

# SM3807 Final Paper: Teeth Brush Helper

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## Abstract

The robot was invented to help people to lower their workload. Nowadays, many robots are replacing human employees because the employee payments are heavier for the company, and the mistake of the robot is lower than the human employee. Before robotics technology was improved, humans did not believe in robotic invention. The robot sometimes makes mistakes and mixes up the trouble together because they just are a program and stubborn in some cases. This project wants to discover the error and go back to the past, investigating whether robot mistakes can affect human emotions.

On the other hand, most the toothbrush does not completely automatic, the electronic toothbrush just has a rotating brush in the head of the toothbrush, which means the toothbrush does not have an automatic function to control the movement of the entire toothbrush nowadays, people still need to use their hand to control which part of the oral they want to brush and clean. Therefore, we want to create a new type of toothbrush and create a real automatic system, so we have a survey to investigate the habit of brushing teeth of people, their problems with brushing teeth, their knowledge of brushing teeth, etc. Through research and survey results to modulate a new robotic toothbrush.

## Introduction

In the past, the invention was for improving human life quality. For example, Alexander Graham Bell [1], invented the telephone for people to communicate in March 1876. The Wright brothers [2], Wilbur and Orville Wright invented the plane in the air in December 1903. Those inventions are improving human life quality. However, nowadays inventions are useless and just for fun. The useless machine was invented by Bruno Munari in the 1930s. He is an Italian artist. He aims to fight against society and make some difference with the invention of machines. Besides that, Katerina Kamprani built an uncomfortable collection [3] with different daily life objects that we will use every day. As a result, we want to make a useless and funny machine that is joyful for humans as one of the purposes. It may have or getting wrong on the angle of the toothbrush. We design the teeth brush helper for helping people to brush their teeth and having fun. We hope the user of the toothbrush helper can save their time for other purposes.

There are different functions for this toothbrush helper. The basic function is a movement arm for teeth brushing. The helper will give you a sound reminder to tell you you are ready to brush your teeth with the speaker. It will brush your teeth in around 2 minutes [4] and remind you with a voice message. After it starts running, you can just put it on the table everywhere in your house, not only in the washroom. Adding the mirror helps you observe how the robot assists you and increases the mobility of the robot placement. View the produce method for more detail.

# Background

Brushing our teeth is very important to our oral health, Haruaki Hayasaki[5] mentioned in Japanese Dental Science Review that brush the teeth can remove plaque removal which cause people to have the periodontal disease and gingivitis, therefore brush our teeth can protect our oral (Haruaki, 2014)Hayasaki, 「Tooth Brushing for Oral Prophylaxis」. We always hear many academic or some doctor recommend brush teeth two times in a day which can effective and better protection of the mouth, but Trends in the research of toothbrushing in 20 countries/regions from 1994 to 2010 which show prevalence of brushing more than once a day continued to decline in 2010 (Honkala, 2015)Honkala, 「Trends in toothbrushing in 20 countries/regions from 1994 to 2010」[6]. Moreover, based on the covid-19 problem which change our daily life, we need to wear a mask everyday to avoid to get the covid-19 but this situation affect human' behavior of brush teeth, Peloso have research to show people reduce brushing times because they wear the mask (Peloso, 2021)Pinzan-Vercelino, 「Does the use of face masks during the COVID-19 pandemic impact on oral hygiene habits, oral conditions, reasons to seek dental care and esthetic concerns?」[7]. Therefore, we want to create a robot to help us with brushing and reminders, we hope this robot will improve their bad behavior and daily life.

We always busy in the morning. Sometimes we may oversleep and stay in bed for a long time to reduce the time available in the morning. We need to check social media, make breakfast, make up and catch the bus. Also people always finish those things in a short time, so this may increase our time pressure. Roxburgh has researched the association between subjective time pressure and depression, he shows the time pressure will increase people to have depression (Roxburgh, 2004). Therefore, we created something to decrease the time pressure in the morning and hope to improve and help people's mental state, so we want to create the brushing robot to help people to brush and earn more time to reduce the time pressure.

We try to make the robot into the non-perfect way, not only let people know the robot which can't totally replace humans, but the robot also has its technical problem, even nowadays the technology has a huge advance, the technology of the robot have improved and started to be growing up, we can see the robot have some problem in our society, for example, recently Hong Kong restaurant has a new element to replace employee which is the robot to replace human to the delivery order, we can see those robots have a problem like it will non-stop to say "Excuse me" when the customer or something had blocked the robot, so the robot can't totally replace human because the robot does not have any emotion and thought. However, we also try to use non-perfect way of the robot to bring our pleasure to users, it is because have research to show the robot which has a mistake, human will more like a robot and attracted by the robot, it is because the robot will more like a human as robot have a mistake and no longer perfect and out of reach, also the robot has a mistake, human will feel interesting (Nicole, 2017)[8]. On the other side, a robot can easily attract human attention due to its novelty[9]. An object can move and will catch the eyeball. It is a kind of reminder for

humans to brush their teeth when they see this robot. Work and time are not enough to use in our daily life.

## Methods

Questionnaire analysis and directions for manufacturing robots:

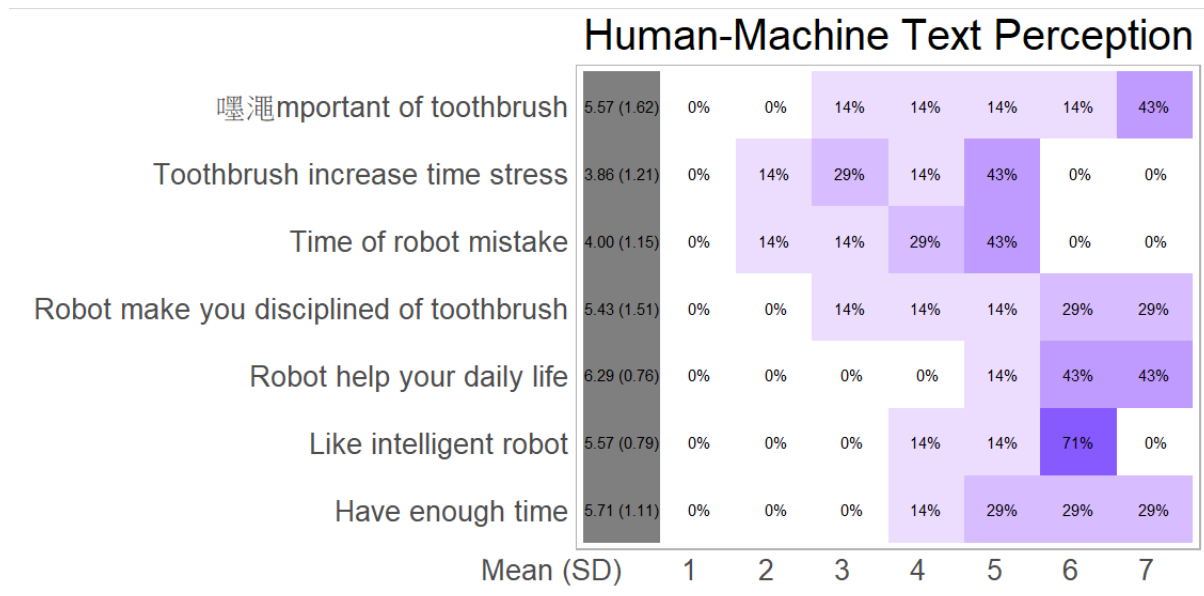


Figure 1: chart about some question of our survey

How much time do you have to finish your morning work after you wake up? (morning work such as: make breakfast , take a shower, watch news.....)

7 則回應

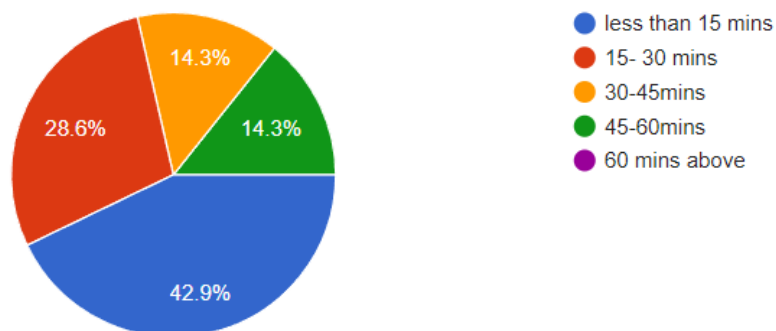


Figure 2: chart about question 7 of our survey

We have a survey to investigate people's habits with a toothbrush and ask some questions about the feelings of robots. We have collected seven people's replies to our survey, which include 2 women and 5 men, and their age group all are 18 to 25 years old. Most of the

respondents think a toothbrush is quite important. The SD from 1 score to 7 scores is 5.57. However, it has over 50 percent of respondents less than 2 minutes to brush their teeth every time, According to the School Dental Care Service of the Department of Health Hong Kong advice takes 2 to 3 minutes to thoroughly clean all the teeth which can protect our teeth, that show the respondents do not have enough knowledge of toothbrush although they believe toothbrush which is important for protecting our oral health. Therefore, we will add the reminder function to let the users know how long they have brushed and how long they need to brush.

Moreover, we have asked them what is their reason brush their teeth less than 1 time, most of the reasons is laziness which has 5 respond reply that reason. Also, many respondents said that they do not have enough time to do some morning work (morning work such as: making breakfast, taking a shower, watching the news.....), the SD from 1 score to 7 scores is 5.71 which means mostly agree not enough time, and over 29 percent respond is 7 which mean extremely insufficient time. We believe the reason for not enough time in the morning is most people wake up very late, we ask a question which is How much time do you have to finish your morning work after you wake up, it has over 60 percent less than 30 minutes, and it has 40 percent choose less than 15 minutes, but it has many things need to do after we wake up, so they need to wake up more early to let the time more enough. However, our robot helper can solve those questions, our toothbrush robot has an automatic brushing function that lets the user multitask when they brush their teeth and do not need to worry about not having enough time to brush their teeth over 2 minutes.

### The toothbrush helper robot produce methods:

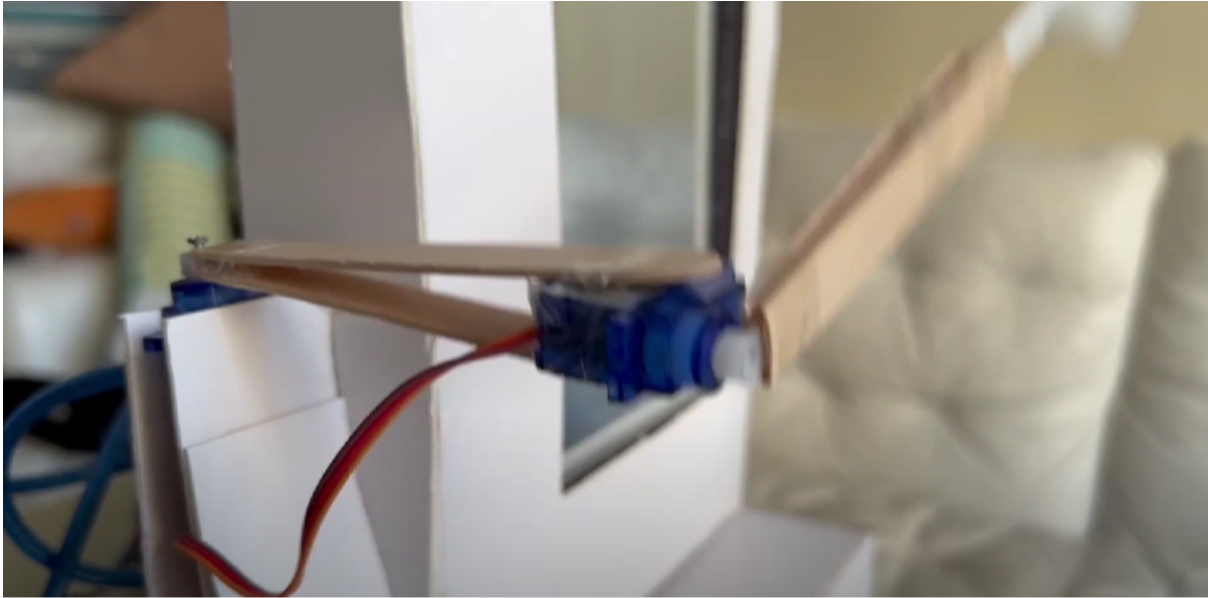
This toothbrush robot helper has more functions than the traditional toothbrush and electric toothbrush, this toothbrush adds an arm for automatic moving, adds a countdown function, and adds some buttons for some smart control. First, the robot arm designed for the user can free the hands, so the user doesn't need to use their hands to grab their toothbrush, we want this toothbrush helper can cover to clean more parts of the oral so our help has two motors and connect to Arduino for different direction movement, one servo motor control the toothbrush up and down movement and the other one servo motor control left and down movement. Then, the count down timer function hopes to let the user clean their oral to have enough time, this timer can remind the user to know how long they have brushed their teeth, this countdown timer user Arduino's Serial monitor to build it, use basic code if-else statement and delay function to create the count down system, through Serial monitor to show the time and some reminding words to remind the user. Finally, one of the buttons controls the on and off function for starting the brush system, when the user press the button will turn on, and press it again that will turn off, and the other button controls the toothbrush to move down and get the toothpaste.

### Material list:

- Arduino x1
- Servo motor x2
- Ice-cream stick x4
- Mini mirror x1

- Some cardboard

## Video preview



<https://youtu.be/0LGn5VdvXss>

## Summary

Using the teeth brush helper can increase the quality of life through health, joy, and time-saving. It will remind you of teeth brushing, so we won't forget to brush our teeth. Robot mistakes are joyful and funny for humans, and it can relax us from the stressful workload. The teeth brushing process can free out your hand for doing your morning work or other work. Therefore, no matter whether it fails or not, it can still be a robot that benefits our lives.

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