation performance. MArch and BArch students will advance the spatial, formal, aesthetic, material, and tectonic characteristics of the housing prototype and Inc.UBATOR. Collaboration with development partners, stakeholders and consultants will be central to efforts. At the conclusion of the module, work will be presented to the community for feedback in a public forum. Engagement tools in prototype form will be utilized in real time as the primary form of communication with community residents.

The feedback received through critical discourse and community engagement at the termination of *ARTICULATION* will form the platform for work during the *CONSIDERATION* module. The stance in work for all student cohorts will be simultaneously reflective and projective. Reflection will be utilized as the mechanism for evaluating what might be improved, and what must remain constant as strengths in the work developed. Projection will be utilized in numerous ways, first and foremost will be refinement of work in response to criticism and resident engagement. Second, will be the identification of workflows and objectives for positioning work in the subsequent semester and summer. Third, will be the life of the proposed work in the context of generational permanence.

Multiple collaborative working environments and techniques will be utilized to advance research, design, and construction of work in the *HOME RE_CONSIDERED* studio. The creation of a Home is a great privilege. The influence that it will have on individuals and the environment carries with it tremendous responsibility. Fulfillment of that responsibility will be carried out individually, in disciplinary specific groups, and through interdisciplinary partnerships of varying size. The mode of work, individual or group based, will alternate in cycles corresponding to the developmental needs of projects. The UDBS adopts a workshop culture to facilitate successful completion of work and promote dexterity in the exchange of information between constituencies.

UDBS Projects are client driven, executed in the service of those clients, and implemented in the context of defined budgets. While the pedagogical framework outlined here is provided for the development of related analytical and design work, the variables associated with the work will evolve constantly. Daily and weekly responsibilities will be determined by immediate needs in satisfying project objectives. When it benefits the delivery of a project, project statement amendments will be issued. Students are responsible for content in the original statements and any amendments provided. As work is predicated on collective intelligence, students are expected to be fully aware of, and have intimate knowledge of the entire teams research and work; not just content relevant the individual or subset of a specific group. Work will be executed collaboratively, and will be reliant on effective mechanisms of communication. Class sessions will be utilized to review, resolve, and define critical paths to problem resolution in issues related to the projects development. Successful completion of constructed work will be dependent on individuals not affiliated with the academic context of Carnegie Mellon University. Effective communication and timely delivery of work will be central to productivity.

Individual and collaborative effort will be invested outside of the course sessions in 1) Developing a Coherent Project Chronology, 2) Fulfilling Assigned Responsibilities, and 3) Executing work in Production. The outcome of the course is intended to be the facilitation of construction that benefits society and makes a demonstrable positive contribution to the environment. The realization of projects in construction is a privilege, not an entitlement.

COURSE SCHEDULE
The REALITY COMPUTING STUDIO will meet Mondays and Wednesdays, 130pm to 3:20pm. This class overlaps with the UDBS Studio meeting time, and these students will participate collectively with us. Joint class times are expected to be used for collaboration with teams from Architecture, review and critique of project progress, and delivery of relevant materials through instructor and guest lectures. Course meetings will occur in Hunt Library A10, unless otherwise noted.

Note that this schedule is subject to change according to evolving project needs. The projects are funded, they have established deadlines attached to funding and implementation, they are intended to serve communities in need of service, and the success of the projects is based on collaboration with stakeholders, residents, and consultants. As the semester progresses, the schedule will adjust and evolve to reflect changes necessary in fulfilling project related

obligations and responsibilities with collaborating entities. Similarly, the execution of this work in the context of an educational environment requires the development of requisite knowledge. The schedule will adjust as necessary to ensure the development of skills and knowledge as abilities of individuals and groups are demonstrated.

Note: The following schedule corresponds to the REALITY COMPUTING component of this course ONLY.

01 CONTEXT
M 08.28.2017   Course Introduction
W 08.30.2017   Coordination and Collaboration Meeting

02 CONTEXT
M 09.04.2017   Labor Day, No Class
W 09.06.2017   DATA SETS Lecture/Work session Kristen Kurland, GIS and ESRI

03 CONTEXT
M 09.11.2017   CONTEXT component assignment Introduction, skill assessment and collaborative team building exercise
W 09.13.2017   Data Collection, on site photogrammetry and Lidar scanning training/work session with Marc Zinck, Autodesk, 1:30pm to 3:20pm on site in East Liberty/Larimer;

04 CONTEXT
M 09.18.2017   Group work session and workshop on using capture tools to create representation; demonstration on bringing assets into unity; demonstration on use of ReCap, navigating in 3D and RealView, Editing: LimitBox / Clipping / Regioning / Deleting, Annotation & Markups, Measurements, View States, Video Export with Marc Zinck
W 09.20.2017   CONTEXT interim review/progress check-in

05 DEFINITION
M 09.25.2017   *CONTEXT* REVIEW;
W 09.27.2017   Introduction to DEFINITION component of work;

06 DEFINITION
M 10.02.2017   Coordination/Collaboration/Demonstration/Work session;
W 10.04.2017   Coordination/Collaboration/Demonstration/Work session;

07 DEFINITION
M 10.09.2017   Coordination/Collaboration/Demonstration/Work session;
W 10.11.2017   Coordination/Collaboration/Demonstration/Work session;

08 DEFINITION
M 10.16.2017   *DEFINITION* REVIEW;
W 10.18.2017   Introduction to *ARTICULATION* component of work; 1:30pm to 3:20pm, IDeATe Physical Computing Lab (HLA 10);

09 ARTICULATION

M 10.23.2017   RC Demonstration/Work session;
W 10.25.2017   Coordination/Collaboration/Demonstration/Work session;

10 ARTICULATION

M 10.30.2017   RC Demonstration/Work session;
W 11.01.2017   Coordination/Collaboration/Demonstration/Work session;

11 ARTICULATION

M 11.06.2017   Coordination/Collaboration/Demonstration/Work session;
W 11.08.2017   Coordination/Collaboration/Demonstration/Work session;

12 ARTICULATION

M 11.13.2017   Coordination/Collaboration/Demonstration/Work session;
W 11.15.2017   Coordination/Collaboration/Demonstration/Work session;

13 ARTICULATION

M 11.20.2017   *ARTICULATION* REVIEW; 1:30pm to 3:20pm, IDeATe Physical Computing Lab (HLA 10);
T 11.21 2017   **MA/AECM/BA/RC** UDBS Community Meeting/Presentation, PROTOTYPE Testing; East Liberty/Larimer Neighborhoods, Time and specific location TBD
W 11.22.2017   Thanksgiving Break, No Class

14 CONSIDERATION

M 11.27.2017   Introduction to *CONSIDERATION* component of work;
W 11.29.2017   Coordination/Collaboration/Demonstration/Work session;

15 CONSIDERATION

M 12.04.2017   Coordination/Collaboration/Demonstration/Work session;
W 12.06.2017   Exhibition Coordination/Collaboration/Demonstration/Work session;

▌**Reading**

There are no required readings for this course. Students in UDBS are required to read certain texts, so these are recommended below.

Recommended Text

EVICTED: Poverty and Profit in the American City: Desmond, Matthew; Penguin Random House, New York, 2016

ACADEMIC POLICIES

For this course it is expected that all interactions, including those with fellow students, should be treated as though this were a professional work environment. While this course offers opportunities to experiment with designs and technologies - and to take larger risks than one might in an actual workplace - you are still expected to exhibit the conduct of a professional adult at all times.

Attendance:
Attendance is expected for all class sessions. (Exception: If you are sick, stay home. Do not infect the rest of us. Please send a note to myself and/or the TA to let us know that you will be out) Excused absences will be considered on a case-by-case basis. If you know you will be out of town or have a conflicting appointment, please let the instructors know ahead of time via e-mail. It is your responsibility to communicate and coordinate this absence with your teammates.

Class Conduct:
Be on time and ready when class begins. Repeated late arrivals will be noted and your grade may be penalized. Make sure that you are awake, engaged, and participatory. Be respectful of our guests, our staff, and each other.

When computers are in use during class time, they will be utilized for work – not entertainment or social media. Entertainment websites and social media will not be active. Headphones will only be used for the development of audio elements of the project, if any.

Please refrain from bringing food and beverages into the classroom. Our classroom contains a significant amount of electronic equipment, so as a precaution liquids are prohibited. We share the IDeATe facilities with many departments, please keep them clean.

Assignments:
Project parameters and deliverables will be distributed at the beginning of each assignment. If you have questions about the assignment or deadlines, please ask.

Students are expected to turn in their own work. Do not cheat or plagiarize. Please review CMU's policy on Academic Integrity (http://www.cmu.edu/academic-integrity/). Materials created by someone else (code, photographics, music, etc) should include proper permission and/or attribution. Use of code libraries can be approved on a case-by-case basis.

Grades for the four components of studio coursework will be derived from weekly performance evaluations assessed each Monday of the semester. The Criteria for evaluation will be consideration of 1) Appropriateness of Design/Program Resolution; 2) Affordability/Cost Effectiveness of Design; 3) Replicability of work; and 4) Craft/Quality of Execution in Work Product. Each of these criteria will be evaluated each week to determine the week's performance and establish standards for subsequent work. PROCESS and PRODUCT will be considered as equivalent dimensions within each criteria, and each has a weighting of 50% for any given week or any given component task.

Grading Policy
Students in the Reality Computing course will be graded individually for participation and as a group for team assignments. Team assignments will be evaluated for both project (the quality of the final product) and process (the quality of effort, organization, and teamwork put forth by the team members). All team members will receive the same

project and process grades, except in cases where an individual's effort is shown to have greatly mismatched that of the rest of the team.

- **20%** CONTEXT
- **25%** DEFINITION
- **25%** ARTICULATION
- **20%** CONSIDERATION
- **10%** Participation (Individual)

Grades for this course are assigned based on the following table:

97%	A+	
92%	A	**Excellent** Exceeds expectations
90%	A-	
87%	B+	
82%	B	**Good** Meets expectations
80%	B-	
77%	C+	
72%	C	**Satisfactory** Meets requirements, but not expectations
70%	C-	
67%	D+	**Unsatisfactory** Below requirements and expectations
65%	D	

Late Work
Projects and Exercises are to be turned in at the beginning of class on their due date. Late work will not be accepted without instructor's prior approval and written agreement as to revised due dates and grading policy. Upon approval, late work will be penalized by a reduction in score of 25% per day late. Failure to submit work for any single deadline is grounds for course failure at the discretion of the instructor.

Incomplete Work
Incomplete work will not be accepted without instructor's prior approval and written agreement as to revised completion dates and applicable grading penalties.

STATEMENTS
Recognition of Personal Risk

By enrolling, students understand and recognize that there are risks in travelling to and from work sites, meeting locations, and other studio related destinations visited regularly throughout the course of the semester. Students acknowledge that they understand Project RE_, the primary work and fabrication space utilized by the Urban Design Build Studio (UDBS) is an off-campus facility and that the studio work requires the utilization of construction tools that may cause bodily injury. Students acknowledge that they understand the risks associated with using the tools and do so of their own volition. The Urban Design Build Studio (UDBS) collaborates with organizations that may or may not include individuals with previous legal violations and/or incarceration. The trade Institute of Pittsburgh (TIP), a partner in Project RE_, focuses its apprentice training on individuals re-entering society post incarceration. Students enrolling in this studio acknowledge that they understand the working conditions and have elected to participate in the studio of individual volition.

Intellectual Property
By enrolling in this course each student recognizes and consents to the assignation of all intellectual property rights from work produced to the Urban Design Build Studio (UDBS) and PROJECT RE_. Each student recognizes that work is collaborative and in the service of UDBS clients and the Public Interest Design entity, UDBS.

Permission to Use Photography and Work Product in Publication
Dissemination of information and practices employed in serving public interest clients is fundamental to the UDBS mission. By enrolling in the studio each student grants permission to Carnegie Mellon University and the UDBS in using work product for purposes of publication. All work will be credited to authors.

Subject to Change
With the exception of the grade and attendance policies, parts of this syllabus including the course calendar are subject to change with advance notice either as a class handout or on the course web page, as deemed appropriate by the instructor.

Carnegie Mellon University Academic Policies
Please refer to the following web-link for policies regarding goals, rights and responsibilities of students at Carnegie Mellon University: http://www.studentaffairs.cmu.edu/theword/acad_standards/

Carnegie Mellon University Student Code of Academic Integrity
Please refer to the following web-link for policies concerning plagiarism and authenticity in student work: at Carnegie Mellon University: http://www.studentaffairs.cmu.edu/theword/acad_standards/integrity.html

Retention of Work
The Carnegie Mellon University School of Architecture has the right to retain any student project for the purposes of display, accreditation, documentation, educational or legal purpose. The work produced is the property of the UDBS and represents the collaborative efforts of the organization. Each individual relinquishes personal rights to the work and assigns it to the UDBS.

Statement of Support for Students' Health & Well-being
Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking time to relax. This will help you achieve goals and cope with stress. If you feel you are struggling, there are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is almost always helpful.

If you or anyone you know experiences feelings of extreme anxiety, depression, or is in danger of self-harm you are encouraged to seek support. Counseling and Psychological Services (CaPS) can be contacted by phone at 412-268-2922 or you may visit their website at http://www.cmu.edu/counseling/. Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help. Additional resources that may be of help are:

CaPS: 412-268-2922
Re:solve Crisis Network: 888-796-8226
If the situation is life threatening, call the police
On campus: CMU Police: 412-268-2323
Off campus: 911

Accommodations for Students with Disabilities
If you have a disability and have an accommodations letter from the Disability Resources office, you are encouraged to discuss your accommodations and needs with the professor as early in the semester as possible. Accommodations will be provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, they can be reached at access@andrew.cmu.edu.

Office Hours

Professor John Folan, Director UDBS, Executive Director PROJECT RE_
Office: College of Fine Arts (CFA) Office 212, UDBS
Office Hours: The professor maintains an open door policy for meetings with students Monday through Friday. Specific appointments can be scheduled on Tuesdays and Thursdays
P: 412 268 6260
C: 412 897 1619 (use with discretion)
E: **jfolan@andrew.cmu.edu**

Professor Tom Corbett, Special Faculty, Entertainment Technology Center
Offices: IDeATe Office (Hunt 246), Entertainment Technology Center (PTC 3319)
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