

**WATER BOTTLE COOLING STATION**

**VIRTUAL REALITY AND THE HARMS OF EXCESSIVE DATA COLLECTION: A  
CASE OF RISK SOCIETY**

An Undergraduate Thesis Portfolio  
Presented to the Faculty of the  
School of Engineering and Applied Science  
In Partial Fulfillment of the Requirements for the Degree  
Bachelor of Science in Computer Engineering

By

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## EXECUTIVE SUMMARY

The long-awaited virtual reality (VR) revolution is just on the horizon. VR is among the fastest growing industries in the market. Like most rapidly growing technologies, its advancement far exceeds the regulations that govern it. The science, technology and society (STS) research paper uses “risk society” in order to evaluate the perils associated with this technology, the current statutes regulating the technology and how the statutes can be improved. The technical research report analyzes the effects of a thermoelectric cooling system designed by a team of four computer engineers. The cooling station was designed with the idea to decrease the amount of wasted water and provide a system that can help reduce bodily ailments such as fevers. Though there seems to be little connection on surface level between virtual reality and a thermoelectric water-cooling station, the similarities lie in how the technologies are implemented. One cannot rely on an over-night infrastructure policy change in order to promote the safe use of technology. Instead, innovations must be implemented on a smaller scale.

The technical report summarizes the design and construction of a stationary liquid cooling station. Often when liquid inside a water bottle becomes an unsatisfactory temperature, it is poured out and refilled. This device can chill liquids to the desired temperature and then maintain that temperature to the exact degree. It uses a thermoelectric cooler consisting of four parts: a Peltier module, heat sink, fan and aluminum plate. The electronics for the device were designed with Multisim. The programming tools used were Visual Studio code and Code Composer. Finally, SOLIDWORKS was used for the CAD design and 3D printing.

Several prototypes were assembled over the course of the construction period. Each facet of the device: the cooler, the code, the 3D-printed casing and heat sink all worked individually. However, when the pieces were assembled together, the power supply of 180W was too much

for the printed circuit board (PCB) to handle. The group had challenges designing a PCB small enough to fit within the printed SOLIDWORKS structure that was also capable of handling the large power supply without heating up to a point of affecting the temperature of the liquid. With additional time, another PCB could have been designed that could handle these restraints.

The interest in the topic of VR and its issues with data vulnerability came when Facebook, a company with a history of data breaches, changed its name to Meta. This represented its conversion to a broader technology company with an emphasis on conquering the “metaverse.” The thesis question transitioned to a more general focus on surrounding regulation to data protection and potential modifications to account for the rise of VR. The studying of the current standard for data protection, the General Data Protection Regulation (GDPR) of the EU, current VR technology terms and conditions, law reviews and related articles were all necessary to gain a sufficient understanding of this topic. The late sociologist Ulrich Becks’s “risk society” was used to guide the thought process and understand the perils attributed to VR technology.

The research into current data protection regulations and risks revealed a number of policy changes that would better protect VR users in the future. First, a transition away from text-based informed consent could account for the volatility of “big data” information inferences. The use of excessive warning labels, videos and interactive exercises that educate users of the possible consequences would be better suited to the situation. Second, a standardized rating system for VR technologies and the degree to which they mine personal data. Finally, “no share” laws that eliminate personal data as the use of a commodity.

With the advancement and improvement of internet-based technologies comes the advancement and improvement in methods for mining user data. VR is consistent with this idea, and its potential for data harvesting methods far exceed any technology to date. Therefore, it is

necessary to gather a broad understanding of the technology and attributing risks and, thereafter, alter current data regulation standards to account for these risks.

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