

# About me



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First-year master's student at Igarashi Laboratory,  
Ochanomizu University, in Tokyo
- 今回はInteractivityで発表  
a participant of Interactivity part of CHI2023
- 今回が人生初の国際会議参加  
CHI2023 was my first experience of an international conference.



About my research

A hand is holding a small, rectangular electronic device. The device has a brown, textured surface with several strips of gold leaf applied to it. A black wire is connected to the device, and a red wire with a red alligator clip is also connected. The red wire is coiled in the background. In the foreground, a blue and yellow battery is visible, connected to the device. The background is dark and out of focus.

# Demonstrating FoodSkin: A Method for Creating Electronic Circuits on Food Surfaces by Using Edible Gold Leaf for Enhancement of Eating Experience

Kunihito Kato <sup>1</sup>

Ami Motomura <sup>2</sup>

Kaori Ikematsu <sup>3</sup>

Hiromi Nakamura <sup>4</sup>

Yuki Igarashi <sup>2</sup>

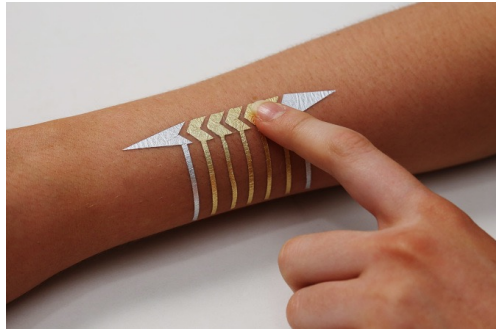
<sup>1</sup> Tokyo University of Technology

<sup>2</sup> Ochanomizu University

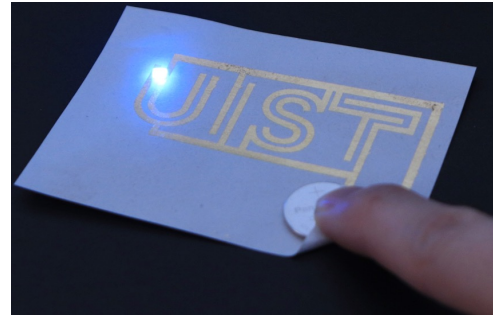
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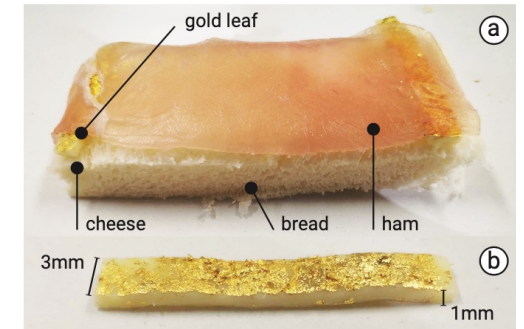
# Introduction



DuoSkin  
[ISWC 2016]



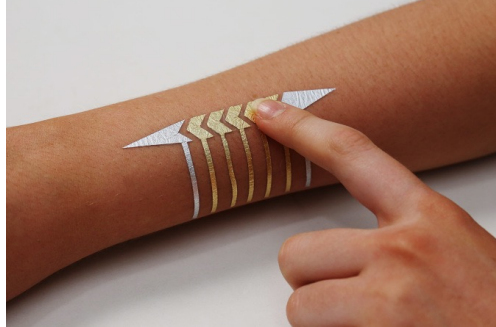
Rapid Prototyping of Paper Electronics  
Using a Metal Leaf and Laser Printer  
[UIST 2019]



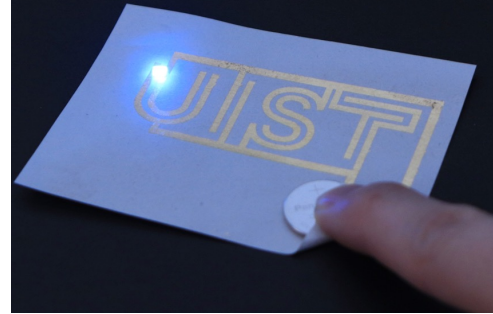
EdiSensor  
[LifeTech 2021]

Aesthetics and conductivity of gold leaf have led to it being applied to the surface of various objects to create electronic circuits

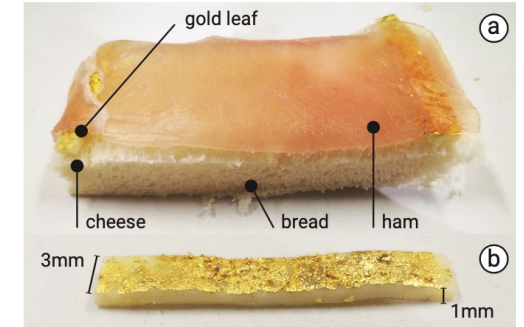
# Introduction



DuoSkin  
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Rapid Prototyping of Paper Electronics  
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EdiSensor  
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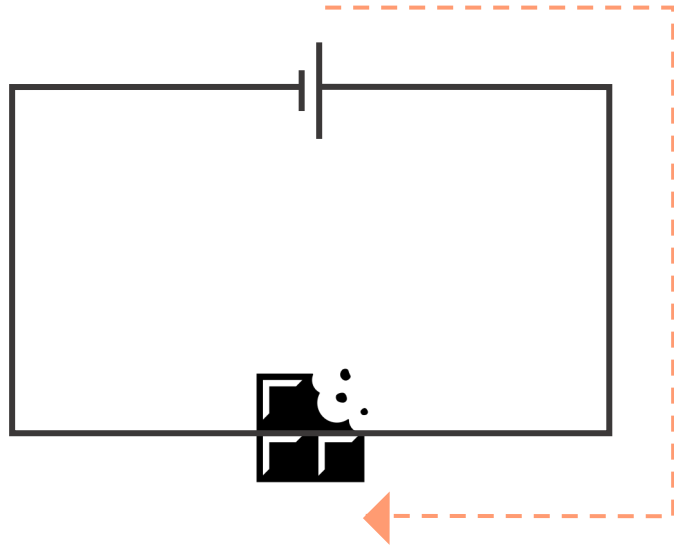
Aesthetics and conductivity of Gold leaf have led to it being applied to the surface of various objects to create electronic circuits

## However

- No method has been established to form arbitrarily shaped patterns using only edible materials.
- It is difficult to create complex circuit patterns with edible materials as with inedible materials.

# Introduction

## Previous method



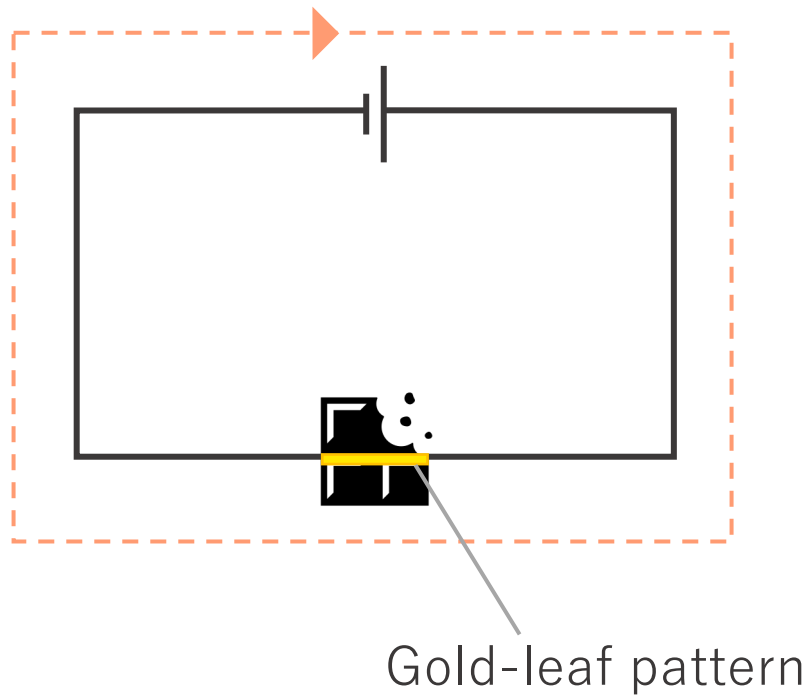
Dry foods are not conductive.



It is difficult to include as a part of an electronic circuits.

# Introduction

## FoodSkin



Attaching an edible gold leaf on food surface

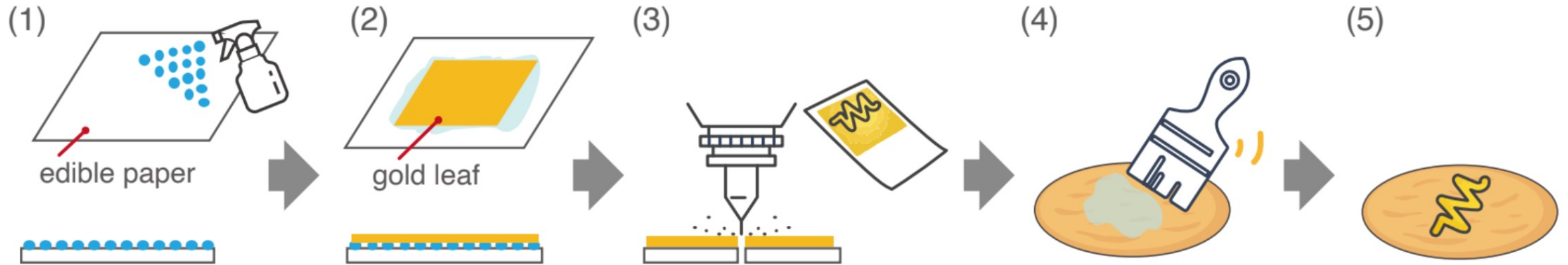


Enabling the integration of dry foods into electronic circuits



Expanding the design space of the computer-augmented dining experience.

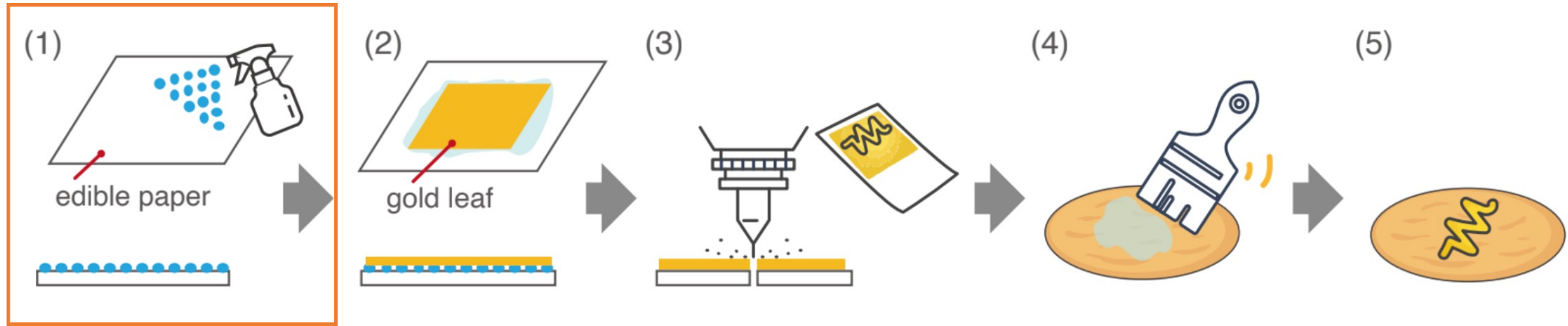
# Fabrication Process



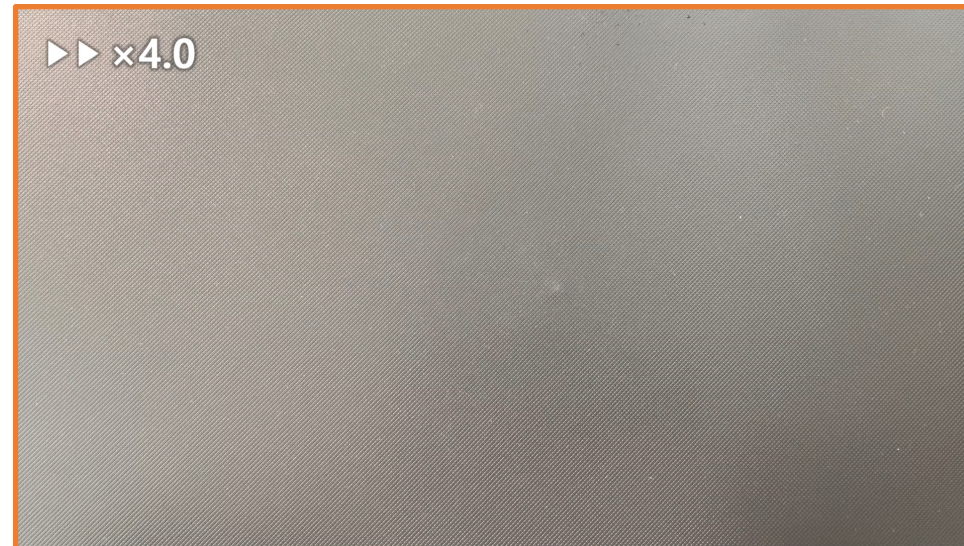
- FoodSkin consists of these five steps.
- Fabrication is easy due to the use of readily available materials. (gold leaf sheets, water, edible paper, and potato starch)



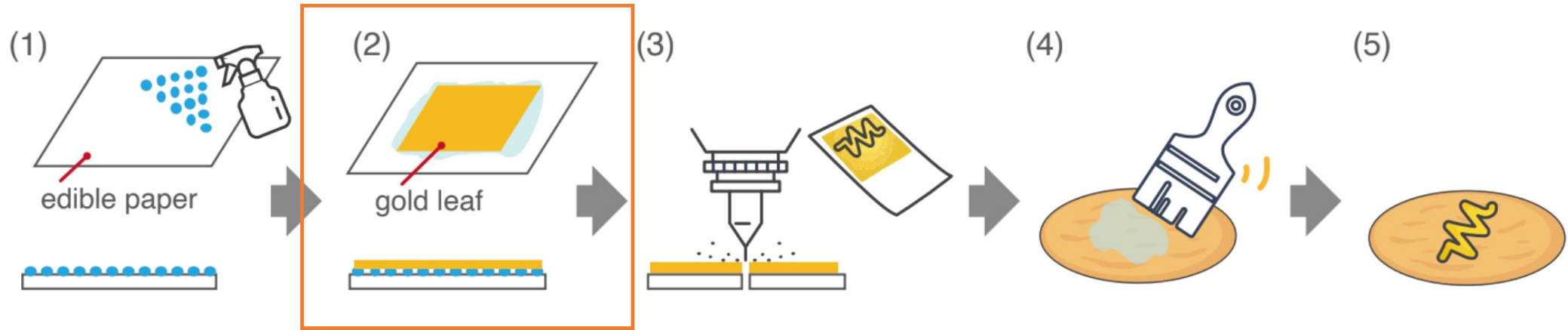
# Fabrication Process



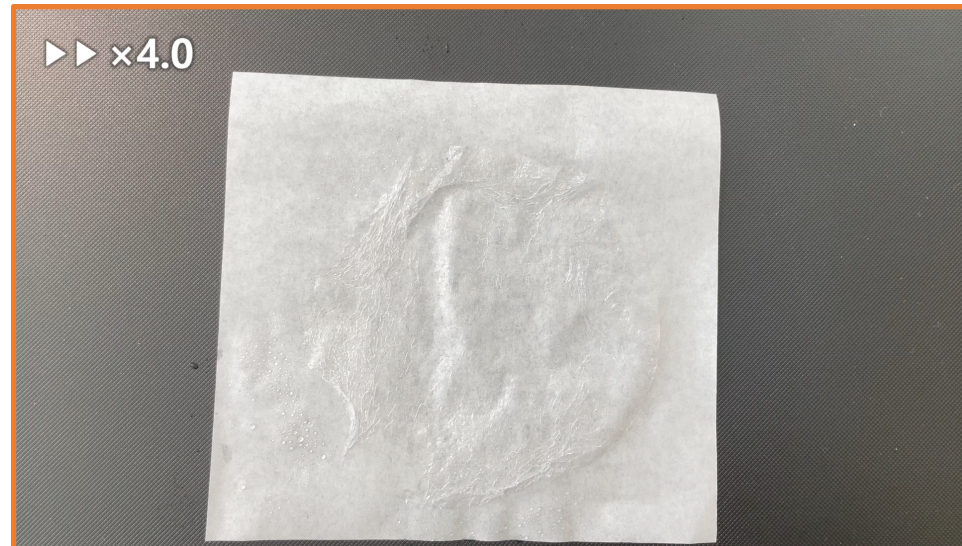
moisten edible paper slightly using mist blower



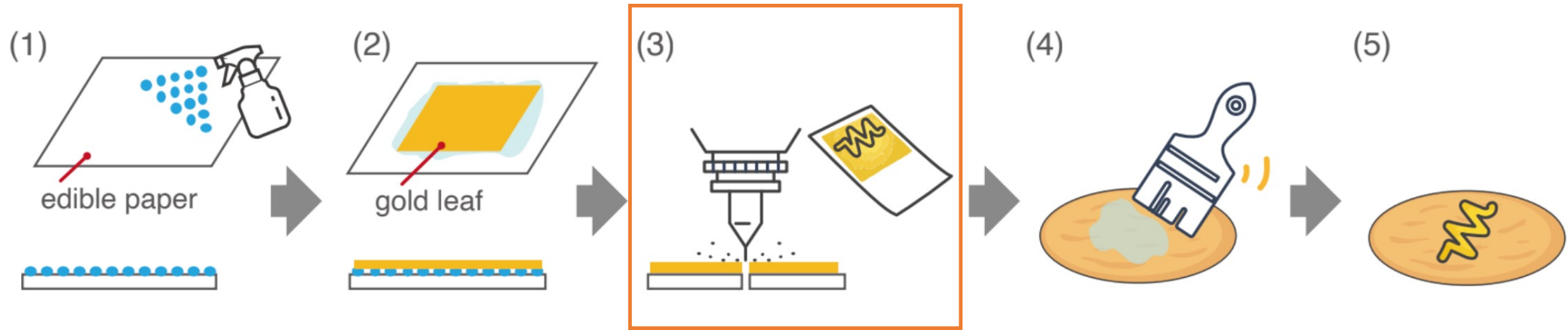
# Fabrication Process



place the gold leaf on the moistened surface of the paper



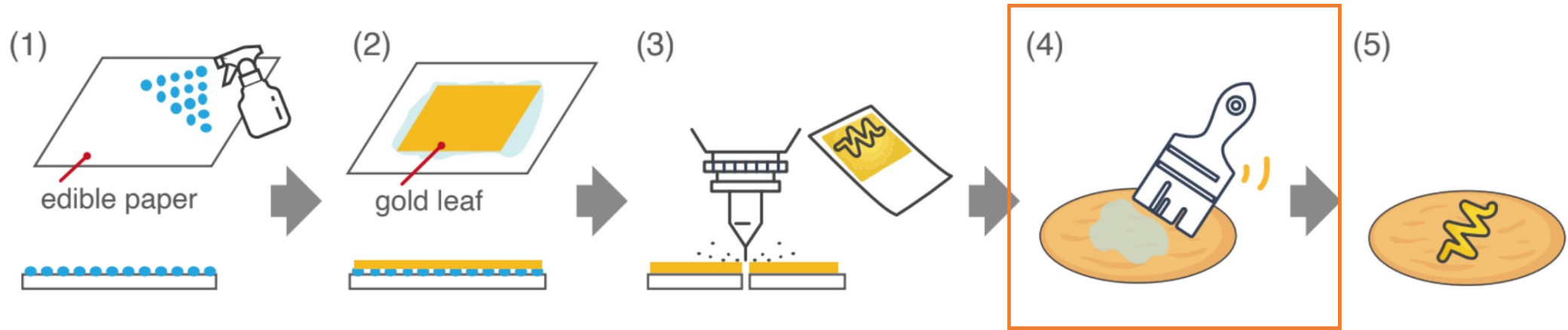
# Fabrication Process



after drying, cut the shape into the desired pattern



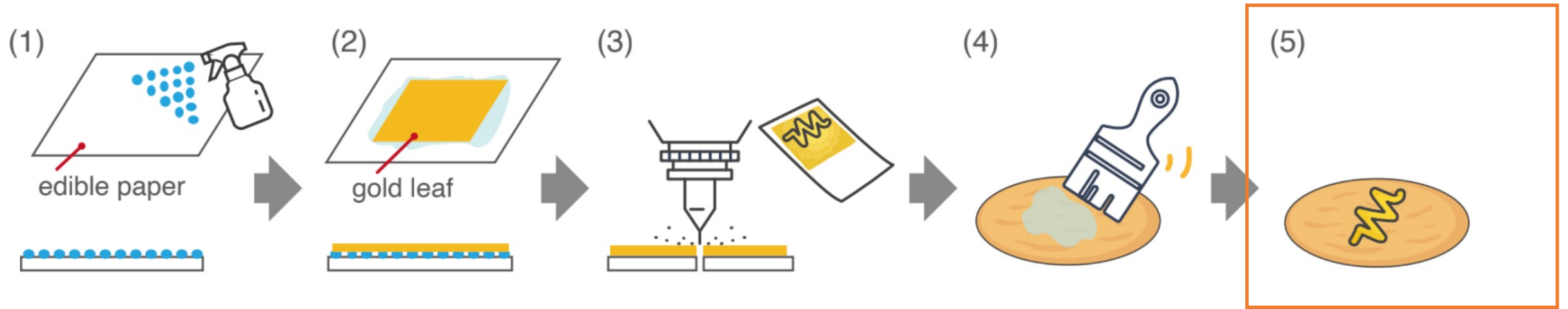
# Fabrication Process



apply a thin adhesive to the food surface



# Fabrication Process

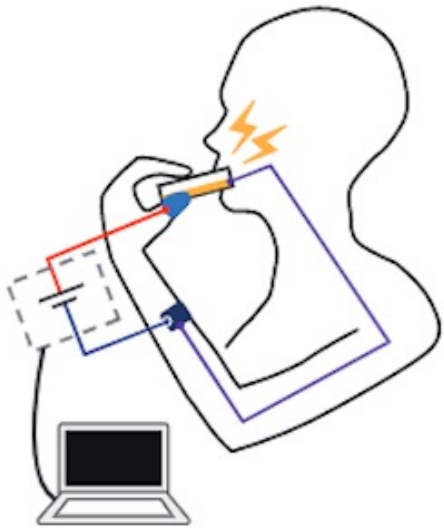


place the gold-leaf pattern

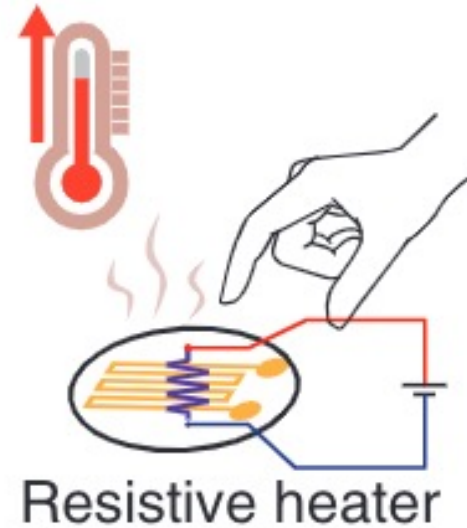


# Applications

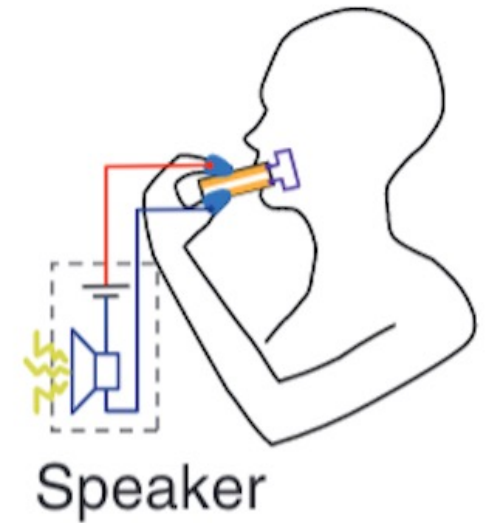
We introduce three applications of FoodSkin that enhance the eating experience.



Controlling Food Taste

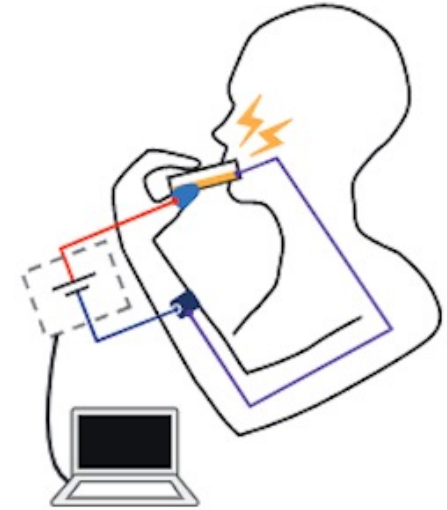
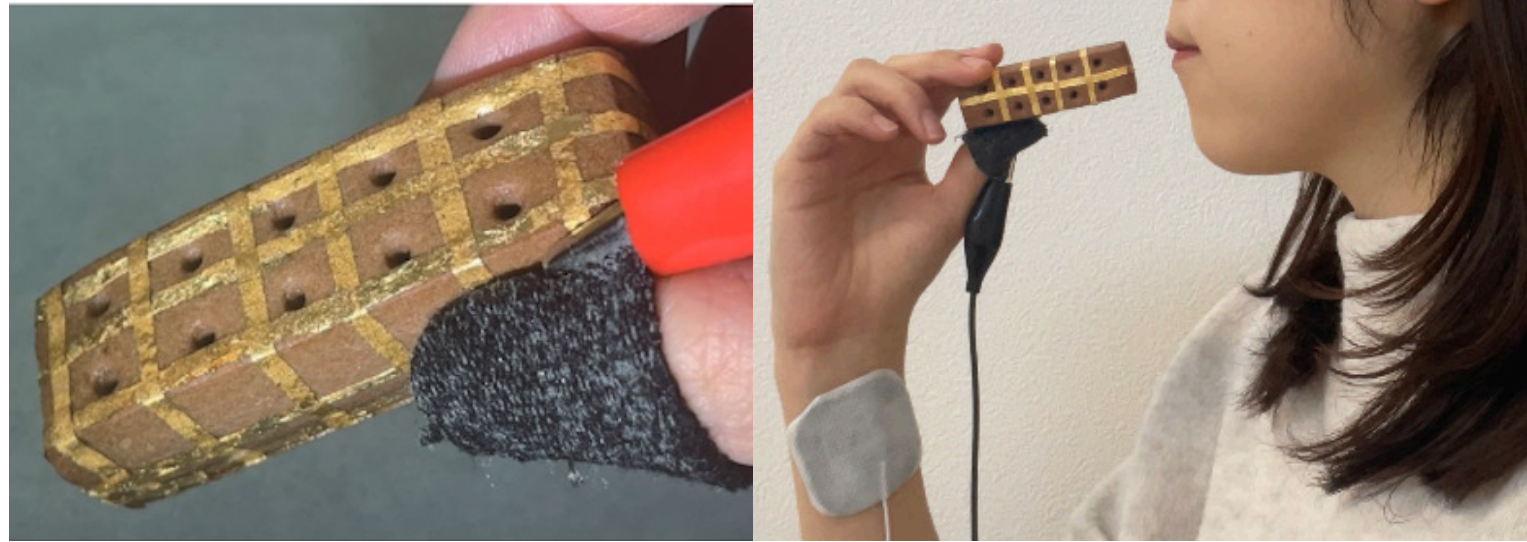


Controlling Food Temperature



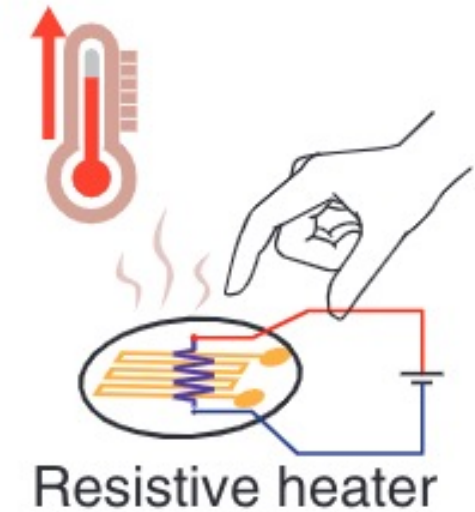
Providing Auditory Feedback

# Controlling Food Taste through Electrical Stimulus



This application is controlling the taste of a food by applying an electrical stimulus to the mouth through an electrode made of edible gold leaf attached to the food surface.

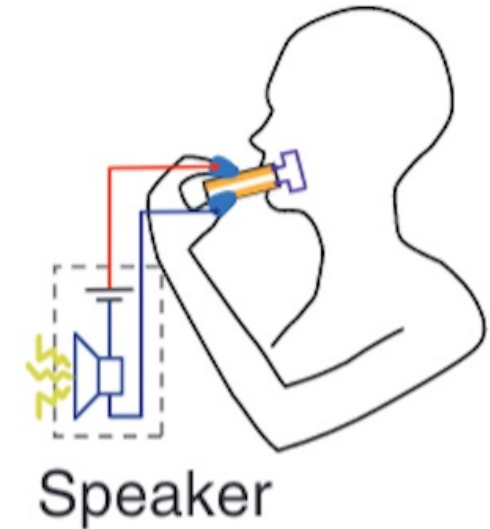
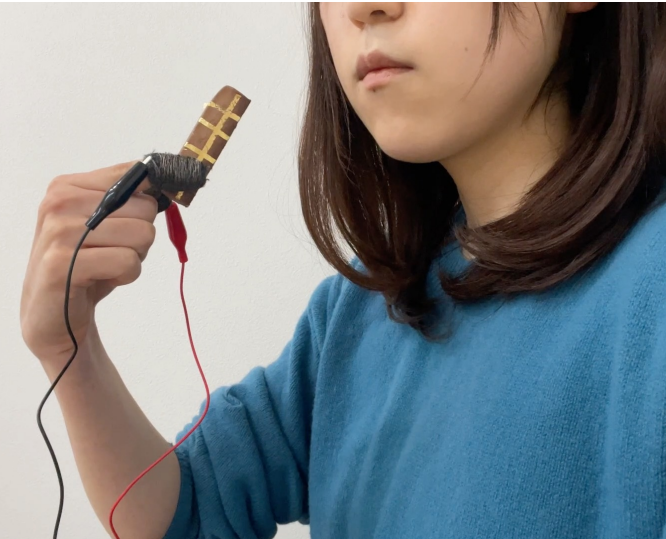
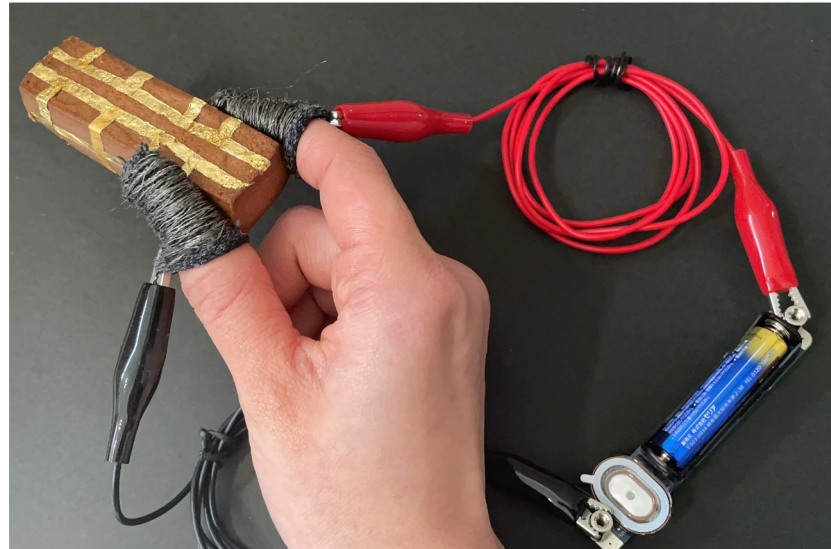
# Controlling Food Temperature



This makes it possible to keep food warm until immediately before ingestion and to change the temperature dynamically during ingestion



# Providing Auditory Feedback when Eating Sweets



This application is creation an interactive sweets that emit a sound form an external speaker when consumed.

# Conclusion & Future work

- We have presented a method for creating circuits on food surfaces by using edible gold leaf and its potential applications.
- Our method enables the incorporation of dry food into an electronic circuit, which is difficult with previously proposed methods.
- FoodSkin will expand the design space of computer-augmented dining experiences.
- Future work is applying FoodSkin to a wider range of applications.

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ここからは日本語で

# Interactivityについて

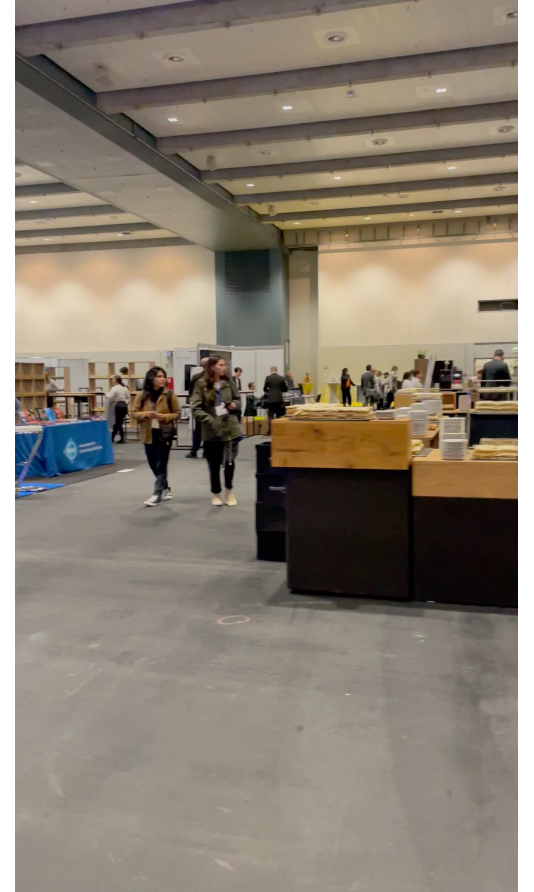
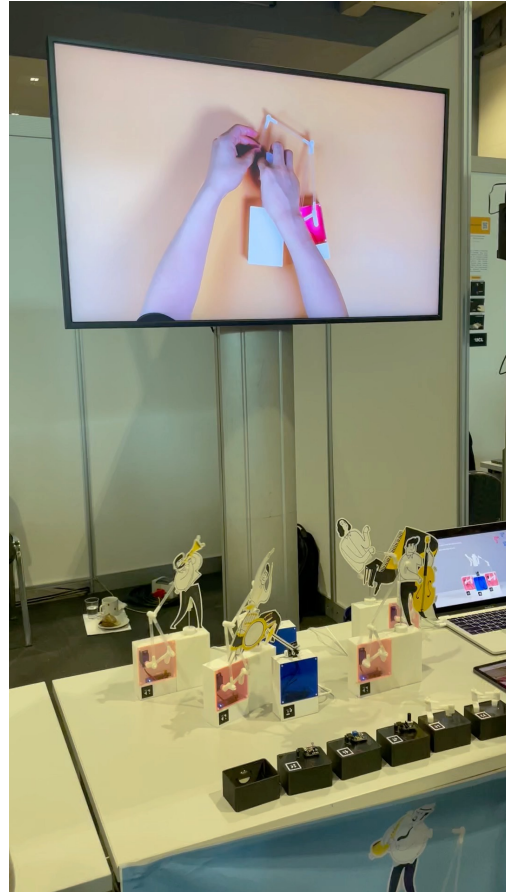
- 一言で言うと、デモ発表部門
- HCI、ゲーム、エンターテインメント、デジタルアート、インタラクティブアート、デザイン等々、様々な分野の発表を実体験できる
- 今回は完全対面
- 2023年の採択件数/応募件数は52/133件(39%)
- 日本人が関わっている発表もそこそこ多かったように感じた（完全なる主観）
- 参加したことのある国内学会と比較すると、WISSのデモ発表をもっと賑やかにした雰囲気を感じた

**CHI23**

Hamburg, Germany | Hybrid  
April 23-28, 2023  
reCHInnecting

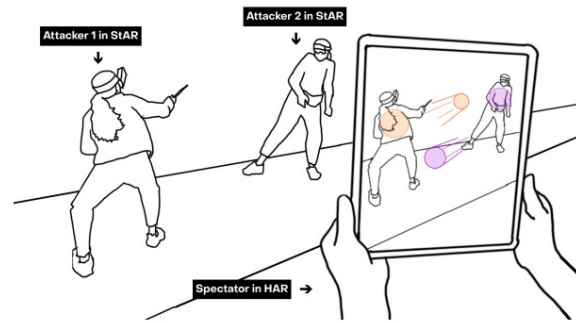


# Interactivityについて

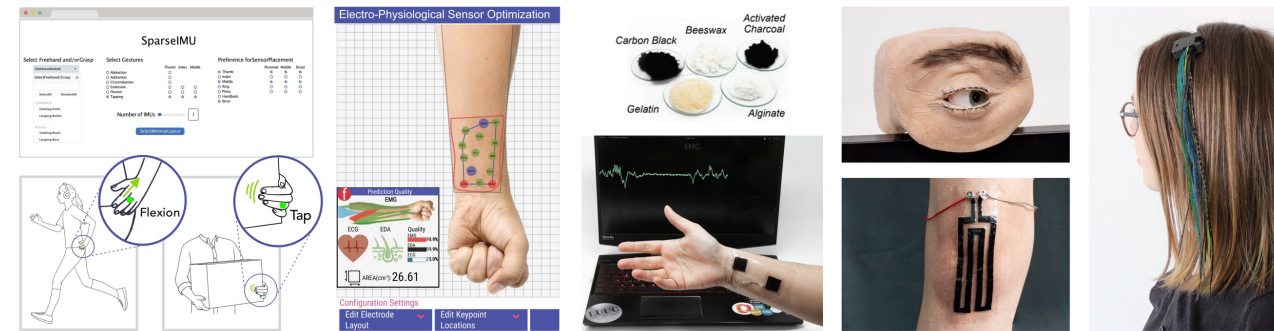


# Interactivityについて

- 審査員賞や一般投票賞もある



Computational Design Tools ----- Fabrication of Soft Interfaces with New Materials ----- Body-Based Interactions



Jury's Best Demo Recognition Winner: **MOFA**

People's Best Choice for Best Demo Winner:  
**Design and Fabrication of Body-Based Interfaces**

# 発表を振り返って

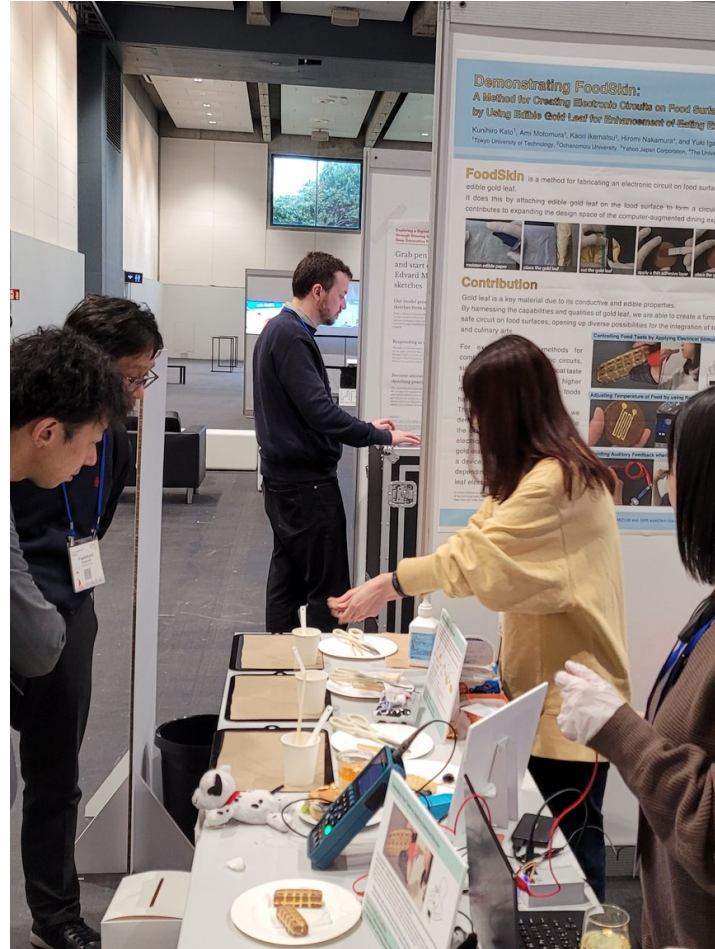
## 発表内容

- アプリケーション3つの展示（食品の実食はしない）
  - 電気味覚—電気が通ってる様子をオシロスコープで見せる
  - 温度変化—温度変化の様子を実演
  - 聴覚フィードバックデバイスを使用する様子を再現
- 回路作成の体験コーナー
  - 金箔をカットしてクッキーの表面に接着する工程を体験できる
  - クッキーはお持ち帰りできる
- 4人で担当分担して説明





# 発表を振り返って



## 感想

- 1番の感想「楽しかった！」
- リアクションが豊かで国内学会でのデモ発表よりも発表しやすかった
- 時間もあっという間に過ぎた
- 「これ食べていいの!？」とすごく聞かれた^^;



# CHI2023参加を通して

## 参加前の正直な心情

- 初めての国際会議
  - 海外渡航も10年ぶり人生2回目！
  - 会議の雰囲気について軽く調べたがあまりわからないまま参戦
  - 英語もあまり得意ではない…
  - 参加者に知り合いの学生もほとんどいない…
- 不安だ…、何もかも…(^^;



# CHI2023参加を通して

## 参加後の心情

- なんといってもまずは「楽しかった！」
- 思っていたよりもかなり和気藹々としていた
- 英語による発表もなんとかなった
- が、聞き取りは上手くいかず、他の発表の聴講時には力不足を痛感する場面も多々…
- 国際発表への印象が大きく変化（というか参加前はかなり恐れていた）
- 修士に入って心機一転というこのタイミングで参加できて良かった
- 研究がより好きに、今後のモチベーションに
- ハワイ行きたい！頑張ります！



# CHI23

Hamburg, Germany | Hybrid  
April 23-28, 2023



Thank you for listening!