

## E-Waste Entangled in a Disruptive Society

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*Contextual Review and Concept Statement.* We nowadays live in the digital transformation era. The increase of the Internet and digitalization, the outcome of technological innovation, allows consumers to easily access new information and trends (Vadicherla et al., 2017). The results of this technological advancement are ambivalent because its innovation also generates tremendous material waste from discarded electrical or electronic devices, which are difficult to biodegrade or recycle. People live with multiple digital devices (e.g., smartphone, smartwatch, tablet) and they often replace old devices to new ones every three to five years. The increase of e-waste is accelerating worldwide, leading pollution and adverse health effect on people (Perkins et al., 2014). E-waste has been rapidly increased with an annual growth rate of 1-5% in weight and 10-25% of e-waste is landed in developing countries (Forti et al., 2018). Here, the question was derived, “where are these discarded e-waste (e.g., plugs, cords, computer chips) eventually landing to?” As a part of nature, we, human being, should concern about the environment we live in and prevent natural disruption we create every day.

The designer became aware of the power of electronic devices that we use every day and was concerned with the mess of entangled wires that are dangerous to people and the planet. The fashion industry is one of the oldest manufacturing industry (Hayes, 2011) and in this 21st century, the factories still run unimaginable working hours in unsustainable conditions, where workers face structural, fire, or electrical risks from abound of electrical wires (Liu et al., 2018). Without such an awareness regarding unsustainable outcomes the industry generates, this industry will inevitably be tangled with the dangers of pollution with full of material wastes including e-waste. “What can we do with e-waste once they are thrown out?” “Can we give a second life for e-waste as wearables? Thus, this experimental design was conceptualized through upcycling design challenge using e-waste.

*Aesthetic Properties and Visual Impact.* This design, *E-Waste Entangled in a Disruptive Society*, upcycled unconventional material wastes to wearable art with sustainability awareness in mind. Upcycling gives a fresh perspective of the old or disposed items and create a new design through combining creativity, awareness, and innovation. Vadicherla et al. (2017) state that upcycled design is sustainable, affordable, and innovative by bringing a second life to the product and a healthy life to our community. The upcycling process of this experimental design was derived through the visual experimentation of relationships among the imagery of digital disruption, the

shape of e-waste, and the evolving 3D structures inspired by entangled wires as shown in Figure 1. Any kind of wastes, including threads, wires, plugs, and soda-can tabs touched by the designer, became unique materials for their second life. Using the aforementioned unconventional materials, the designer intuitively created the design without having such a plan. This undefined artistic process was applied through freely hand-crocheting electronic wires until they formed the shape on a dress form. This upcycled design reflects the designer's intent to express digital disruption within the ecological system and provide sustainability awareness to the public.



Figure 1. Inspiration

*Process, Technique, and Execution.* The design and development of *E-Waste Entangled in a Disruptive Society* involves multiple steps: design ideation, collection of material wastes, material manipulation, and assembly. The design process started from gathering e-waste (e.g., electronic wires, cables) through local thrift stores and recycled bins located in the university campus. As shown in Figure 2, electronic wires started to build a form and trap each other as the designer hand-crocheted one another using the technique of hand-crocheting with wire referenced by single rope braid videos (Fools, 2015). Cable-ties were used to hold wires altogether to support them from gravity. Considering a wearer's comfort and safety, exposed wires were covered by bulky and soft yarns to minimize the direct contact of wires to human body. Every yarn used in this design were ones discarded from the design studio at the university. Soda-can tabs donated from the university cafeteria were threaded through yarns and wires. The wires entered into one of the two holes of each soda-can tab and came through the other hole, which spiraled the wires back and forth forming tangled structures. For the dress, electronic plugs instead of traditional zippers or buttons were used as closures. A wearer can put on and take off the dress by unplugging the plugs on the back-right shoulder area.



Figure 2. Hand-crocheting

As shown in Figure 3, during the design creation process, millinery was also created with the same crocheting technique to fully deliver the message of digital disruption through human being wearing disordered electronics from the top to the bottom.



Figure 3. Millinery

*Cohesion.* This upcycled design introduces a way of repurposing littered wires to wearable art. Using the hand-crocheting technique, every discarded materials had entangled one another, forming layers into chaos. The garment simulates the tangled dangers that the fashion industry

currently holds and the seriousness of the world bounded by electronic equipment. The design was created with approximately 65 electronic wires and plugs, and weighed about 40lbs. This tells how serious e-waste is as we each wear a burden on our future. This design is a true reflection of our disruptive world.

*Significance, Rationale, and Contribution.* Through this upcycling design challenge using human-made detritus, this design well portrays the natural disruption we create every day. The chaotic mess of this design depicts a cluster of wastes the future generation will confront and provides sustainability awareness to the public. Furthermore, it presents an alternative solution to e-waste. Upcycling of e-waste to wearable art is a considerable action moving towards our healthy environment.

*Originality and Innovation.* Material diversity is a key for innovation (Gullingrad & Perkin, 2015). This free forming design, representing the ecological system disruption, is innovative and environmentally conscious in terms of unconventional garment structures with an unique approach utilizing diverse discarded materials and the hand-crocheting technique.

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