

# Knit Stimming

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## ABSTRACT

Advanced automated knitting machines have the capability to greatly impact many areas of research. With the creation and research of new scripting languages for these machines, this is becoming a reality. Two areas of research that could be greatly benefited are e-textile research and custom accessible clothing research. While research in these areas is starting to increase, there has been little research done on the possible application of machine knitting in the creation of accessible stimming devices and clothing for people who identify as neurodivergent. Our study will be exploring this specific application.

## INTRODUCTION

The technology needed for advanced automated machine knitting already exists and is widely used in the clothing and textile industries. Many other areas of research could drastically benefit from these machines such as in the area of e-textiles using conductive yarns [2]. However, a big issue has made these machines not very applicable to other sub fields in recent time. The problem is the machines lack of programmability. For a long time, the only way to program these machines was to write code in a specific machine language that made code reuse difficult and required someone with high expertise in programming skills, especially with machine languages, to be able to write and read the code [3, 1]. However now with the development of new scripting languages for these machines such as KnitScript [4], someone with less coding experience will be able to program these machines and read the code.

These machines have the ability to drastically boost the research capabilities in areas of research such as e-textiles which uses conductive yarns and embedded sensors/actuators [2] to make circuits in the fabric along with the area of making custom disability friendly, accessible clothing. In our study, we will be exploring the intersection and applicability of advanced automated machine knitting with these two areas of research, specifically working with people who identify as neurodivergent.

## METHODOLOGY

The focus of the research is to identify the possible application of advanced automated machine knitting in the creation of stimming devices that are either integrated into clothing or stand-alone for people who identify as neurodivergent. We will also be using the tenets for social accessibility [5] in the probe design process and during the user study to tackle the issues of social accessibility with common stimming devices. On top of this, we will be exploring the possible new engineering aspects of knitted objects [2, 3, 1] and testing the capabilities of automated knitting machines through the design and creation process of the stimming device probes for the user study.

## USER STUDY

Participants for this study must identify as neurodivergent and will be recruited through emails, flyers, online postings such as social media posts, and verbal announcements. When participants register for the knit stimming study, they will be required to complete an online survey that will gather information on their personal experience/usage with stimming devices or toys, and gather basic demographic information.

After they complete the survey, participants will take part in a one hour, one session video and audio recorded in person study. The session will begin with a 15-minute introductory phase where the participants will first be given a brief background on the research goals and a description of the different phases of the study. They will then be shown various knitted materials that range from different shapes, textures, e-textiles along with additional knitted fabric stimming device prototypes. They will also be given information about each presented material. Participants will be given time during these 15 minutes to ask questions about the discussed information and provided materials if needed. Once the introductory phase is complete, participants will now move on to the 35-minute design phase. Participants will be given their task of designing and creating a rough prototype of their ideal stimming device or toy that they can choose to be stand alone or integrated into an area of clothing that they specify. To create their rough prototype, participants will combine the various materials introduced to them earlier using safety pins that will be provided. Once the 35-minute time limit is up or if the participant states they're finished with their design early, they will then move on to the final 10-minute concluding interview phase. During this time, participants will be given an opportunity to describe their design, its features, and their reasoning behind it.

## FUTURE WORKS

I will be continuing the knit stimming project in the fall since the automated knitting machine we were supposed to use during the summer broke very early on. This summer, I completed the necessary work for the user study and worked on the programming for the probes that will be used in the user study. Once I get back to school in the fall, I will be working on the creation of the stimming device probes using the advanced automatic knitting machine at the University of Washington. Once all the stimming device probes for the user study are created, I will conduct the study and gather the necessary data.

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