Lights, Animation, Interaction!
Synchronizing Music
with Computer-controlled Visuals
in Live Performances

Society for Animation Studies 34th Annual Conference, 6/12/2023

Jun Kato

National Institute of Advanced Industrial Science and Technology (AIST)

https://junkato.jp (slides: https://bit.ly/sas34kato)

1. Introduction

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Jun Kato | 加藤 淳 | @ junkato | https://junkato.jp

- **The University of Tokyo** Igarashi Lab '09 BSc, '11 MSc, '14 PhD
- **Microsoft Research** Asia '12/1-4 Research Intern / **Microsoft Research** '12/6-9 Research Intern
- **Adobe** Creative Technologies Lab, Seattle '13/8-11 Research Intern
- **National Institute of Advanced Industrial Science and Technology (AIST)** '14/4- Researcher, '18/10- Senior Researcher
- **Arch Inc.** '18/7- Technical Advisor (PI at R&D unit Arch Research)
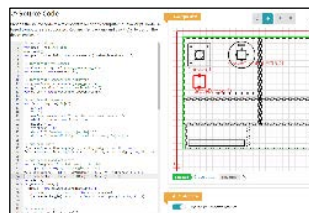

DejaVu [**ACM UIST'12**]

Picode [**ACM CHI'13**]

TouchDevelop [**ACM PLDI'13**]

TextAlive [**ACM CHI'15**]

f3.js [**ACM DIS'17**]

Songle Sync [**ACM Multimedia'18**]

Griffith [**SAS'21**]

Human-Computer Interaction researcher **studying creative activities** e.g., programming, video authoring, storyboarding through **building and deploying creativity support tools**

In short, I am a "**toolsmith**" for creators including animators

Past, Present, and Future of Storyboarding in Japanese Animation

Jun Kato, Ryotaro Mihara, Nao Hirasawa (Arch Inc.)

SAS 2021 (Animated Energies), Online, June 15

ARCH|Research   https://research.archinc.jp/en

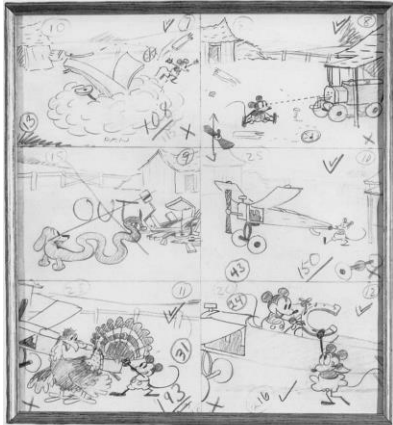# Missing feature in E-Conte: collaborations

Figure 2.1 A series of story sketches detailing a scene from *Plane Crazy* (1928). Image provided courtesy of The Walt Disney Company (TWDC would like to make clear that they cannot confirm the red pencil markings, reproduced here in black and white, were made by Disney artists)
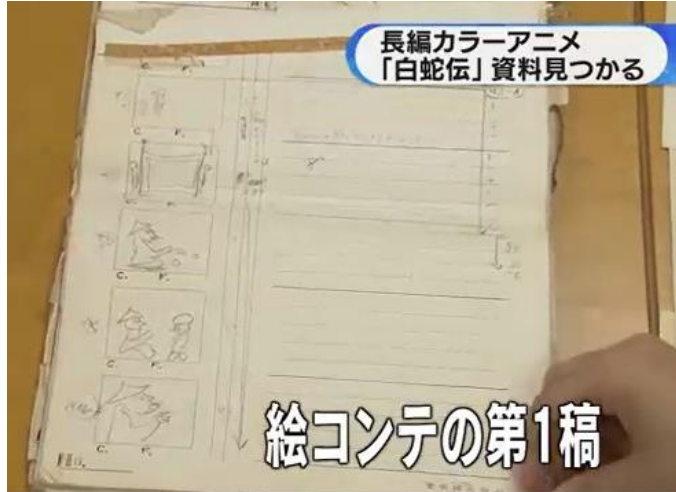

長編カラーアニメ
「白蛇伝」資料見つかる

絵コンテの第1稿

Figure 2.2 A promotional still, c.1933, showing a staged story planning session for *The Grasshopper and the Ants* (1934), featuring Webb Smith seated far left and Walt Disney in the centre. Image provided courtesy of The Walt Disney Company.

?

- The **"story corkboard"** part is completely missing
- Storyboarding process has usually been **handled secretively by a director** and not shared with others until its completion

More detailed comparison in SAS 2021 slides:
https://research.archinc.jp/en/publications

[Images] Chris Pallant and Steven Price, "Storyboarding: A Critical History," p.50 and p.53 / Seiji Okuda, "Anime no Shigoto wa Omoshiro Sugiru," p.38

Past, Present, and Future of "Toolsmiths" in Japanese Animation

Jun Kato (**Arch Inc.**)

in collaboration with Yuki Koyama (Graphinica Inc.), Tatsuo Yotsukura (OLM Digital, Inc.), and Koya Imamura (Toei Animation Co., Ltd.)

SAS 2022 (Animation Unlocked),
Hybrid (Middlesbrough, UK & Online), June 29

ARCH|Research   https://research.archinc.jp/en

Three case studies
in the dawn of computer-aided animation

New York Institute of Technology
Computer Graphics Laboratory

Japan Computer Graphics
Laboratory

Toei Douga Co., Ltd.
(Toei Animation Co., Ltd.)

NYIT example image from https://blog.siggraph.org/2020/08/pioneering-pixels-the-nyit-computer-graphics-lab-then-and-now.html
JCGL logo from https://note.com/nahnah/n/ne7e30432c6fe
Toei Animation logo from https://corp.toei-anim.co.jp/ja/company/about_pero.html

Our research question

Many studies of animation begin with a question about the object—**what is anime?**—but I suggest a different entry point: **Who makes anime?**

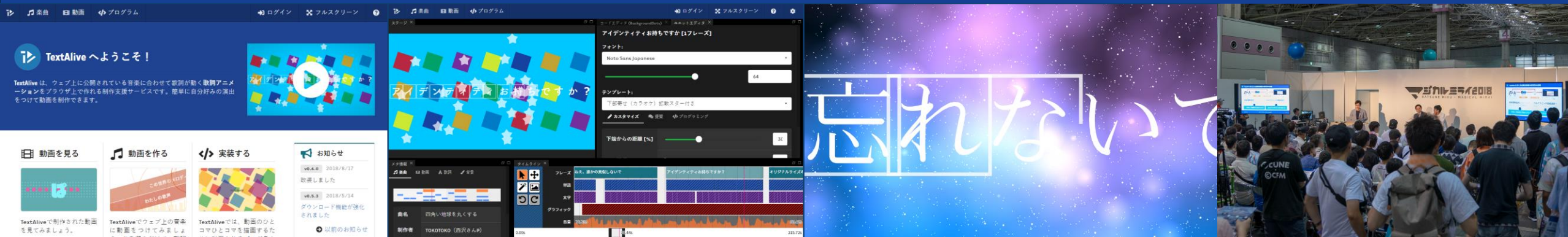Ian Condry, "The Soul of Anime," p.3

We pose yet another entry point—our research began with exploring the design space of building <u>creativity support tools</u> for anime production studios, which can be summarized as: **how to make anime?**
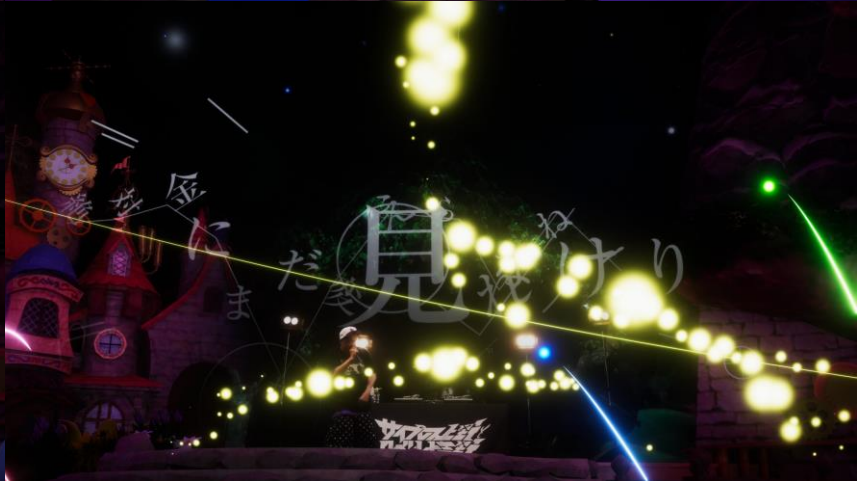
TextAlive in use for Hatsune Miku live performances

SNOW MIKU 2018 LIVE!（LamazeP feat. 初音ミク, 愛の詩 & TOKOTOKO feat. 初音ミク, 四角い地球を丸くする）／初音ミク「マジカルミライ 2018」ライブ（DIVELA feat. 初音ミク, METEOR）／SNOW MIKU 2019 LIVE!（四角い地球を丸くする）／初音ミク「マジカルミライ 2019」ライブ（*Luna feat. 鏡音レン, メインキャラクター）

https://textalive.jp/events

SANRIO Virtual Festival 2023
Jan. 13-22, 2023
https://textalive.jp/events/sanrio-v-fes2023
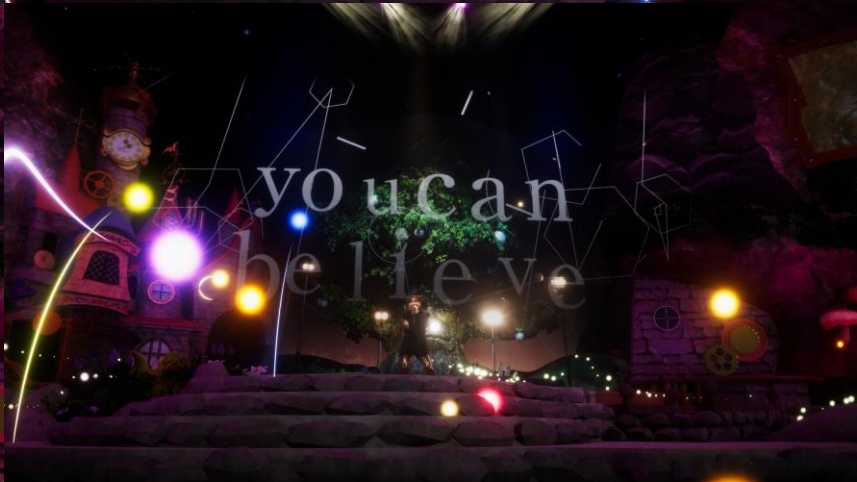
Our research question

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Jun Kato at 32nd and 33rd SAS Annual Conferences

We have provided a new <u>creativity support tool</u> to author lyric videos, which has been used in production, such as live music performances enjoyed by more than 30,000 audiences—**how do the "animating lights" contribute to the performances?**

2. What is live music performance?

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新・舞台照明講座 光についての理解と考察

by 岩城 保 (2022)
Title in English: [New Edition] Stage Lighting Lecture – Understanding and discussing lights

Section 8-3. Role of Stage Lighting

8-3. 舞台照明の位置づけ（p.87）

- Stage lighting is **a part of the performance**, not a work in itself.

  舞台における照明はその舞台作品の一部分として位置づけられるのであり、
  照明単独で作品となるわけではない。

- If the lighting on stage pops out prominently, it is a "lighting show" and not the real stage lighting.

  舞台照明が目立って飛びだしていたら、それは「ライティングショウ」であって、本当の舞台照明ではない
  のです。（『舞台照明』大庭三郎 1976 p.5）

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8-3. 舞台照明の位置づけ（p.87）

- Given that lighting on stage is a part of the performance, to design lighting, one must **understand the intention of the artistic production holistically**.

  照明が舞台作品の一部分を成すのだとすれば、照明を作るためには、その舞台作品全体の意図を理解していなければならないはずです。

- Stage lighting without **a good understanding of the main body of the play**, dance, musical, etc. being performed results in the stage *simply be lit*, but not a true (artistic) picture of light.

  ここで最も大事なことは、舞台照明とは演劇・舞踏・ミュージカルなど上演されるその本体をよく理解していなければ、舞台に**単なる光**は出ても、本当の光の絵にはならないむずかしさがあることです。（『舞台照明』大庭三郎 1976 p.12）

コンサートライティング入門

by 加藤 憲治 (2014)
Title in English: Introduction to Concert Lighting Design

[p.7] A stage of a theatrical performance with photorealistic stage sets
(Photo in courtesy of 劇団昴)

[p.7] 写実的な舞台装置がセットされた演劇の舞台
（写真提供＝劇団昴）

[p.7] A concert stage designed with beams of light

[p.7] 光のビームでデザインされたコンサートのステージ

- Theatrical performance lighting is **based on the script**, which creates the stage scenes in accordance with the story.

  - 演劇の舞台照明のデザインの基になるのは台本であり、ストーリーに沿って、場面の情景を舞台の上につくり出していきます。

- Concert lighting needs to be **based on the music** to be performed, therefore challenging the imagination.

  - コンサートライティングでは、演奏される音楽を基にしながら、そこからイメージされるシーンをつくることが求められます。

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[p.7] A concert stage designed with beams of light

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- In theatrical performance lighting, **lighting sources such as spotlights are usually hidden** from the audiences.

- 演劇での舞台照明では、基本的に光源となるスポットライトなどの照明器具が、観客から見えないようにセッティングされています。

- In concert lighting, **the sources are part of the stage sets**; not only their existence is visible, but their animations are part of the expressions.

- コンサートではスポットライトなどの照明器具も、ステージセットの一部と考えられてステージがつくられています。また、光源としての照明器具の灯体はもちろんのこと、明かりの動きや点滅などを直に観客に見せ、これを表現のひとつとして使用しています。

Live music, stage, and lighting as "**the animated environment**"

コンサートライティング入門
by 加藤 憲治 (2014)
Title in English: Introduction to Concert Lighting Design

- [p.100] When sound and light are synchronized, the sound is created by the musicians and sound staff, and the light is created by the lighting staff, but **the audience does not perceive them separately.** The audience perceives the entire synchronized sound and light as "one event" (with a certain kind of "reality")

- [p.100] 音と光が同期している時、実際には音はミュージシャンと音響スタッフが、光は照明スタッフがつくりだしているのですが、観客はそのように分けては捉えません。観客は音と光が同期した全体を「一つの出来事」として受け取ります。

新・舞台照明講座 光についての理解と考察
by 岩城 保 (2022)
Title in English: [New Edition] Stage Lighting Lecture – Understanding and discussing lights

[p.8] The stage where the light source of the luminiaire becomes part of the design
[p.8] 照明器具の光源がデザインの一部となったステージ

3. Full-color pixels: from abstract to concrete

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Pixels on the stage

Gobo (lighting)
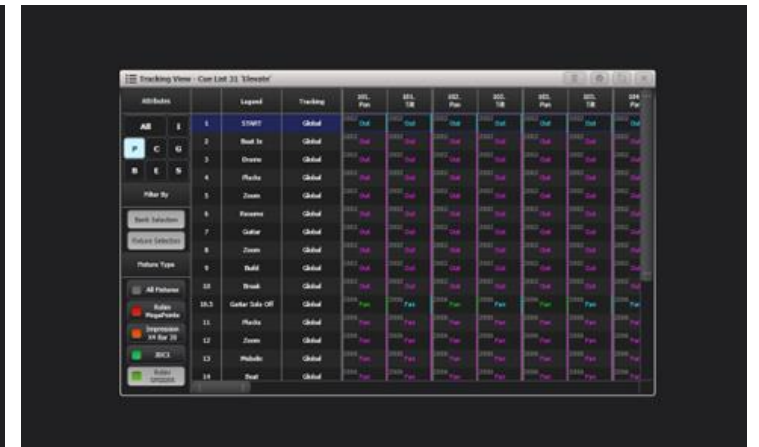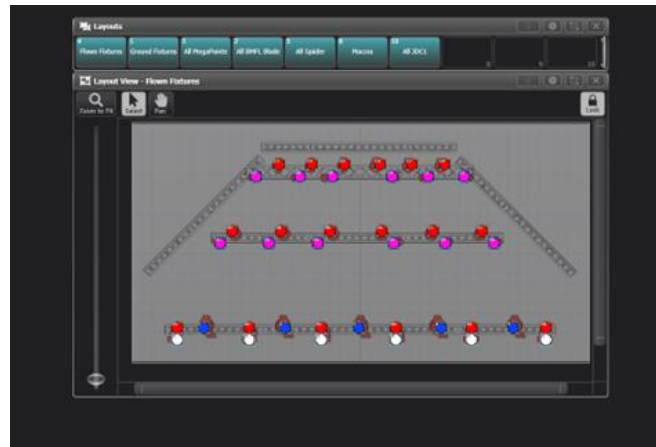(2023, May 13). In *Wikipedia*.

Vari-Lite
(2023, May 19). In *Wikipedia*.

- Conventional stage lighting devices such as spotlights can be regarded as **huge and bright pixels**, which used to be static, and their intensity was the only parameter to be controlled

- Concrete images can be projected using "**Gobo**", and their motion became controllable with the **Vari-Lite** debut in **1981**

- Digitally controlling protocol **DMX512** became generally available in **1990s**

ステージ＆舞台照明マニュアル by 藤井 直 (2019)
Title in English: Stage & Stage Lighting Manual
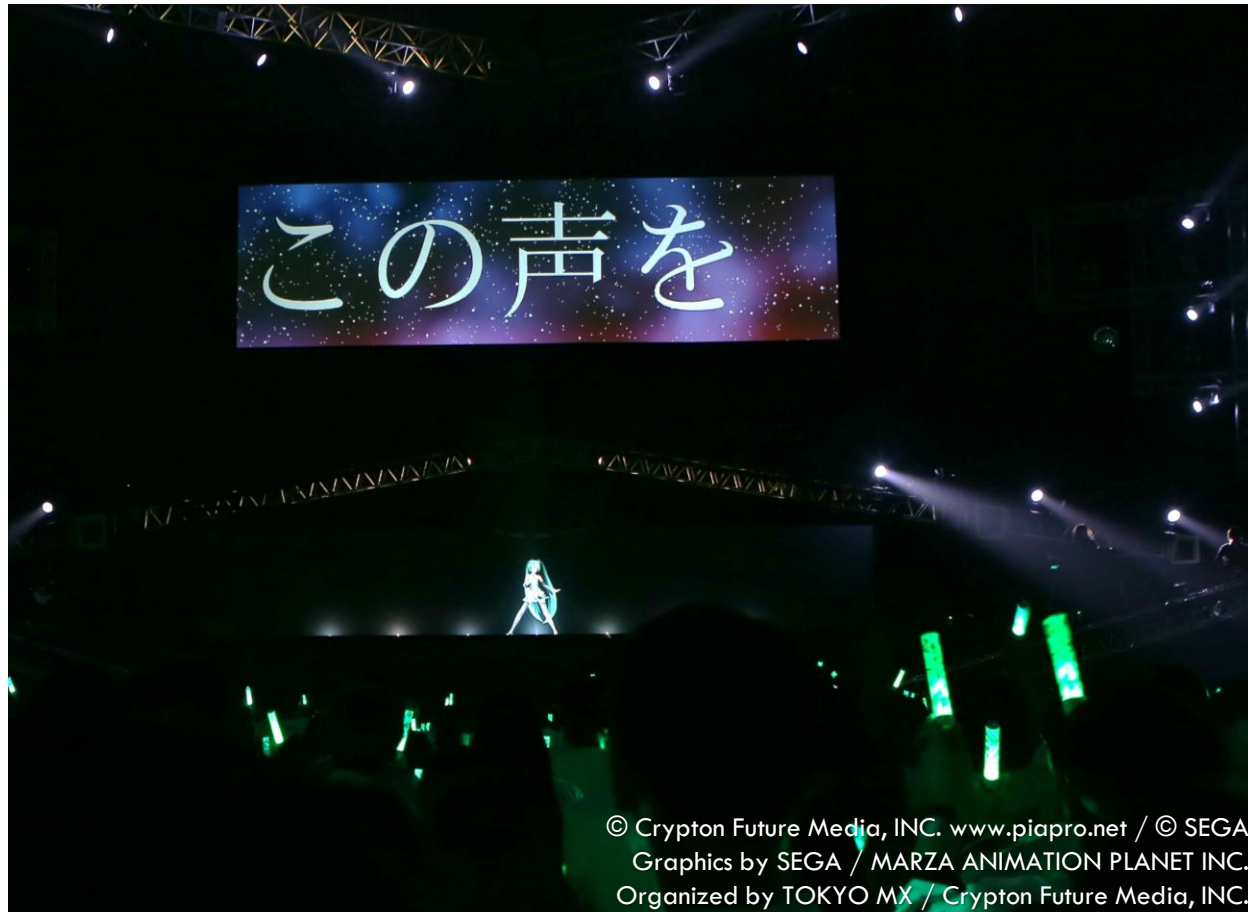
Digitization of lighting design

- After the standardization of the **DMX** protocol, lots of lighting simulation/controlling/programming software appeared

- DMX can handle 512 8-bit channels, but can easily fall in short when controlling complex lighting devices these days

https://www.avolites.com/avolites-announces-immediate-availability-of-powerful-new-titan-v15-software/
https://www.avolites.com/avolites-announces-the-release-of-new-titan-v16-0-software/

Lighting sources in the post-digital era

© Crypton Future Media, INC. www.piapro.net / © SEGA
Graphics by SEGA / MARZA ANIMATION PLANET INC.
Organized by TOKYO MX / Crypton Future Media, INC.

- **LED lighting sources** can change their colors quickly

- **LED displays and projectors** can play videos synchronized with music

- **Glowsticks** enable active participation of the audiences

LED displays:
from abstract lighting to concrete animations

掴んだヒカリ　解き放つオト

METEOR / DIVELA feat. Hatsune Miku

忘れないて

METEOR / DIVELA feat. Hatsune Miku
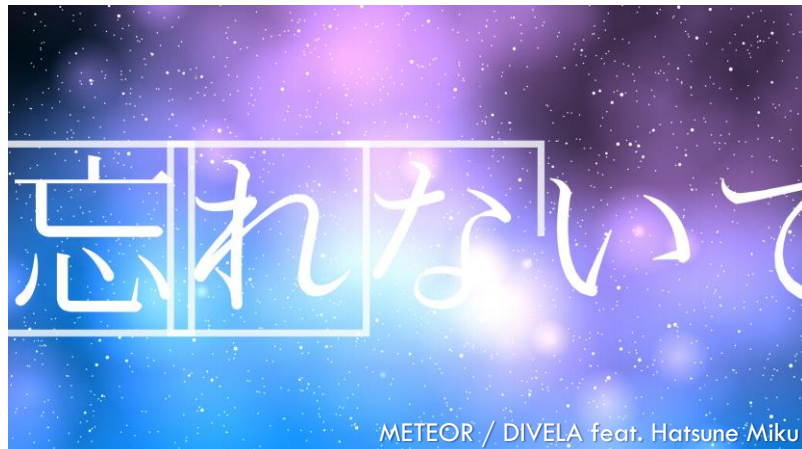
コンサートライティング入門
by 加藤 憲治 (2014)
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- [p.144] Sometimes more can be conveyed by videos, and depending on the performed music, the stage features the video, regarding conventional lighting as support. … We believe that **a total direction method that is conscious of the overall visuals**, including lighting, video, and stage set, will be more required in the future.

- [p.144] 映像による表現の方がより多くのことを伝えられる場合もあり、演奏される曲目によってはステージの表現を映像をメインにし、ライティングはサポートのような表現になることもあります。…これからはライティング、映像、ステージセットと全体的なビジュアルを意識したトータルな演出の方法が、より求められてくると思います。

Glowsticks, wristbands, and smartphones: from the passive to active audience

- The audience can wave glowsticks, wear wristbands and hold smartphones automatically changing colors to music
- We even allowed the audience to interact with the animations played on the smartphones [Songle Sync, 2018]

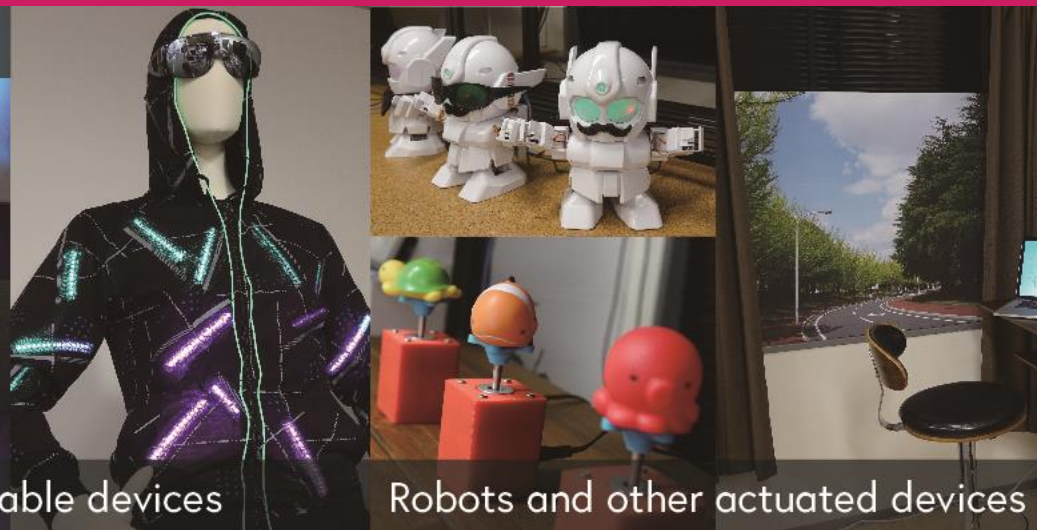https://magicalmirai.com/10th/goods_nic_penlight.html

Xylobands.
https://xylobands.com

Wham City Lights.
https://vimeo.com/86363873

Songle Sync. https://junkato.jp/songle-sync and
https://youtu.be/dCmlEwDTkDY

4. Role of "Animators"

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Virtual stages:
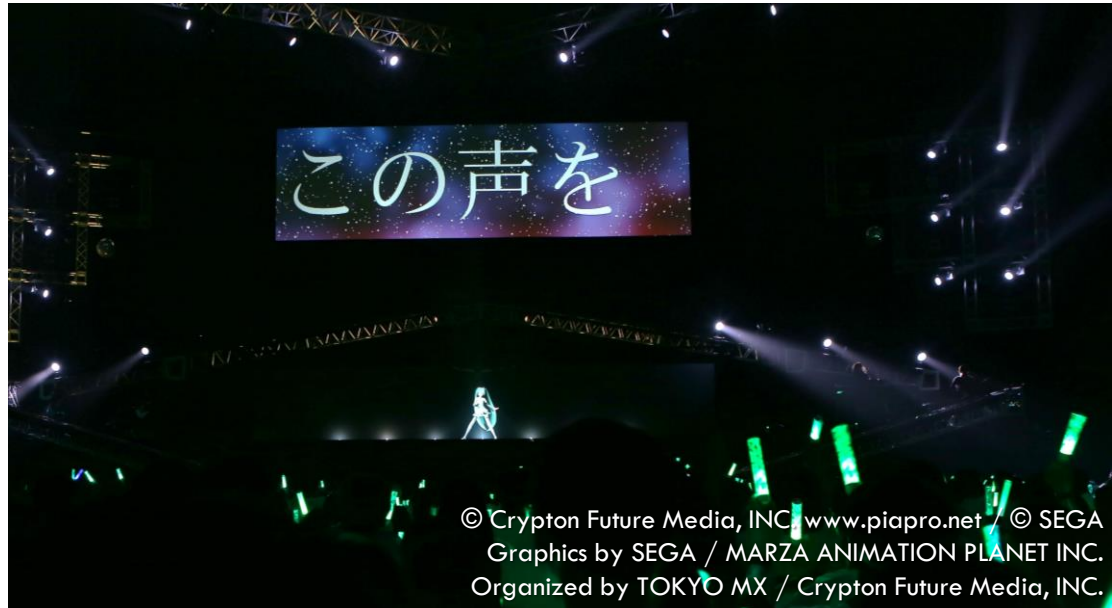# Musical performances in post-COVID19 era

MIKU LAND 2023 New Beginning

Happy Coaster / emon (Tes.) feat. Hatsune Miku

https://textalive.jp/events/mikuland2023

Lights, animation, interaction!
– or the information overload for the audiences?

© Crypton Future Media, INC. www.piapro.net / © SEGA
Graphics by SEGA / MARZA ANIMATION PLANET INC.
Organized by TOKYO MX / Crypton Future Media, INC.

https://textalive.jp/events/mikuland2023

- Computers are controlling **lights, animation, and interaction** for more immersive and active music listening experiences
- The role of animators will be to combine these technical elements to build **the animated environment** surrounding the audience

Lights, Animation, Interaction!
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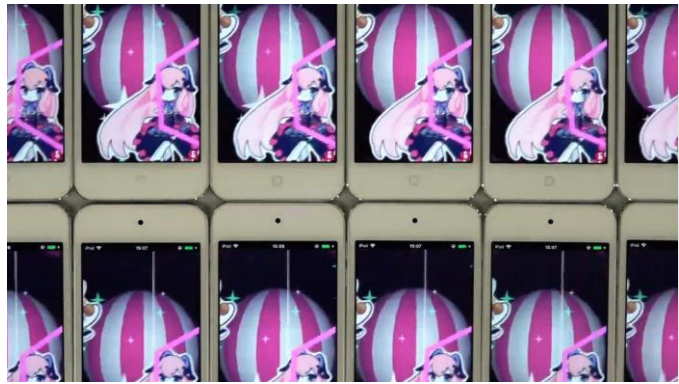
Songle Sync was used to enable this interactive performance held at *Magical Mirai 2019*.

https://junkato.jp/songle-sync

https://youtu.be/dCmlEwDTkDY

TextAlive was used to produce the lyric video for the *MIKU LAND 2023* attraction.

https://junkato.jp/textalive

https://textalive.jp/events/mikuland2023

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