

## Illini Gadget Garage: Education through Electronic Product Life Extension

Requested funding: \$95,000

Project Lead: Joy Scrogum; Project Team: William Bullock, ISTC staff TBD\*, SEI campus consortium members TBD\*

### Please provide a brief background of the project, the goals, and desired outcome.

Electronic waste, or e-waste, is a growing national and global problem. [According to the US Environmental Protection Agency<sup>1</sup>](#), only 29.2% of electronics were recycled in the US in 2012. While the proportion of electronics recycled nationally has increased in recent years, due largely to landfill bans and related legislation in various states, it's also true that our consumption of electronic devices is increasing over time. For example, [PC World reported<sup>2</sup>](#) that 1 billion smartphones were shipped worldwide in 2013—enough for roughly 1 in every 7 humans on the planet. That's a staggering statistic for only one category among many electronic devices which saturate our lives. Beyond items like your phone or laptop, electronic components appear in a multitude of everyday items not typically considered "electronics," from coffeemakers to greeting cards that play music. The manufacture and transport of electronics require great investments of natural and human resources in a variety of ways, and include economic, social, and environmental impacts throughout their product lifecycles. Meanwhile, society continues to foster the perception of electronics as items meant to be replaced frequently as newer models are released, or to be considered completely disposable (in the case of products like electronic greeting cards). The belief of many consumers that electronics are too complex or expensive for a layperson to repair often contributes to the short lifespan of electronics in practice, causing people to replace mildly damaged equipment rather than investing resources in maintenance. [The United Nations University<sup>3</sup>](#) has estimated that an average of 7 kg of used electrical and electronic products are produced per person per year globally, and that by 2017 this collective annual volume of e-waste will increase by a weight equal to 11 Great Pyramids of Giza. Our "throw-away society" may become our most monumental mistake.

In the face of such complex problems, the goals of the Illini Gadget Garage are relatively simple. We propose to:

1. Provide a center where UI students and staff will bring their electronic devices for assessment and repair. Service will fit the situation, ranging from guidance on how to make your computer run faster to actual repair and replacement of components.
2. Foster financial self-sufficiency for the Gadget Garage by charging nominal fees associated with jobs requiring extensive work. Clients will pay for any new components ordered. Wherever possible, parts will be purchased through local electronics repair businesses, and if required work is beyond the abilities of the student staffers, customers will be referred to those local businesses. Fees collected will be applied to Gadget Garage operations.
3. Provide information on IL electronics legislation and local recycling options. Depending upon feasibility (to be determined<sup>†</sup>), unwanted devices could be donated to the Gadget Garage for sale at a deep discount to community members in need or area non-profits, similar to what has been accomplished at the campus Bike Shop. Funds from sales could help sustain the Gadget Garage financially, fund coursework or educational opportunities related to its operations, or fund other sustainability projects on campus. Alternatively, unwanted devices might be [donated for use in the iFixit Technical Writing Project<sup>4</sup>](#).
4. Provide unique experiential learning opportunities for UI students directly involved in the repair of devices and daily operations of the Gadget Garage.
5. Inspire more sustainable consumer behavior through direct and indirect education on the impacts of electronics and our perceptions of them.

This seed funding from SSC will foster course and educational opportunity development; cover faculty and staff time for student oversight; and contribute to acquisition of necessary tools, equipment and space rental. ISTC will use SSC funds to bring together various stakeholders from UI staff, faculty, and student organizations, as well as relevant businesses and community groups for the planning and implementation of this concept, coordinated via [ISTC's Sustainable Electronics Initiative \(SEI\) campus consortium<sup>5</sup>](#). We will seek in-kind contributions and matching funding from relevant corporate sponsors (drawing from relationships forged through SEI's past [educational projects<sup>6</sup>](#)) and private donors (via the UI Foundation SEI Various Donors Fund), as well from other campus and external funding opportunities (e.g. the Graduate College's Focal Point program, Office of Public Engagement Grants, etc.). ISTC will primarily serve to facilitate and coordinate efforts among stakeholders to bring the Illini Gadget Garage to fruition, and assist with making it a self-sustaining campus operation.

Desired outcomes for students, staff, and the community include:

1. Hands on experiences for UI students, not only in terms of performing repairs, but also in: process documentation and fostering sustainable behavior on a larger scale through the [iFixit Technical Writing Project](#)<sup>7</sup>; marketing and business operations; lessons in industrial design for repair and recyclability; and in environmental education and communication.
2. Increased awareness of electronics laws and recycling options.
3. Increased awareness of sustainability issues surrounding electronic products throughout their lifecycles.
4. Decreased misconceptions regarding the disposability of devices and prohibitive complexity of electronics repair and maintenance.
5. Contribution to the overall efforts to make ours a more sustainable campus with a reduced carbon footprint.

### Please provide a brief summary of how students will be involved in this project.

Students will perform troubleshooting, assessment, and repair of devices as part of multidisciplinary courses, relevant registered student organization (RSO) and community group activities, along with potential internships with electronics recycling, refurbishment, and asset management operations. Courses may include existing sustainability-focused classes or new special topics courses in engineering, computer science, industrial design, library and information science, business, communications, marketing, or social work. RSOs such as Act Green; Design for America; MakersUIUC; IEEE student chapter; Engineers Without Borders, UIUC Chapter; Computer Science Graduate Student Organization; Students for Environmental Concerns; the Student Sustainability Committee; etc. will be engaged and encouraged to participate in various aspects of the Gadget Garage operations. These might include marketing, customer education, and identifying and engaging local non-profits that might benefit from donated devices.

Students will also produce repair and replacement guides for iFixit.com, the self-described “repair manual for everything,” dedicated to empowering consumers to extend the useful life of products they own. Students would participate in the [iFixit Technical Writing Program](#) as an assignment for a course or courses associated with the Gadget Garage. [UIUC is already a partner university for iFixit](#)<sup>8</sup>, having integrated the iFixit program into ENG 498: Sustainable Technology: Environmental and Social Impacts of Innovations, a special topics course taught by Joy Scrogum with Dr. Brian Lily as the professor of record. This exercise not only teaches students technical writing techniques, but also provides an opportunity to produce a resource that will assist people globally, foster sustainability, and serve as a lasting example of their work for their resumes. For examples, see the guides for the [Olympus Stylus 1030 SW](#)<sup>9</sup> and the [Samsung S85](#)<sup>10</sup> written by UIUC students. Guide usage statistics (views) available at the bottom of each guide page illustrate the real-world utility of such resources, enhancing the portfolios of UI student participants as they enter the job market.

Students will also be involved as clientele for the Gadget Garage, benefiting from the repair of their items and/or the provision of information and assistance regarding recycling and reuse options. If the sale of donated items is incorporated into operations, as described above, students may additionally benefit from the availability of discounted electronics from the Gadget Garage.

### Please provide an overview of the total project timeline.

This is an estimated timeline based upon a 1 year project period for this seed grant. Dates may shift depending upon pre-existing course schedules, logistical issues, etc.

- **May-July 2015:** Engage various stakeholders in planning for Illini Gadget Garage, including identification of faculty/staff for student oversight, potential course connections, and designation of suitable space for regular operations.
- **May 2015-May 2016 (continuous):** Engage potential local and national sponsors to acquire monetary and in-kind contributions to sustain Gadget Garage operations.
- **May 2015:** Potentially send a faculty partner to free iFixit educator symposium ([http://edu.ifixit.com/c/Awesymposium\\_2015](http://edu.ifixit.com/c/Awesymposium_2015)<sup>11</sup>)
- **June-July 2015:** Development of new course for student repair and technical writing experience, or incorporation into an existing course or courses.
- **July-August 2015:** Acquisition of required equipment and space set up.

- **August-September 2015:** Work with students to develop a marketing and communications strategy and begin promotion.
- **September 2015:** Grand opening of the Illini Gadget Garage.
- **August-December 2015:** Conduct at least one course with faculty partner(s) in which students learn about the impacts of electronics throughout their lifecycle, gain hands-on experience in the Gadget Garage, and participate in the iFixit Technical Writing Program. Work with faculty partner(s) to plan connections to spring 2016 courses.
- **Mid-December 2015-January 2016:** Close Illini Gadget Garage for Winter Break. Provide mid-term progress report to SSC.
- **January 2016-May 2016:** Open for the spring semester. Again, conduct at least one course with faculty partner(s) or special project with a Registered Student Organization, in which students learn about the impacts of electronics throughout their lifecycle, gain hands-on experience in the Gadget Garage, and participate in the iFixit Technical Writing Program. Work with UI students on marketing and communications of the service center.
- **April 2016:** Earth Week event, highlighting the work done at the Gadget Garage and benefits to students and the community. Details to be determined.
- **May 2016:** Submit final report to SSC. Include assessment of the feasibility of the operation continuing into the next academic year and recommendations for logistics and oversight.

### Additional comments

\*The operation of the Illini Gadget Garage will require a variety of skill sets and varying levels of input/guidance from UI faculty and staff, depending upon how the implementation details evolve from SEI campus consortium discussions. Various consortium participants have indicated interest in the ideas behind the Gadget Garage, but we are cognizant of the fact that teaching and work schedules will factor into which of them are directly participating in project tasks during a given semester. ISTC's role is that of facilitator, and while the expertise of additional ISTC staff members is likely to be drawn upon in response to specific needs/issues, the only ISTC staff members consistently part of the project team will be Joy Scrogum, Emerging Technologies Resource Specialist, and Professor William Bullock, Affiliated Faculty Scientist.

+ISTC will consult with the Illinois EPA regarding whether the occasional acceptance of devices would result in the Gadget Garage being considered a "collector" under IL electronics recycling law. [Electronics collectors and recyclers must register with the state](#)<sup>12</sup> annually, and a fee is associated with registration. If registration were necessary and fees determined to be too great a financial burden for the Gadget Garage, the idea of accepting donated devices for resale at a discount would be dropped.

### Footnotes (URLs)

1. [http://www.epa.gov/osw/nonhaz/municipal/pubs/2012\\_msw\\_fs.pdf](http://www.epa.gov/osw/nonhaz/municipal/pubs/2012_msw_fs.pdf)
2. <http://www.pcworld.com/article/2091940/global-smartphone-shipments-topped-1-billion-in-2013.html>
3. <http://unu.edu/news/news/step-launches-interactive-world-e-waste-map-2.html#info>
4. [https://www.ifixit.com/Info/Device\\_Donations](https://www.ifixit.com/Info/Device_Donations)
5. <http://www.sustainelectronics.illinois.edu/services/campusconsortium.cfm>
6. <http://www.sustainelectronics.illinois.edu/publications/teaching-sustainability-with-electronics.pdf>
7. <http://edu.ifixit.com/>
- 8.. [http://edu.ifixit.com/c/Current\\_Universities](http://edu.ifixit.com/c/Current_Universities)
9. [https://www.ifixit.com/Device/Olympus\\_Stylus\\_1030\\_SW](https://www.ifixit.com/Device/Olympus_Stylus_1030_SW)
10. [https://www.ifixit.com/Device/Samsung\\_S85](https://www.ifixit.com/Device/Samsung_S85)
11. [http://edu.ifixit.com/c/Awesymposium\\_2015](http://edu.ifixit.com/c/Awesymposium_2015)
12. <http://www.epa.illinois.gov/topics/waste-management/electronics-recycling/collectors-recyclers-refurbishers/index>