

**Developing a Multimodal Entertainment Tool with Intuitive Navigation, Hands-Free Control, and Avatar Features, to Increase User Interactivity**  
(Technical Paper)

**Exploring the Relationship Between Technology and Physical Activity**  
(STS Paper)

A Thesis Prospectus Submitted to the  
Faculty of the School of Engineering and Applied Science  
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In Partial Fulfillment of the Requirements of the Degree  
Bachelor of Science, School of Engineering  
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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## General Research Problem

*How can we promote physical activity?*

In the United States, the obesity rate is 42 percent and rising. Among adults of all demographics, physical activity is a major cause. Only 45.5 percent of Americans have sufficient activity levels (fig. 1). Internet usage, including compulsive phone or device use, contributes to physical inactivity. SHAPE America and the National Institute for Occupational Safety and Health (NIOSH) promote physical activity, though their success has been modest. Obesity increases the risk of coronary artery disease by 45 percent, stroke by 60 percent, hypertension by 30 percent, and osteoporosis by 59 percent. Because of its part in mortality from these conditions, obesity may be the leading cause of preventable death in the U.S. (Matusitz & McCormick, 2012).

Characteristic	Overall		Prevalence of Physical Activity Level <sup>b</sup>					
	Sample size (%) <sup>c</sup>		Inactive		Insufficiently Active		Active	
			(N = 19 959)		(N = 10 264)		(N = 20 942)	
			%	(SE)	%	(SE)	%	(SE)
<b>Overall</b>	51 165		34.2	(0.6)	20.2	(0.4)	45.5	(0.5)
<b>Sex</b>								
Male	23 170	(50.2)	32.8	(0.8)	18.5	(0.5)	48.6	(0.6)
Female	27 995	(49.8)	35.6	(0.7)	22.0	(0.5)	42.4	(0.6)
<b>Age (years)</b>								
21–29	6741	(16.2)	27.6	(1.1)	17.5	(1.0)	54.9	(1.3)
30–39	9493	(17.4)	29.3	(0.9)	19.6	(0.6)	51.2	(1.0)
40–49	10 173	(20.2)	32.8	(0.9)	20.5	(0.8)	46.7	(0.9)
50–59	9650	(19.7)	34.2	(1.0)	21.3	(0.7)	44.4	(0.9)
60–69	7119	(13.5)	37.1	(1.3)	22.1	(0.9)	40.7	(1.1)
70–79	4691	(7.8)	42.8	(1.4)	20.8	(1.0)	36.4	(1.3)
≥ 80	3298	(5.2)	56.4	(1.6)	20.3	(1.2)	23.4	(1.3)
<b>Race/ethnicity</b>								
White, non-Hispanic	27 992	(69.0)	30.2	(0.8)	20.7	(0.5)	49.1	(0.6)
Black, non-Hispanic	9749	(11.1)	43.6	(1.1)	19.4	(0.7)	36.9	(0.9)
Hispanic	9638	(13.3)	46.6	(1.1)	18.4	(0.7)	35.0	(1.0)
Other, non-Hispanic	3786	(6.6)	35.2	(1.4)	20.5	(1.3)	44.2	(1.6)

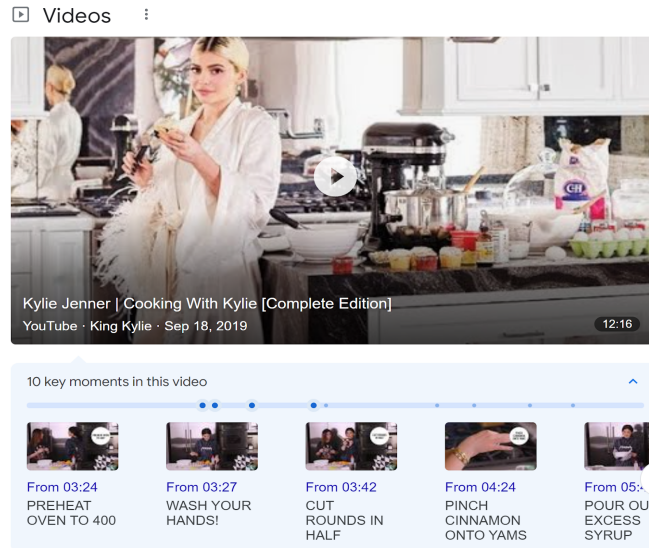
*Figure 1. Distribution of prevalence of physical activity level by various sex and ethnicity – US adults, NHIS and MEPS 2006–2011 (Carlson; data from National Health Interview Survey, 2015).*

## **User Experience Design in Interactive Multimedia Entertainment**

*How can Netflix combine audio, textual, and/or visual components to create an active user experience outside of Netflix's existing products?*

Digital entertainment has become the norm over the past decade. While movies have always garnered widespread enthusiasm since their inception, the rise of streaming services that also stream TV series, games, live sports, and more in the palm of one's hand has undoubtedly changed the way people consume media. Netflix has been the driving force in this industry. Their continued desire to develop new forms of entertainment for their user base has culminated in the project of Professor Gregory Gerling's Capstone team.

The project aims to reimagine the Netflix multimedia experience, specifically in terms of a cooking use case. Many platforms such as YouTube, Hulu, and Netflix themselves, offer one-dimensional cooking experiences with little engagement. Specifically, a subject is typically filmed in a single continuous video that requires no decision-making from the user. This continuous video follows a linear recipe that at times has an arbitrary ordering of instructions. Youtube specifically has adopted this linear concept and developed the key moments feature to provide better visual aids for their users (fig. 2).



*Figure 2. Example of a linear recipe being conveyed through a tutorial with key moments displayed through a timeline (Jenner, 2019).*

However, this concept of linear recipes has limitations due to the arbitrary ordering of steps. For example, in figure 3 the recipe has two primary components: grilled salmon and avocado salad. These components are independent until the last step where they are plated together. Thus, this develops a pain point that disregards the user's preferences and circumstances. In this recipe, the user would have their salmon sitting out getting cold while they make the salad. If the user preferred their salmon piping hot, it would be advantageous to move step 3 up as step 1.

### Grilled Salmon with Avocado Salsa (Healthy, Low-Carb, Paleo, Whole30)

*Tender 20 minute salmon with avocado salsa can be grilled, pan-seared or baked!*

★★★★★  
4.83 from 17 votes

Print Pin Rate

Course: Dinner Cuisine: American

Keyword: avocado, baked, cajun, grilled chicken, healthy, honey garlic salmon, keto, low-carb, pan seared, spiced

Prep Time: 10 minutes Cook Time: 12 minutes Total Time: 22 minutes

Servings: 2 Calories: 528kcal Author: Layla

#### Ingredients

- 2 4-6 oz salmon fillets
- 2 tablespoons olive oil
- 1 clove garlic minced or crushed
- 1/2 teaspoon **chili powder**
- 1/2 teaspoon cumin
- 1/2 teaspoon onion powder
- 1/4 teaspoon black pepper
- 1/4 teaspoon salt

#### For the avocado salsa

- 1 ripe avocado pitted and diced
- 1/2 cup tomato diced (any type of tomato)
- 2 tablespoons onion diced
- 2 tablespoons cilantro minced
- 1 tablespoon olive oil
- 1 tablespoon lime juice
- salt and pepper to taste

#### Instructions

1. Stir the olive oil, garlic, and spices in a small bowl. Brush or rub salmon with the spice mixture.
2. Heat a large heavy-duty (preferably non-stick) pan or grill medium-high heat. Add salmon to the pan and cook for 5-6 minutes per side. Remove from pan, top with avocado salsa and serve immediately.
3. **To make the avocado salsa:** Add the avocado, tomato, onion, and cilantro to a large mixing bowl. Drizzle with olive oil, fresh lime juice and a pinch of salt and pepper. Gently mix with a spoon until fully combined. Cover with plastic wrap until ready to serve.

*Figure 3. Example of a linear recipe for grilled salmon with avocado salsa demonstrating the arbitrary nature of how instructions are ordered (Layla, 2021).*

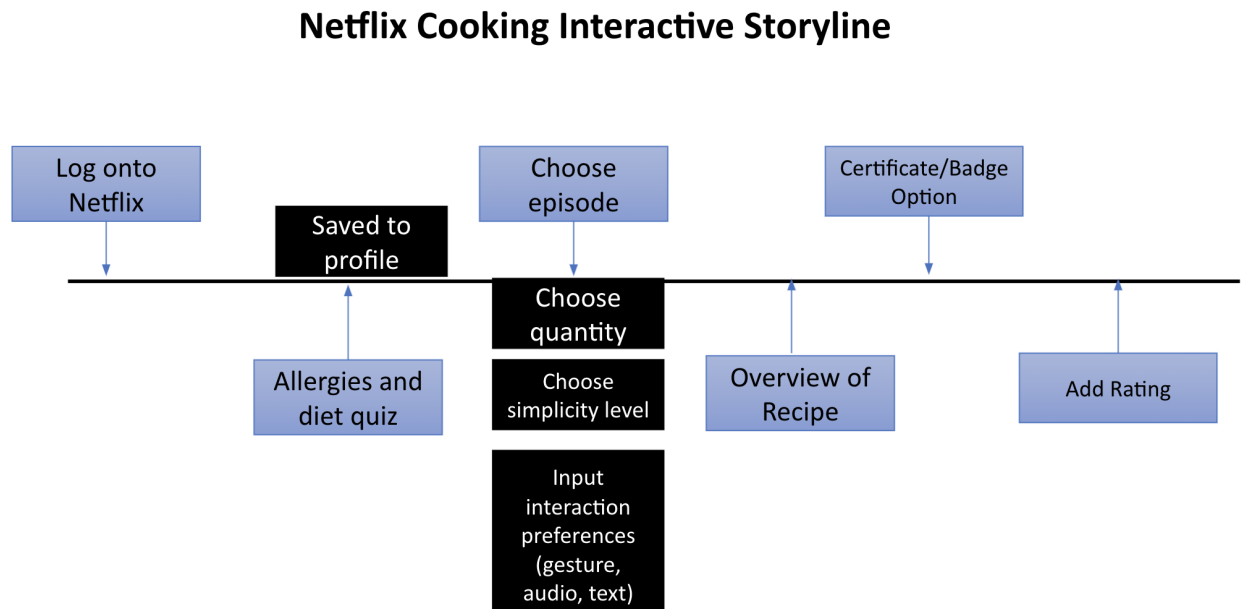
The current Capstone team comprised of Nathaniel Barrington, Caton Gayle, Erin Hensien, Grace Ko, Megan Lin, and Sreya Palnati are working to not only reimagine the linear cooking experience, but also incorporate an interactive aspect through hand gestures, voice recognition, and textual elements to simplify the cooking experience and increase Netflix’s user engagement.

While cooking itself is an active act, its current form within existing multimedia platforms is a passive experience. This creates a contradiction. Why sit back on a couch and press play on a cooking video when the videos are rooted in connecting the chef in the show with the user’s kitchen? With this Capstone project, said end-state will no longer suffice. However,

with this project, we must keep a focus on entertainment and integration with Netflix's existing portfolio in mind.

There are three main components of the project: the storyline, navigation of the cooking interaction, and gestures & voice interaction.

The storyline describes a typical user's journey throughout the cooking show. From the channel appearing on the Netflix home page until the user is recommending the recipe to their friends, the storyboard shows the entire process from start to finish through the user's interaction with the software (fig. 4).



*Figure 4. Gerling's Capstone team's proposed storyline for Netflix's users (author).*

The navigation aspect of the project describes how the user will interact directly with the cooking aspect of the channel. Cooking has always been seen as a linear process, and the chef must work step-by-step to achieve their desired end goal. Such a framework is obsolete and needs to be revamped. This is what the UVA Netflix Capstone team plans to accomplish through a nodular recipe structure (fig. 5).

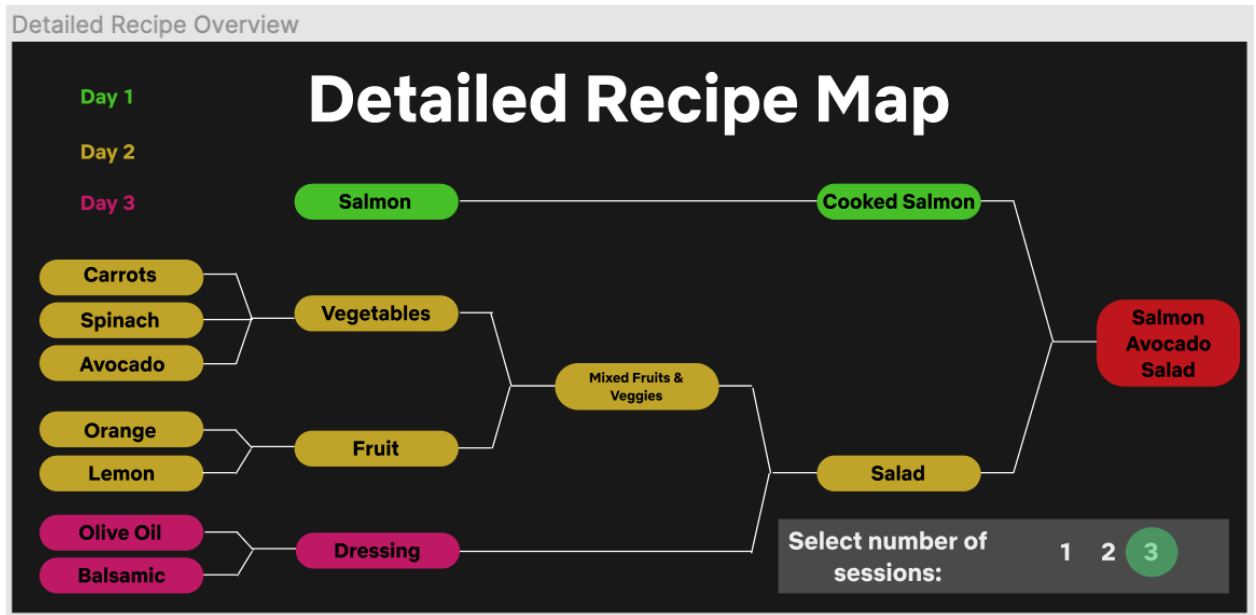


Figure 5. Example of a nodular recipe based on the formerly linear recipe shown in figure 3 (author).

This modular structure groups nodes based on similarity in ingredient type (e.g. vegetables subgroup) and when they are combined (e.g. mixed fruits & veggies). Thus, this will allow flexibility in the ordering of the steps in the recipe depending on the user's preferences and circumstances.

Lastly, different types of gestures will be used in congruence with ordinal touch features. These interactions might take the form of voice recognition, such as the way Siri or Alexa currently operate. Hand gestures may also be utilized to address intuitive use cases. We see high usability and potential in hand gestures as it is a common issue to have dirty hands when cooking. The combination of these three elements will provide a new experience for the user to not just cook, but enjoy the process of it-- something that can be stressful for all parties involved.

Feedback in the form of surveys will be gathered from the target users on these design explorations. This feedback will be used to develop an interactive web mock-up, ideally using voice interaction to control the play of text, audio, and video elements. The final prototype will be created using Figma, a mobile app prototyping software, and remotely presented to Netflix.

To evaluate the feasibility and usability of our prototype, we will trade prototypes with Reid Bailey's capstone group for feedback.

At the end of the project, if successfully completed, the prototype will be researched and modified by Netflix until a launch version is built, implemented into their platform, and maintained/updated long-term. This product would ideally increase physical and mental engagement from users.

### **Corporate Social Responsibility in User Health**

*How have tech companies strived to improve their reputations by developing games and other applications intended to promote physical activity in entertainment?*

How can we increase physical activity in Americans' daily routines? As activities of daily living (ADL) have declined, sedentary living and exertion-free activities have displaced them. Leisure time is often spent with digital devices. The consequent deficit in physical activity increases the likelihood of obesity (Matusitz & McCormick, 2012). Because exercise for health is nonessential to daily routines and requires planning, many do not engage in it (Hutt, 2017).

Participants include Netflix & other tech companies, health advocacies, and some speakers at influential venues, such as TED, promoting healthful living.

According to Hastings (2018), Netflix plans to factor its effects on users' health into its evaluations of corporate performance. The success of Netflix's unlimited access business model tends to exacerbate sedentary living among its customers. The company, therefore, plans to develop features that engage users beyond their couch, promoting physical activity (Netflix, 2021).



The Nintendo Wii, and now Switch, can also induce a more active user experience. Nintendo had been best known for its handheld games, such as the DS, but the Wii made gameplay active. According to Nintendo, it revolutionized gaming to “a place where playing is no longer just about looks, it’s about the feel” (Nintendo, 2006). Though movies and TV have remained passive modes of entertainment, Netflix aspires to change this. This industry-wide lack of innovation creates a prime opportunity for Netflix to create a new standard.

Despite Nintendo’s success in active entertainment, health advocacy groups like the Campaign for Commercial-Free Childhood (CCFC) are working to limit certain big tech companies’ reach citing increased obesity, body dysmorphia, and unhealthy sleep habits (CCFC 2018 and 2021). The CCFC has most recently prevented the launch of FB Messenger Kids (2018) and a kid-targeted Instagram variant (2021).

SHAPE America (2013) also advocates for children’s health. It owns the National Health Education Standards. SHAPE America seeks more and better physical and health education programs in schools (SHAPE America, n.d.). It seeks “a nation where all children are prepared to lead healthy, physically active lives” (SHAPE America n.d.). In adulthood, however, exercise requires initiative and planning.

In the workplace, Total Worker Health promotes exercise through ADL. This program was developed by the National Institute for Occupational Safety and Health (NIOSH) to encourage healthful substitutions, such as stairs over elevators, walking meetings, and treadmill desks (CDC, 2015).

In the public sector, the National Recreation and Park Association (NRPA) promotes park, recreation, fitness, and sports (PRFS) activities. The NRPA provides 173,000 parks and recreational facilities at little or no cost to participants (Mowen & Baker, 2009). It contends that

“by centering health equity,” it “can ensure that all people — regardless of race, class, ability or identity — have a fair and just opportunity to achieve positive health and well-being outcomes” (NRPA, n.d.).

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