Finding ways to use accessible gaming technology to create music is the point of this booklet. This document is kept at the OneSwitch.org.uk Accessible Music page along with much more: https://oneswitch.org.uk/art.php?id=46. Please dive in.

1. Accessible gaming technology
2. Music software
3. MIDI

1. Accessible gaming technology.

Most Xbox, Playstation, PC and Nintendo game controllers can be made to work with music making technology.

A good place to find a range of accessible gaming controllers is at the OneSwitch Shop: https://www.oneswitch.org.uk/shop.php.

This includes accessibility switches, many different joysticks, mounting solutions, software utilities and more. There are also many links to other suppliers and a news blog too.

JoyToKey (music version 4 from https://oneswitch.org.uk/page/joytokey)
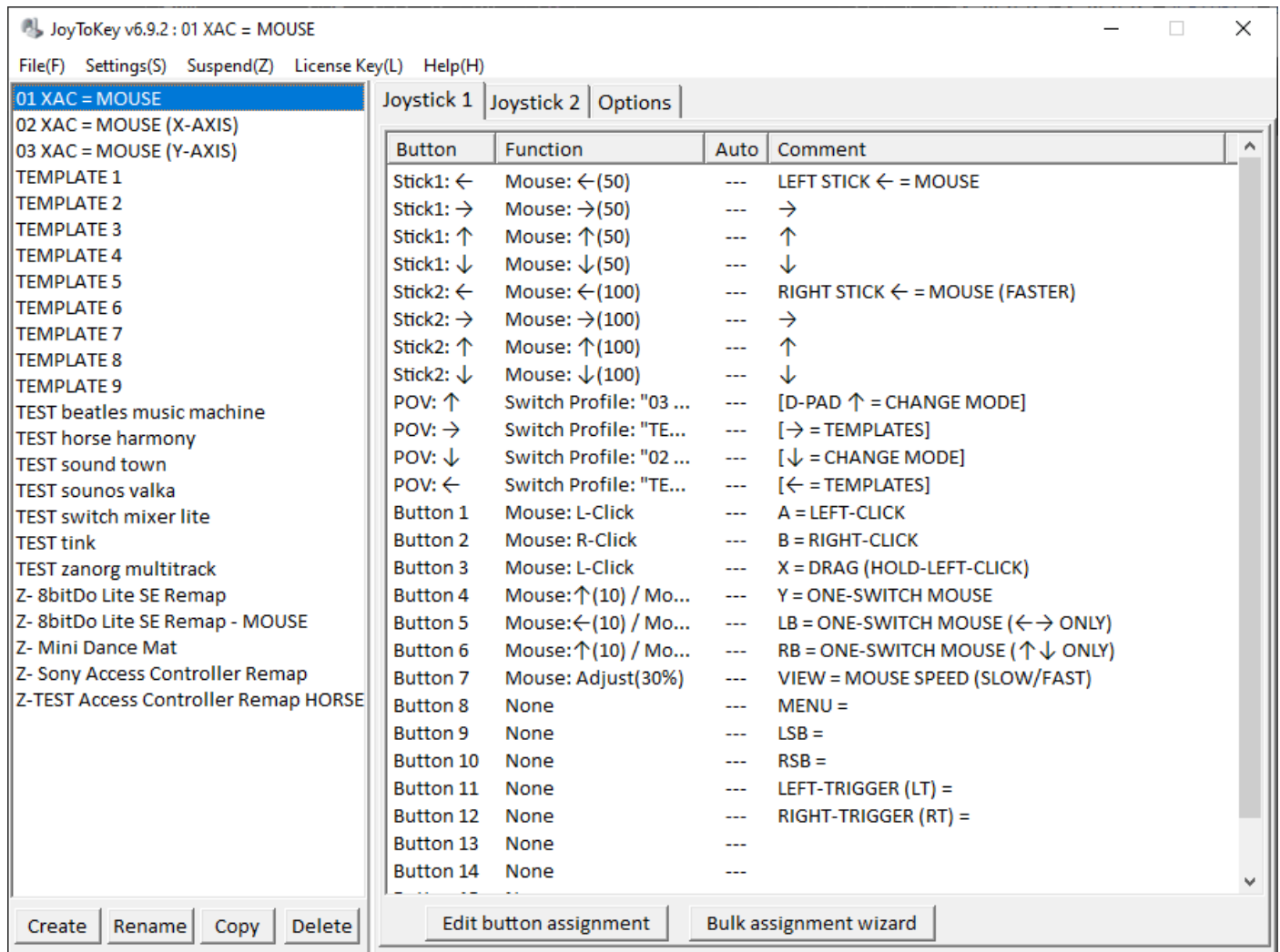
JoyToKey is a very powerful tool for converting gamepad and joystick input to keyboard and mouse output:

1. Connect up to 50 individual game controllers, each with up to 128 buttons and 4 analogue joysticks.

2. Each profile when loaded can alert the user in a wide range of ways (e.g. a JPG, MP3 file, controller buzz and so on).

3. Buttons and joysticks can be set to auto-repeat an action, latch on/off, cycle through controls, shift or launch into another profile and so on.

Note, although you can connect a huge array of buttons, some software won't be able to cope with many chorded keypresses all at once. Also mouse speed depends on the Windows mouse speed setting so be aware of that, and change if needed. It can help to make the mouse pointer size much bigger too.
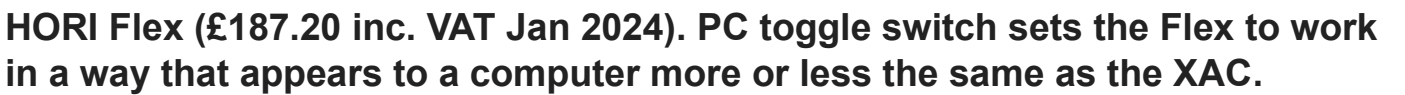
Alternatives, such as reWASD can be found in the "Controller Emulation" section at OneSwitch.

Microsoft Xbox Adaptive Controller (£74.99 Jan 2024) - PC, Xbox One and Xbox Series S/X compatible).

https://www.microsoft.com/en-gb/d/xbox-adaptive-controller/8nsdbhz1n3d8

- **2x USB joystick ports**
- **19x Switch sockets (including 2x "X1/X2" 3.5mm joystick ports). LT and RT trigger sockets analogue compatible (see Logitech Adaptive Kit).**
- **Connect via USB or BlueTooth.**
- **Two large "A" and "B" push buttons, large D-Pad, VIEW and MENU buttons.**

HORI Flex (£187.20 inc. VAT Jan 2024). PC toggle switch sets the Flex to work in a way that appears to a computer more or less the same as the XAC.

https://www.pretorianuk.com/flex-controller

- **2x USB joystick ports. X-Y joystick input ONLY. XAC compatible.**
- **18x 3.5mm switch sockets.**
- **6 user profiles.**

**Learn more at: https://gameaccess.info/hori-flex-controller/**

Sony Access Controller (£79.99 inc. VAT Jan 2024). Joystick and 9 push buttons included, plus interchangeable tops. 4x 3.5mm "expansion" switch sockets. Can connect up to 2x 3.5mm analogue joysticks and 2x Logitech type analogue triggers, or 4 standard switches, or any combination.

https://direct.playstation.com/en-gb/buy-accessories/access-controller
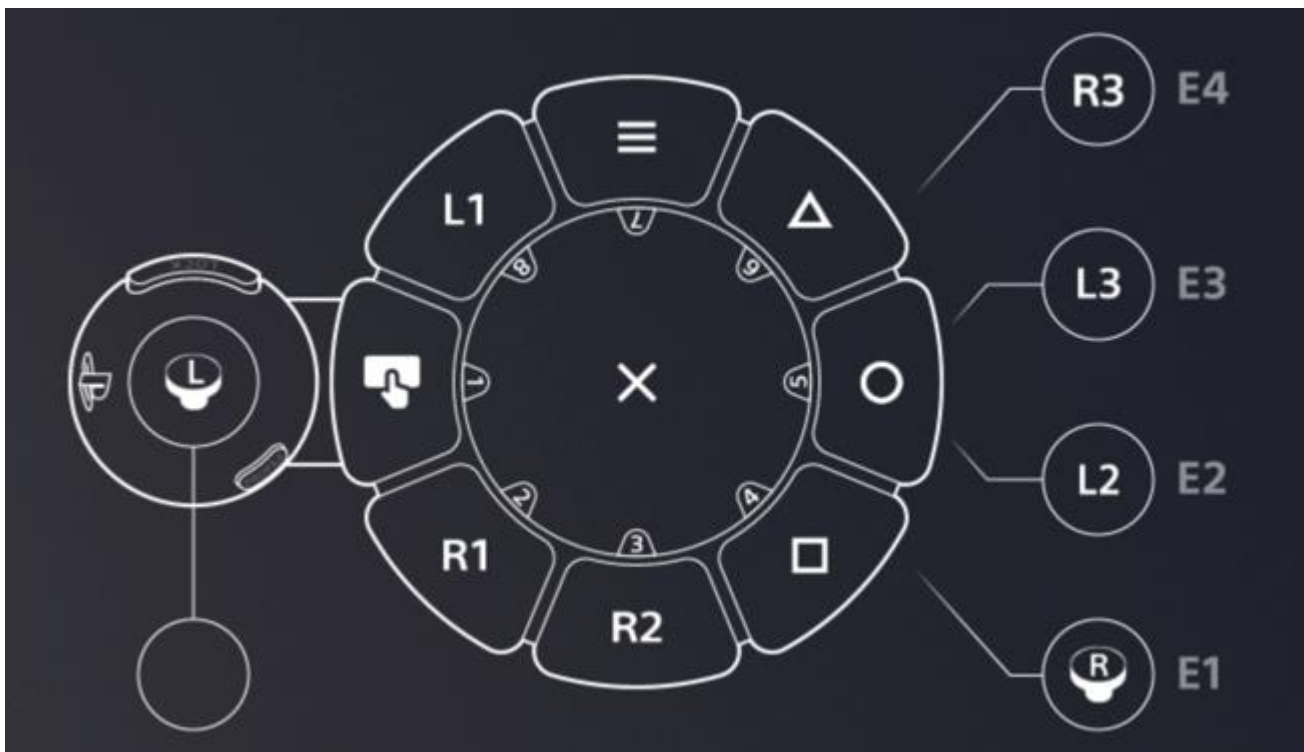
Note: At the time of writing, before using on a PC, you must first configure the Access Controller on a PS5. You can adjust stick sensitivity, orientation, deadzone and what the buttons and four expansion ports do. I recommend matching the

settings above to use on a PC, then using the Sony Access Controller remapped profiles in JoyToKey (option 4).

ADAPTIVE GAMING KIT

The Logitech XAC and Sony Access Controller kits (£89.99 and £69.99) are well worth being aware, as there's a lot in there for the price. Below are the XAC kit analogue triggers and accessibility switches. They also come with a pack of labels which may be useful.

Switches and Sensors

This area deals with accessibility standard switches and compatible gaming equipment. Click on the images below for more details on each controller and from where you can purchase these from.

Please feel free to e-mail for help on anything that is unclear, or to share new information.

Sanwa Accessibility Switches

From OneSwitch (UK).

Small boxed arcade push-buttons for switch use.

Light Pressure Switches

From OneSwitch (UK), Atec and MarbleSoft-Simtech (USA)

See also BJ Sensitive Dual Switch, Aire Touch Switch, G-Click below and the OneSwitch blog.

G-Click and i-Click

Accessibility switches using the 3.5mm jack-plug standard are the type that the XAC, HORI Flex and Sony Access Controller <u>all</u> work with.

Many types exist, some of which can be found at OneSwitch. Some such as The Celtic Magic G-Click Gyro switch are extremely sensitive for users with very little movement or strength.

https://www.oneswitch.org.uk/art.php?id=15

8-way digital arcade joysticks can be converted to act as one to four accessibility switches: https://oneswitch.org.uk/art.php?id=286
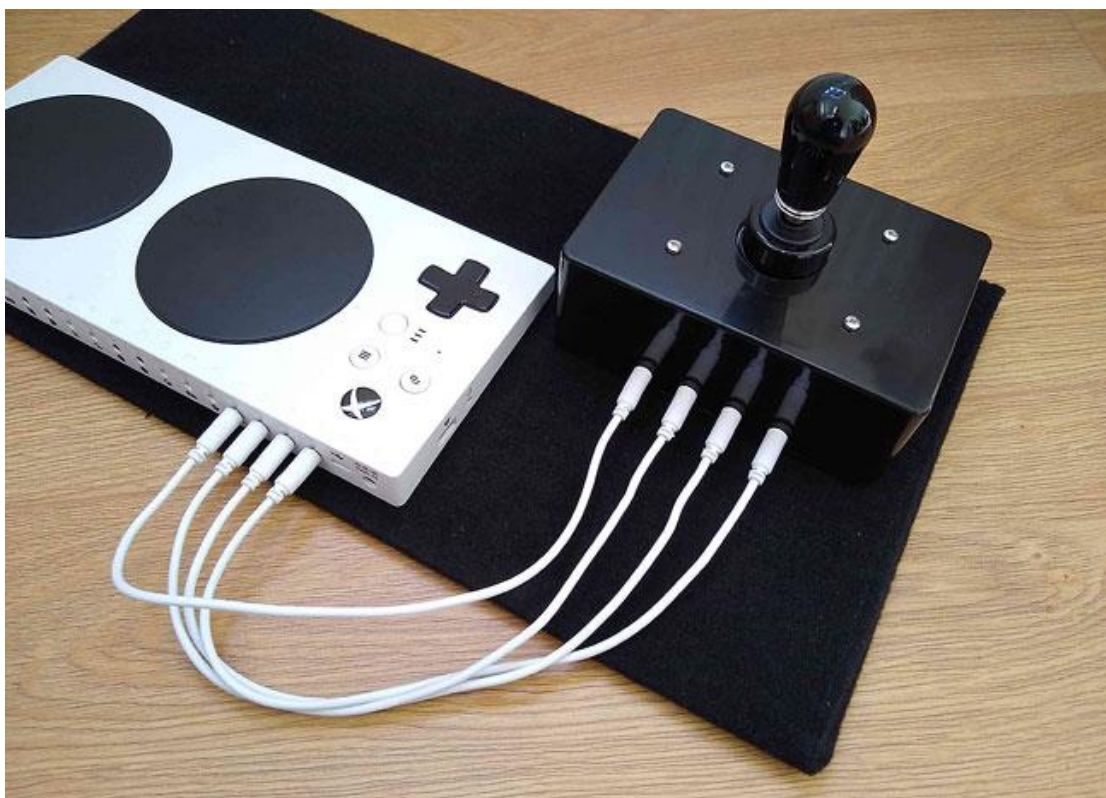
Analogue Joysticks

Analogue joysticks give proportional control, like the accelerator pedal of a car. They are not just on/off devices. JoyToKey is a good starting point for some possibilities.

- **XAC has 2x USB and 2x 3.5mm joystick ports.**
- **HORI Flex has 2x USB joystick ports.**
- **Sony Access Controller (SAC) has 2x 3.5mm joystick ports.**

Some joysticks have buttons. The XAC can detect 6. The others detect none directly. If a stick is said to work on a XAC it should work on a Flex (if USB) or SAC (if 3.5mm). [Some HORI gamepads](#) will work into the Flex (1x stick only). Ask for help if needed.

See more at https://www.oneswitch.org.uk/art.php?id=269

OneSwitch Ultrastiks, USB analogue controllers for the XAC and Flex (from £95 or build your own). Velcro base. A stiffer spring option is available. These do not need a XAC or Flex to work on a PC and can be fitted with up to 8 switch sockets.

https://oneswitch.org.uk/page/shop-ultra-stik

When fitted with a MERU cow-bar top, the top does rotate freely.

The Zik-Zak range above can be fitted with a variety of tops, including a MERU cow-bar. This does not rotate freely, so is easier for users to aim for.

The XAC Mini Sticks above can come in many forms, including 3.5mm plug for the Access Controller and USB.

There are a few options for getting Wii Nunchuk gamepads working on XAC, Flex and SAC interfaces.

Thumbsoldiers are one type of thumb-stick topper. These clamp on tightly to Xbox, Nintendo Pro Controller or Playstation thumb-sticks and can be fitted with a mix of tops.

https://thumbsoldiers.com/collections/shop

The Feather (£420 + postage) is an extremely light-pressure joystick that is compatible with the XAC and Flex: https://oneswitch.org.uk/page/feather

Below is an new old stock Predator Joystick with Nest adapter. Sometimes these can be found on eBay.

The Logitech Extreme 3D Pro (£47.99 + shipping) works on the XAC and HORI Flex. Button use will be limited or non-existent if connected directly.

https://www.logitechg.com/en-gb/products/space/extreme-3d-pro-joystick.942-000031.html It is possible to use this joystick direct to a PC with JoyToKey. Clamp not included (**WELLMETE desk mount for flight sim joysticks**).

Below two high quality USB joysticks from Pretorian: **https://www.pretorianuk.com/assistive-gaming**.

WFE JOYSTIX PRODUCTS

Warfighter Engaged (USA): https://warfighterengaged.org/shop

GlidePoint Touch joystick for XAC from 7 Mile Mountain: https://www.etsy.com/shop/SevenMileMountain?section_id=37784302 (£59.40 + postage in Jan 2024).

Lightweight light-pressure game controllers

https://oneswitch.org.uk/art.php?id=281 – These include the 8bitDo Lite SE gamepad (£30 in Jan 2024), modified gamepads (around £200) up to the Celtic Magic Feather (£420 in Jan 2024), probably the lightest pressure joystick in the world.

Note, the 8BitDo in "D" mode benefits from using JoyToKey to remap many of the controls, which are strangely assigned otherwise. Get in touch for help.

Proteus
CONTROLLER

Microsoft, Xbox, Xbox "Sphere" Design, Xbox Series X|S, Xbox One, and Windows are trademarks of the Microsoft group of companies

Byowave's Proteus controller: https://byowave.com/ is a protoype controller, that can be put together in millions of combinations. Connects wirelessly to a USB dongle to PCs or Xbox One/Series. Can be connected to power at the same time (two USB ports needed at the time of testing).

One-Handed Configuration   **Table Top Configuration**

Azeron one-hand controllers (around 180 Euros): https://store.azeron.eu/. One analogue thumb-stick and many buttons. Many more one-handed methods can be found at https://oneswitch.org.uk/page/one-handed

All Items

Squid-Con | one-handed adapter for N...
£169.67
9 people have this in their basket

One-handed Xbox One attachment
£128.20
8 people have this in their basket

PS5 Flexure Joystick
£14.00

One-handed PS5 attachment
£129.28
Over 20 people have this in their basket

3D Printable PlayStation DualShock H...
£3.23

PS4 Flexure Joystick
£14.00
5 people have this in their basket

One-handed PS4 Attachment
£128.20
5 people have this in their basket

3D Printable Flexure Joystick for Xbox ...
£14.00
Over 20 people have this in their basket

**AkakiKuumeri has many clip on 3D printed mods for making game controllers more accessible for one-handed users: https://www.etsy.com/uk/shop/AkakiKuumeri**

Some of these, and many other assistive technology 3D prints, are available for free upon request from https://thecontrollerproject.com/
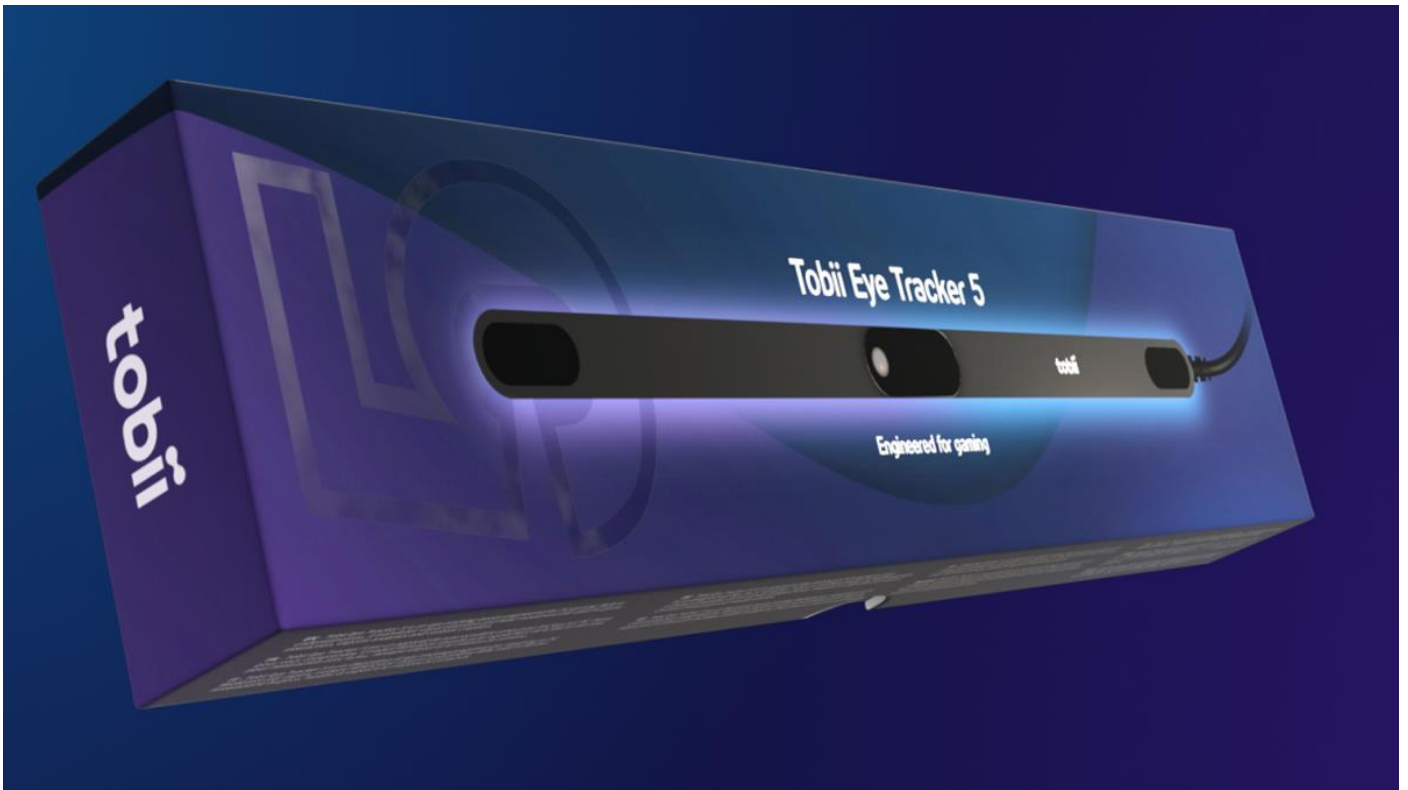
Tobii 5 (or 4C) https://gaming.tobii.com/product/eye-tracker-5/ are gaming based Eye Trackers for around £300.

For 39 Euros (after a 14 day free trial), the Project Iris software: https://iris.xcessity.at/index.php adds missing mouse and keyboard control with lots of options on how keys can be triggered. Can work very well with the likes of EyePlayChords.

See also: https://beam.eyeware.tech/
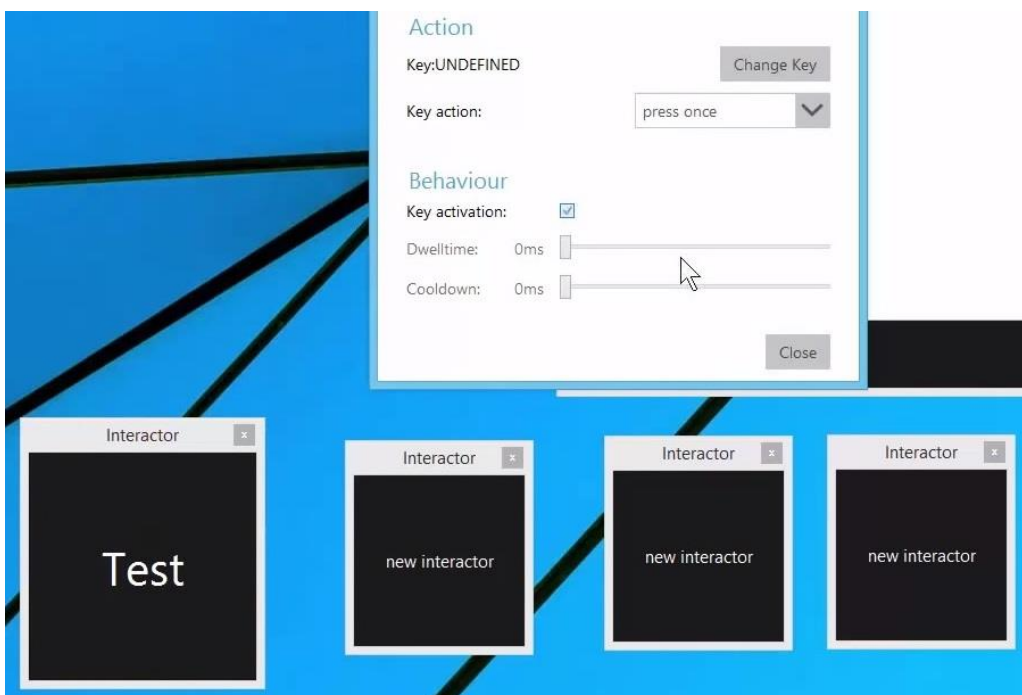
VoiceAttack https://voiceattack.com/ $10 USD Jan 2024). Voice to key software with a free trial. Best with the music volume turned down low or better still, through headphones.

Other methods can be found here:

See also: https://www.oneswitch.org.uk/art.php?id=92 – at the Voice Control / Speech section and the OneSwitch blog: https://switchgaming.blogspot.com/search/label/voice.


Voice Control / Speech

See OneSwitch Blog

PC & Macs have in-built voice to text features. See also GlovePie, Voice Attack, MishkinaMish, Vocola, DWVAC, Dragon, GavPie & the adapters page for speech and console gaming.
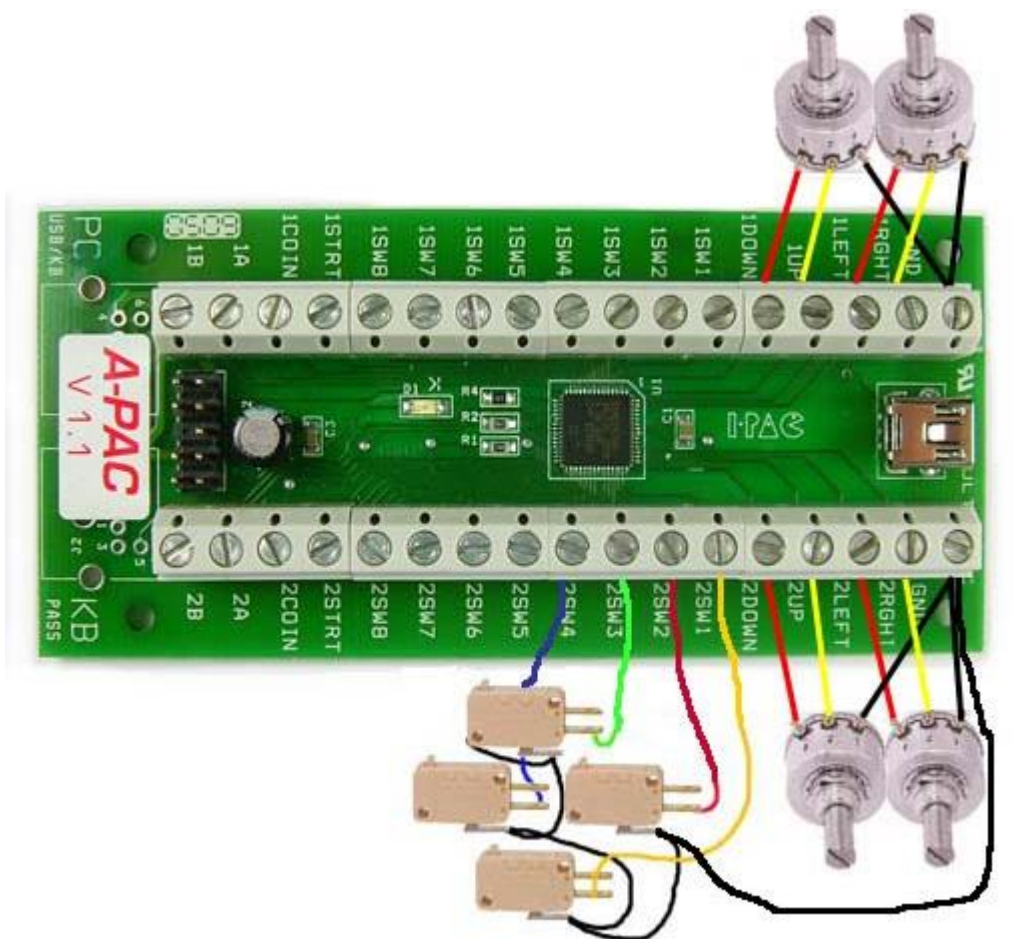
Ultimarc i-Pac and A-Pac boards https://www.ultimarc.com/control-interfaces/a-pac/a-pac/?currency=GBP **(~£40 inc. VAT upwards Jan 2024). D.I.Y. kit aimed at arcade cabinet builders. Joysticks and buttons can be attached and set to output keys or joystick controls. See Arcade World for many suitable arcade parts:** arcadeworlduk.com

Of note, the D.I.Y. approach is the bedrock of accessible gaming. People have been modifying standard game controllers since the early 1970s.
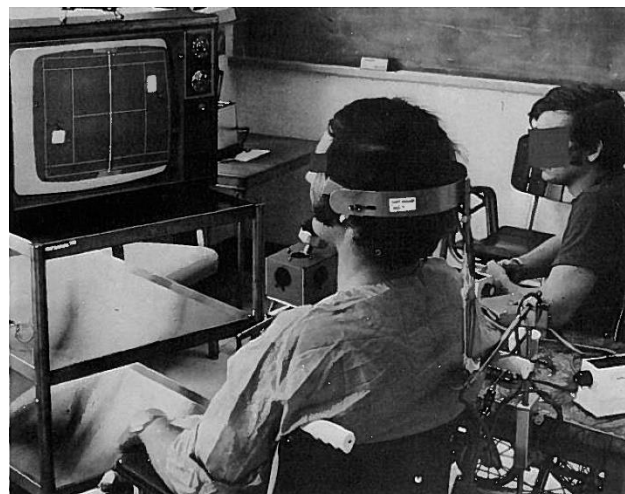
BDM-010 & 020

Advanced D.I.Y.: An even cheaper way to get joysticks and buttons working on a PC is using an Arduino Leonardo ATmega32U4 PCB (around £5 each), programmed via an Arduino IDE. Alternatively, modifying a standard gamepad, perhaps using a "Mod" flex PCB from the likes of XQGaming can be fairly straight forward for some.

Makers Making Change in Canada share many D.I.Y. controllers such as the Oak Compact Joystick pictured left, and mouth controlled sip-puff Lip-Sync pictured right.

The tiny 8-way joystick above is 4-switches in one which could be useful for some.

See more at the OneSwitch D.I.Y. pages: https://oneswitch.org.uk/art.php?id=10 and all over the web.

2a. Music software: on-line

Beatles (https://www.zanorg.com/musicmachines/beatles/)

Point and click. Five Beatles tracks to chose from. Clicking on the question mark icon shows where you need to click. All instruments and singing stays in time.
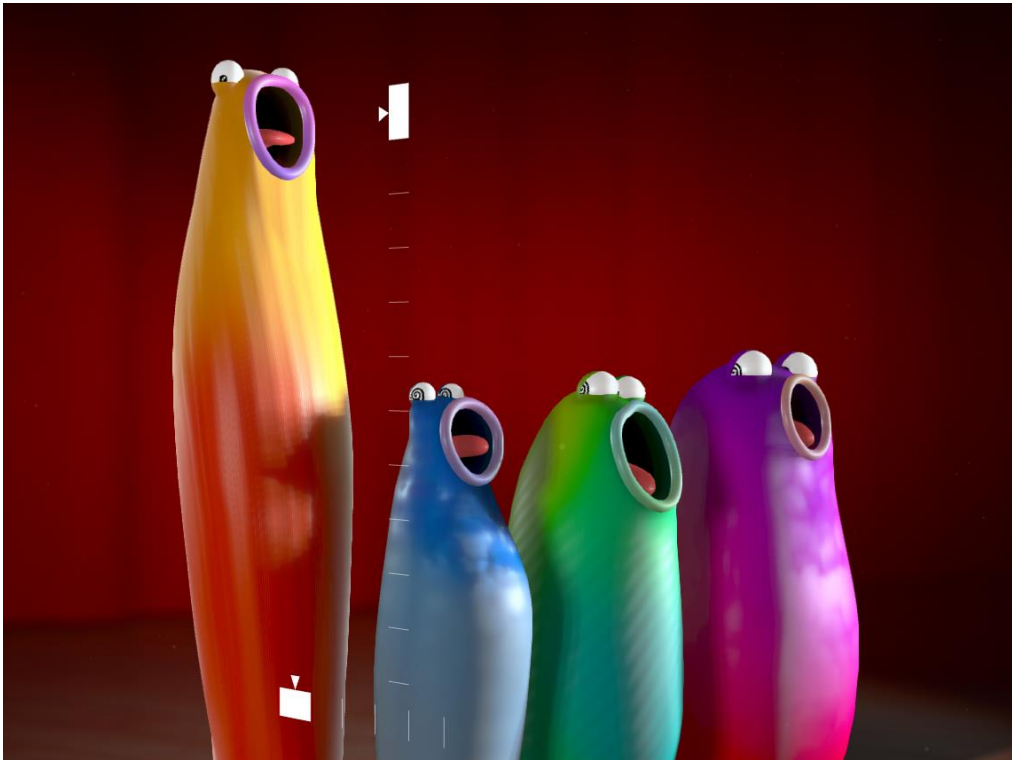

See also: Country, Quatuor (classical musical quartet) and Ukrainian.

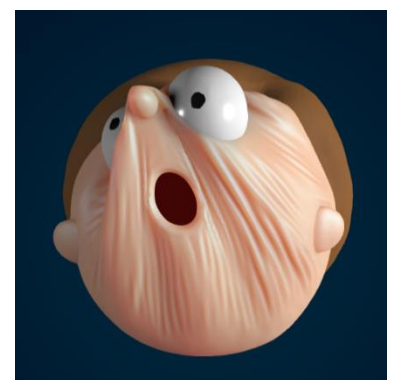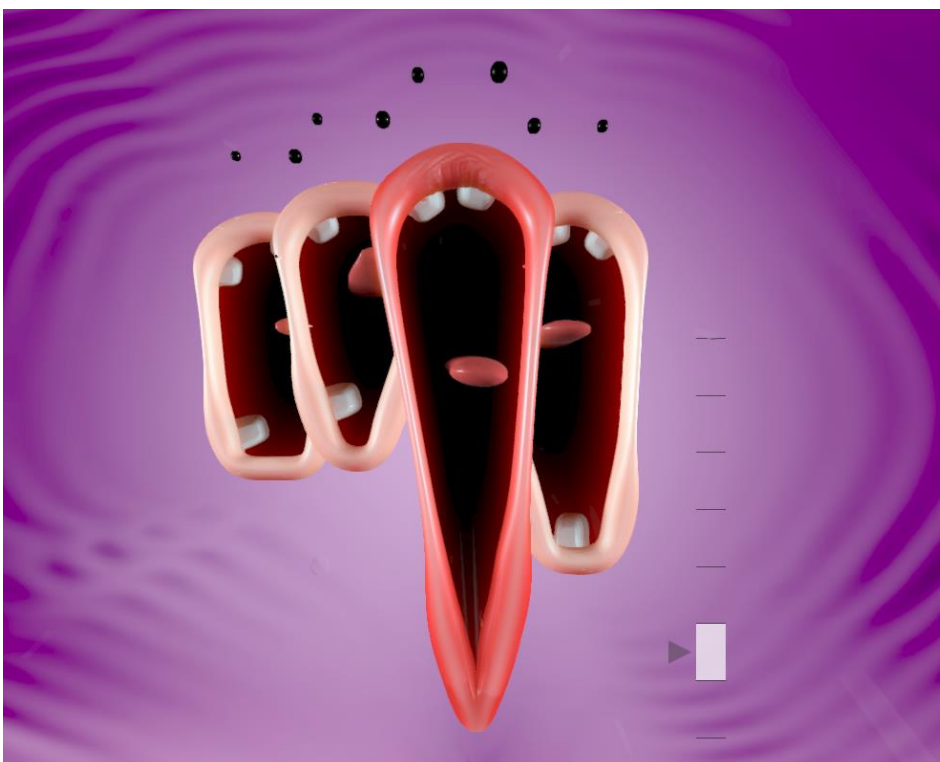## Blob Opera (https://artsandculture.google.com/experiment/blob-opera/AAHWrq360NcGbw?cp=e30)

Point and drag. Move sideways to change the vowel sound (AEIOU), and up and down to change the pitch and lead the harmony. Any voice can be muted at rest.

Choir (https://www.adultswim.com/etcetera/choir/)

Point and drag the bottom lip to sing. Requires a powerful computer.

See also: Elastic Man (just for fun – not musical).

Fanfare (https://zanorg.com/musicmachines/fanfare/)

Point and click. A cheerful brass-band with drums. Click on a band member to stop/start their playing.

tuba   trompette   grosse caisse   caisse claire   soubassophone   trombone

Horse Harmony (https://www.crazygames.com/game/singing-horses)

Point and click. Four singing horses. Click to start/stop each singing in harmony. *Note: Try in Firefox browser if Chrome does not work.*

Indian and Punk* (https://www.zanorg.com/prodperso/indian.htm)
(https://www.zanorg.com/prodperso/punk.htm)

Point and click. Small targets, and just a looping sample player. Things can quickly go out of sync. But some great samples. ***WARNING!** The Dirty Punk Anarchy Machine has swearing in it.

Multitrack love (https://zanorg.net/multitrack/)

Point and click. Turn track on and off from well known music from the 60s to the 2000s. AC/DC, Amy Winehouse, James Brown, Motorhead, Queen, Radiohead, The Clash and so on.
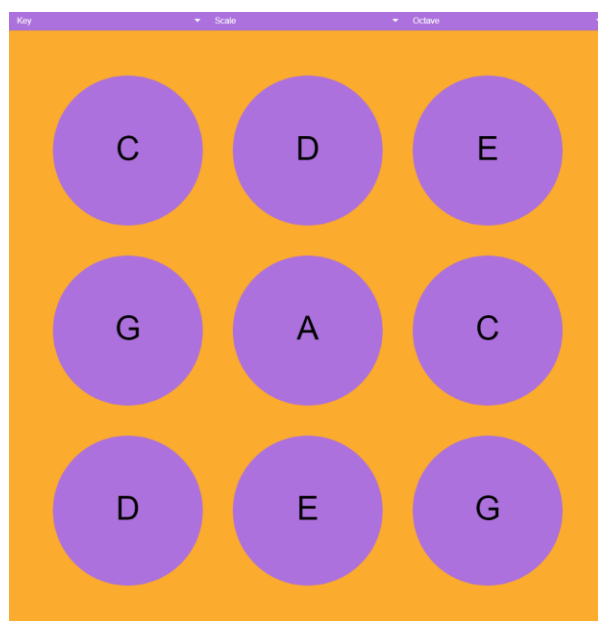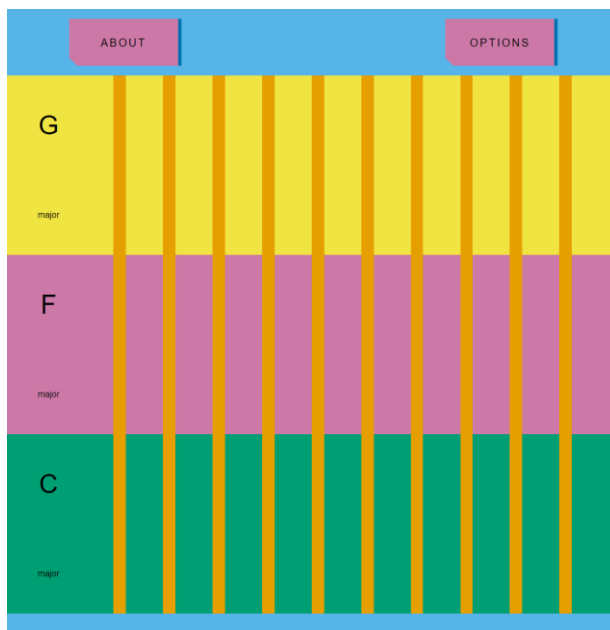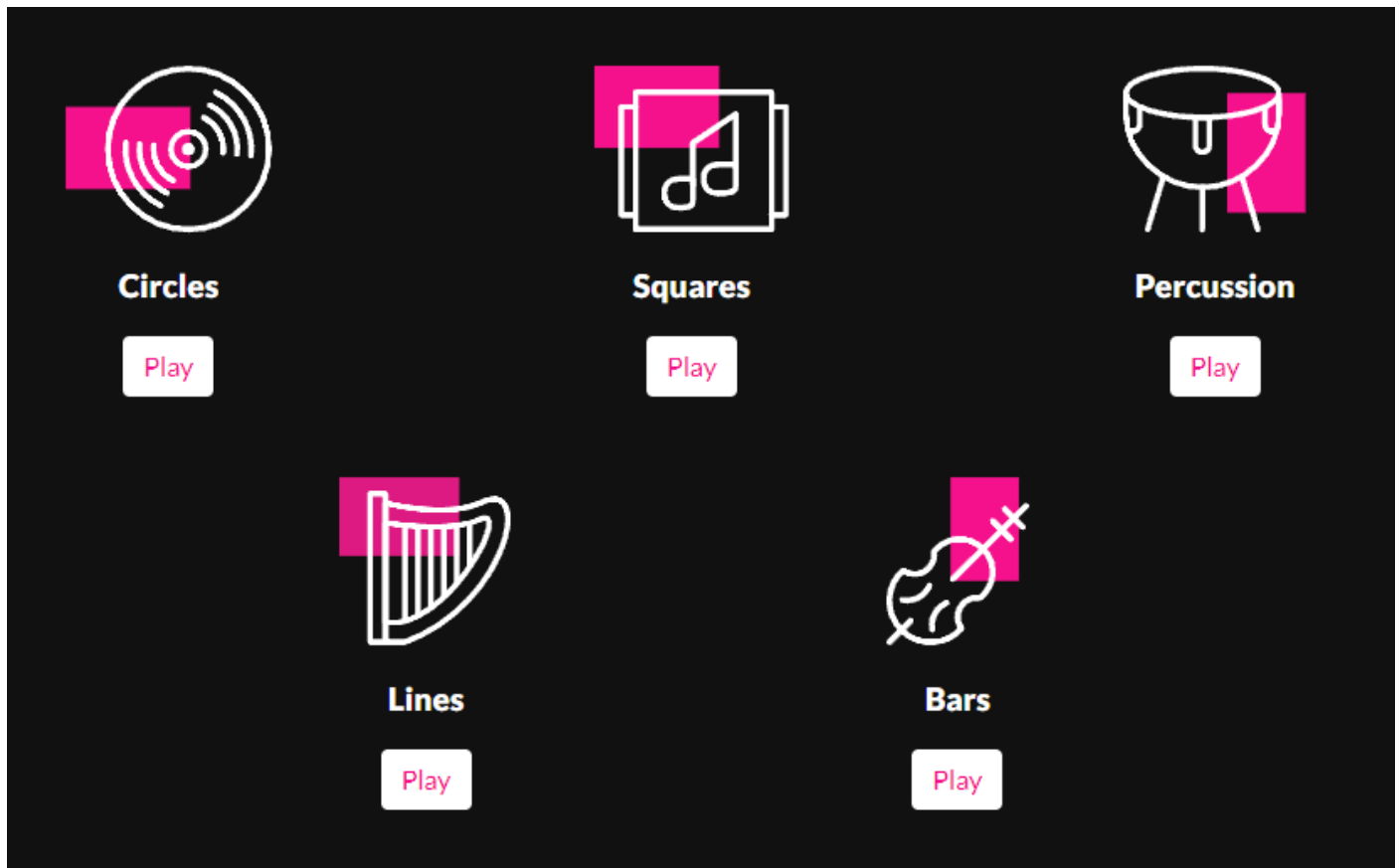
Click Menu and select a track. Wait for it to load then click Play. Click on the track speaker to mute/unmute.
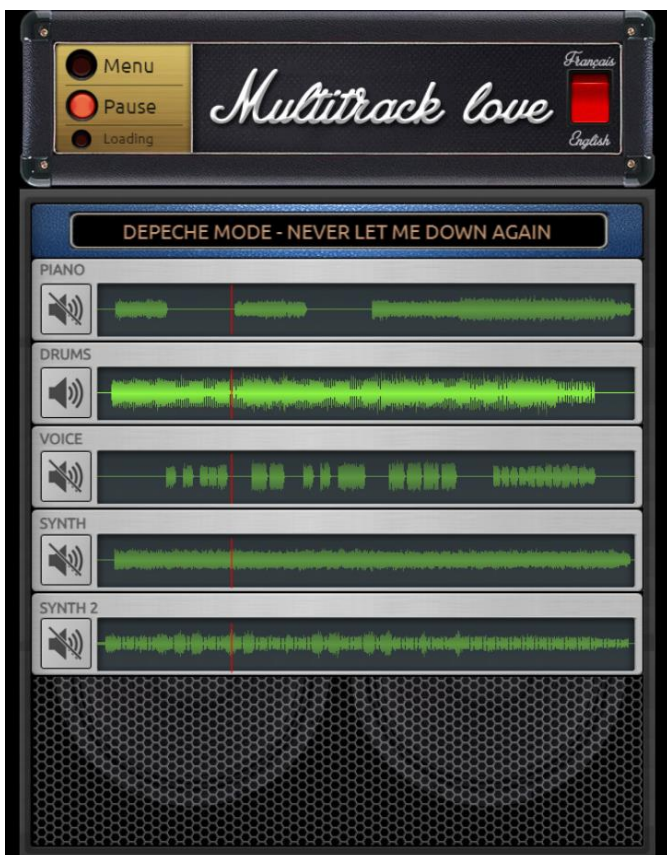
## OrchLab: Soundmakers (https://orchlab.org/soundmakers/)

Some lovely musical activities, that can be controlled with point and click (mouse mode) or keys.

Most use ZXCVBNM (the bottom row of keys), or the entire QWERTY keyboard, or with "BARS" four keys, one from each row (e.g. Z,A,Q and 1).
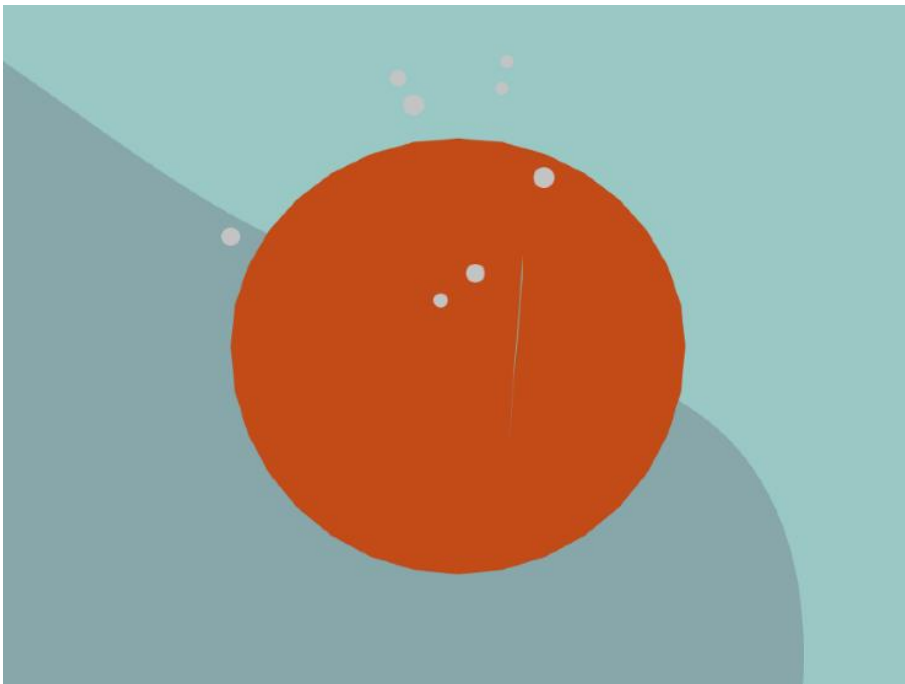
Paint with Music (https://artsandculture.google.com/experiment/paint-with-music/YAGuJyDB-XbbWg?hl=en)

Point and drag repeating musical sequencer.
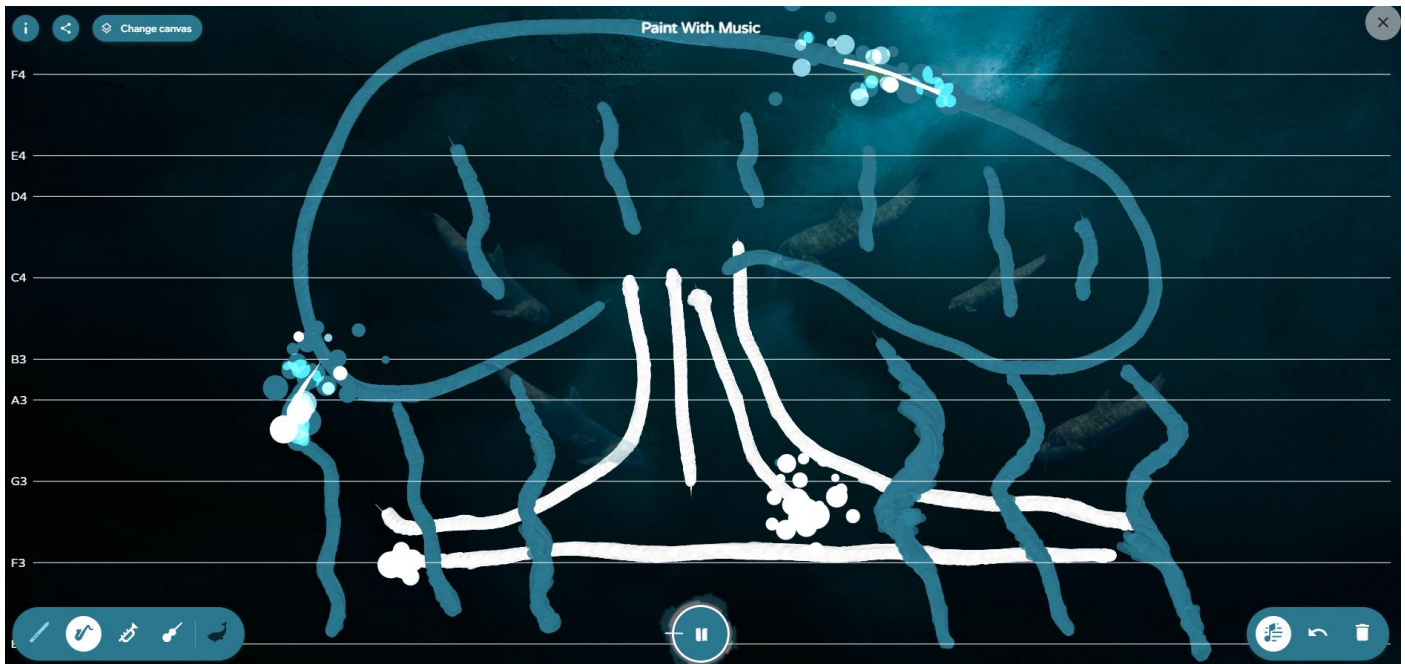
Patatap (https://www.jono.fyi/Patatap)

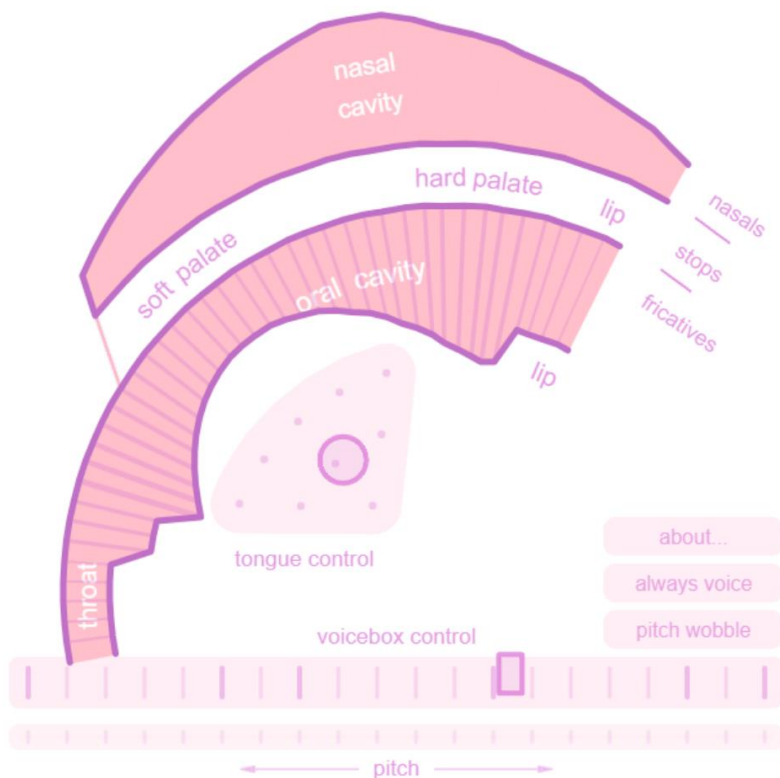Use the keyboard (A-Z) to tap out rhythms. Use SPACE BAR to change the sound and visuals. **WARNING: includes flashing images.**

Pink Trombone (https://dood.al/pinktrombone/)

Point and drag. Interactive recreation of a human voice-box.

Tony-b Machine (https://www.tony-b.org/)
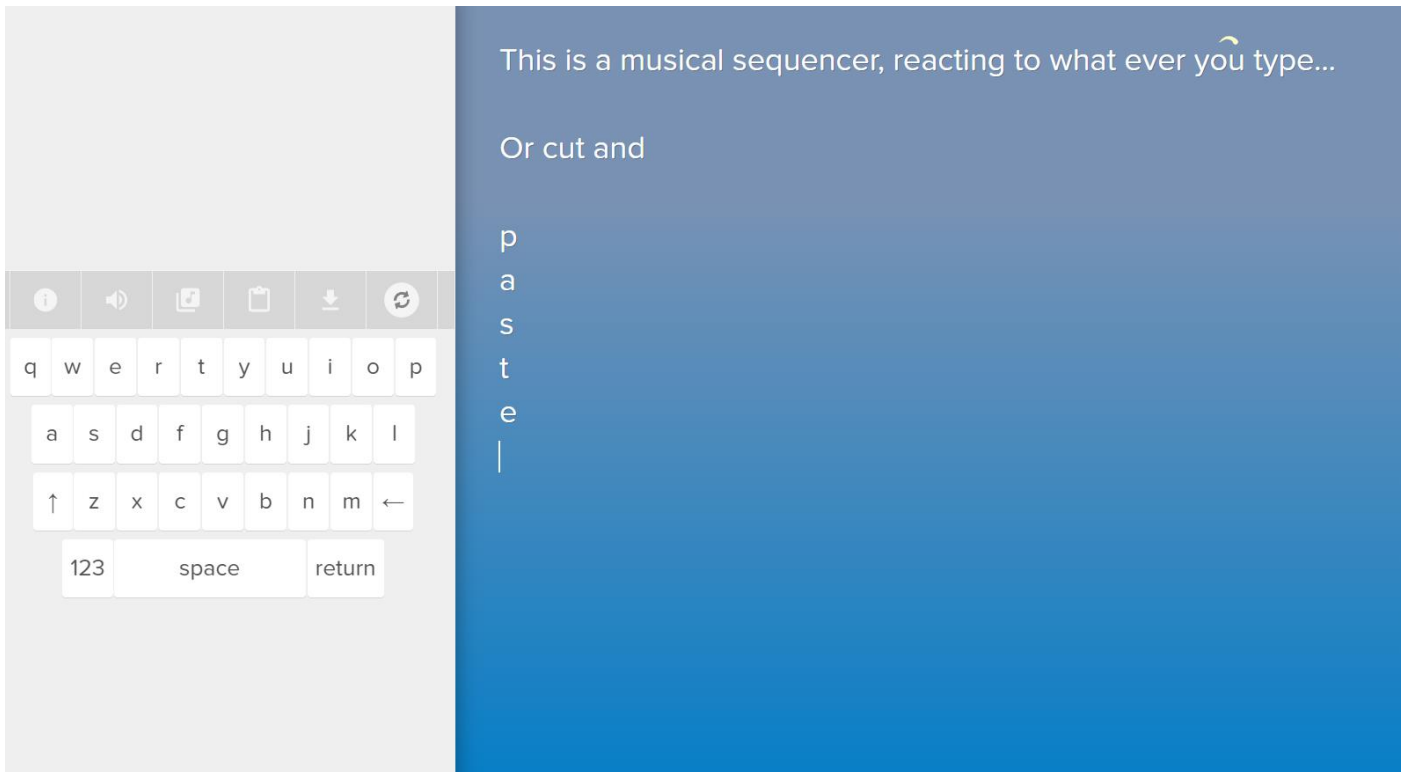
Commodore 64 sound sequencer and live play. Huge fun if you like the sounds. Mostly keyboard or point and click accessible.

Typatone.com

Type, or use the point and click keyboard, or cut and paste test to create musical sequences from your text. Click the musical note to change the sound and speed.

Viola the Bird

Point and drag. Perform a range of classics, or play free-style.

2b. Musical software: download

Beamz Player Software (for model C1R42) (https://beamzinteractive.com/support)

QWER keys play Unit 1 instruments.
ASDF keys play Unit 2 instruments.
ZXCV keys play Unit 3 instruments.

TGB change the Unit instruments on display (1-3)
YHN to turn the Rhythm backing track on/off

Optionally, move the pointer across the beams to play them too. Get these thicker lines by selecting Settings > Options > Eye Gaze Beam Display

Switch Mixer Lite (https://www.oneswitch.org.uk/art.php?id=148)

Use a single switch (set to "1") to play .WAV file sounds from the "Sounds" folder. Change if playing just a single sound ("static"), or playing every sample in order, or at random, using the "Q" key.
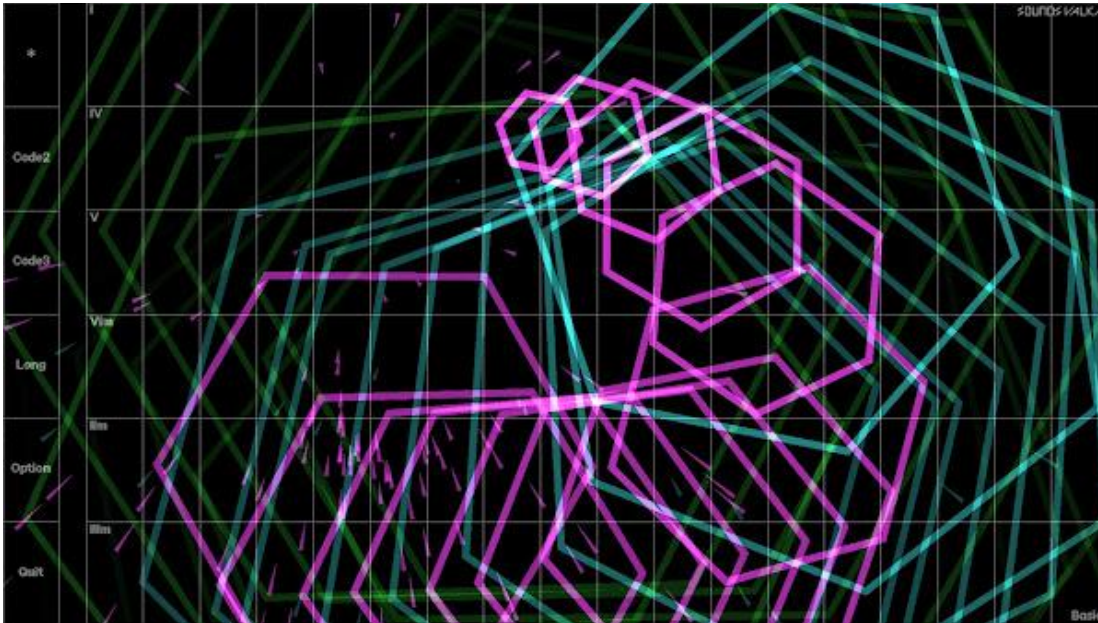
LIMIT: Use "0" to change if you have only one sound playing at a time, or more in layers.

Use software like Audacity to record and edit your own .WAV files to place in the "Sounds" folder.

Sounus Valka (https://switchgaming.blogspot.com/2022/08/sounds-valka-mousetoucheye-gaze-music.html) – **PC DOWNLOAD**

Pointer controlled musical instruments. Could be converted for keyboard access.

Sound Town (https://alexanderhorowitz.itch.io/soundtown) – **PC DOWNLOAD**

Five musical activities that can be interacted with using a single button or switch (set to SPACE BAR). Included are: Berry Forest (pictured below) has you drop berries onto musical leaves in a Bagatelle / Pachinko effect. Lake Swimmer is a one-button Theramin and Lily Pads a frog leaping rhythm affair.

Navigate using the Escape key (A button) and SPACE (B button). JoyToKey not necessary.
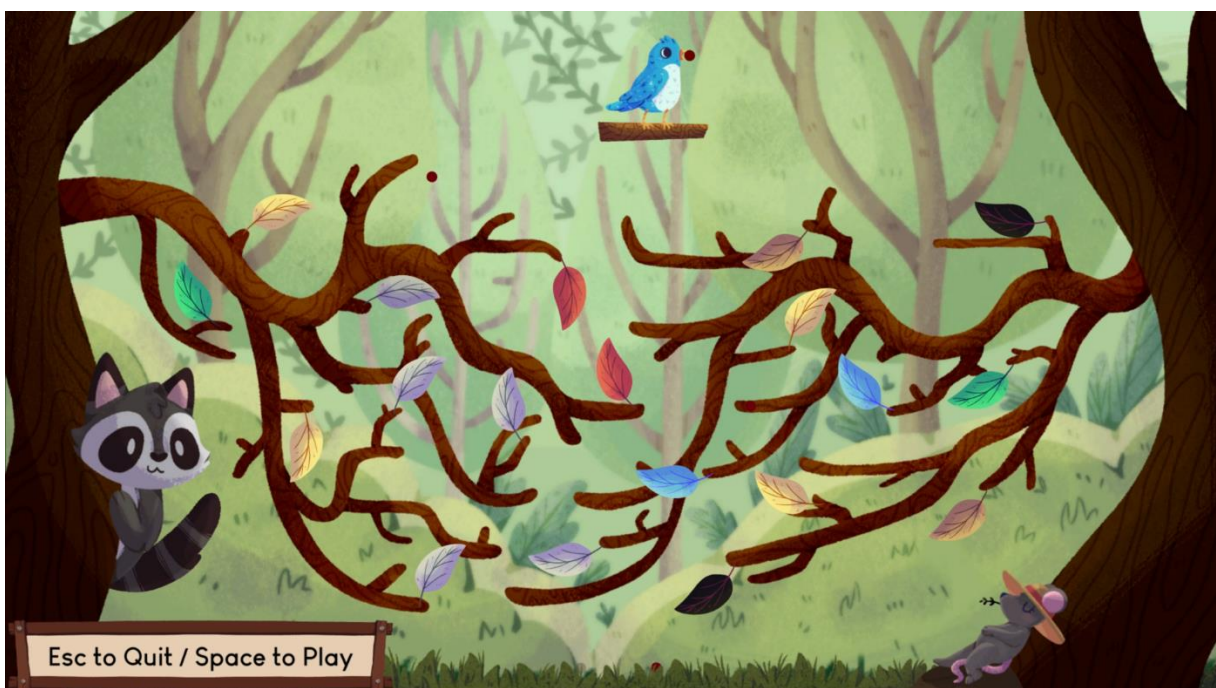
Tink (– **PC DOWNLOAD**

Grid based sequencer. Plant "mines" using a joystick and left-click (or just left-click alone if you click outside the window for the one-switch mode). Backspace to clear the screen.

Change the grid size with "1". "2" cycles through the graphics modes. "4" turns the scan bar on/off.
Up/Down to adjust the tempo. See the Read Me file for more.

The 16 different sounds are all .wav files (e.g. 1.wav to 16.wav) that can be swapped for different sounds.
As with SMLite, sse software like Audacity to record and edit your own .WAV files.
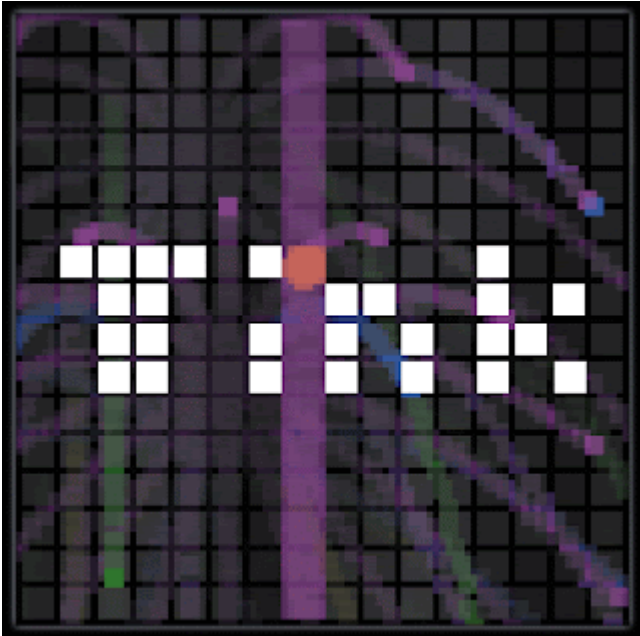
2c. Music software: emulation

Some very unique music creation tools found themselves onto games-consoles and handhelds. Using PC emulation these can be made more accessible for some than they were originally.

See the "Emulation" section here:
https://www.oneswitch.org.uk/art.php?id=148

Fluid (PSone) has a two stage rhythm generator and live performance tool. Quite unlike anything else I've ever seen. Most of the musical instruments stay in tune with one another too.

Music 2000 (PSone) has a 1-4 player Music Jam area.

Electroplankton (Nintendo DS) is a collection of musical toys and sequencers.

Most possible to play using a single "point and tap" stylus. B to go back. SELECT to change. MelonDS works very well for emulation. Some will find the DS itself already very accessible though.
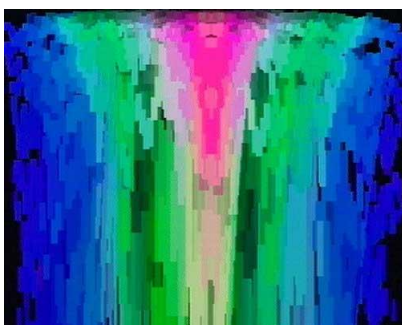
Virtual Light Synthesiser (Atari Jaguar) was originally an interactive visualiser for music CDs. With the new BigPEme emulator it's possible to convert any sound a PC can detect into a light show.

3. MIDI.

MIDI (Musical Instrument Digital Interface) is a connection standard for linking musical devices together. In 1982 this was via round 5-pin DIN plugs. Today it can also be via USB, Bluetooth or purely in software. On a computer you can get access to all sorts of incredible musical sounds, often for free, by delving into the world of DAWs and VST plugins.

A. Digital Audio Workstation (DAW)

Cantabile Lite: https://www.cantabilesoftware.com/free-vst-host perform from a keyboard, mouse or MIDI controller. This free software allows you to import and play VSP plugins.

B. Virtual Studio Technology (VST) plugins

VST plugins can replicate all sorts of fascinating musical instruments and effects.

Crowhill: https://thecrowhillcompany.com/vaults-free-plugin/
Soundpaint: https://soundpaint.com/
Spitfire: https://labs.spitfireaudio.com/
Wires: https://www.audiothing.net/effects/wires/
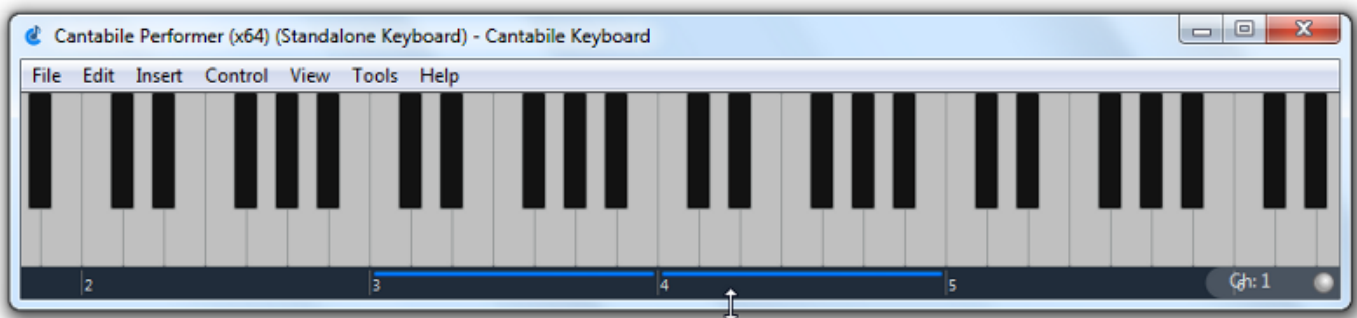
Cantabile has an on-screen keyboard. You can click on notes to play them. If you press F12, you can use your computer keyboard to play notes. And as such, you can use game controllers with the likes of JoyToKey to play too.

Click the blue bar to shift the octave. This is basic, but a good place to start.

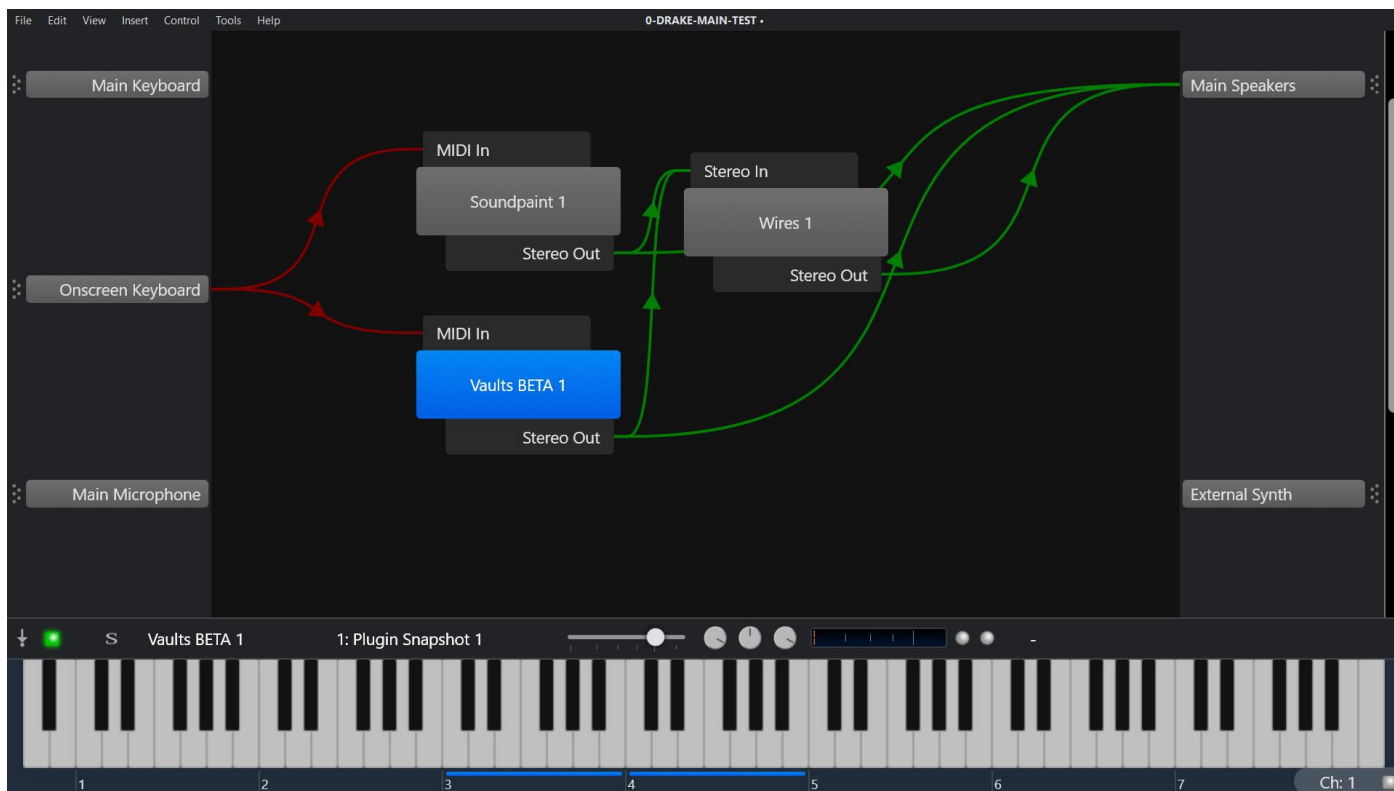**Above shows a map of the Onscreen Keyboard (via F12) linked to two VST plugins (Soundpaint and CrowHill's Vaults) going direct to the speakers, but also into a commercial FX plugin called Wires.**

See also the brilliant EyePlayChords: https://mybreathmymusic.com/en/eye-play-chords with many ideas for playing…
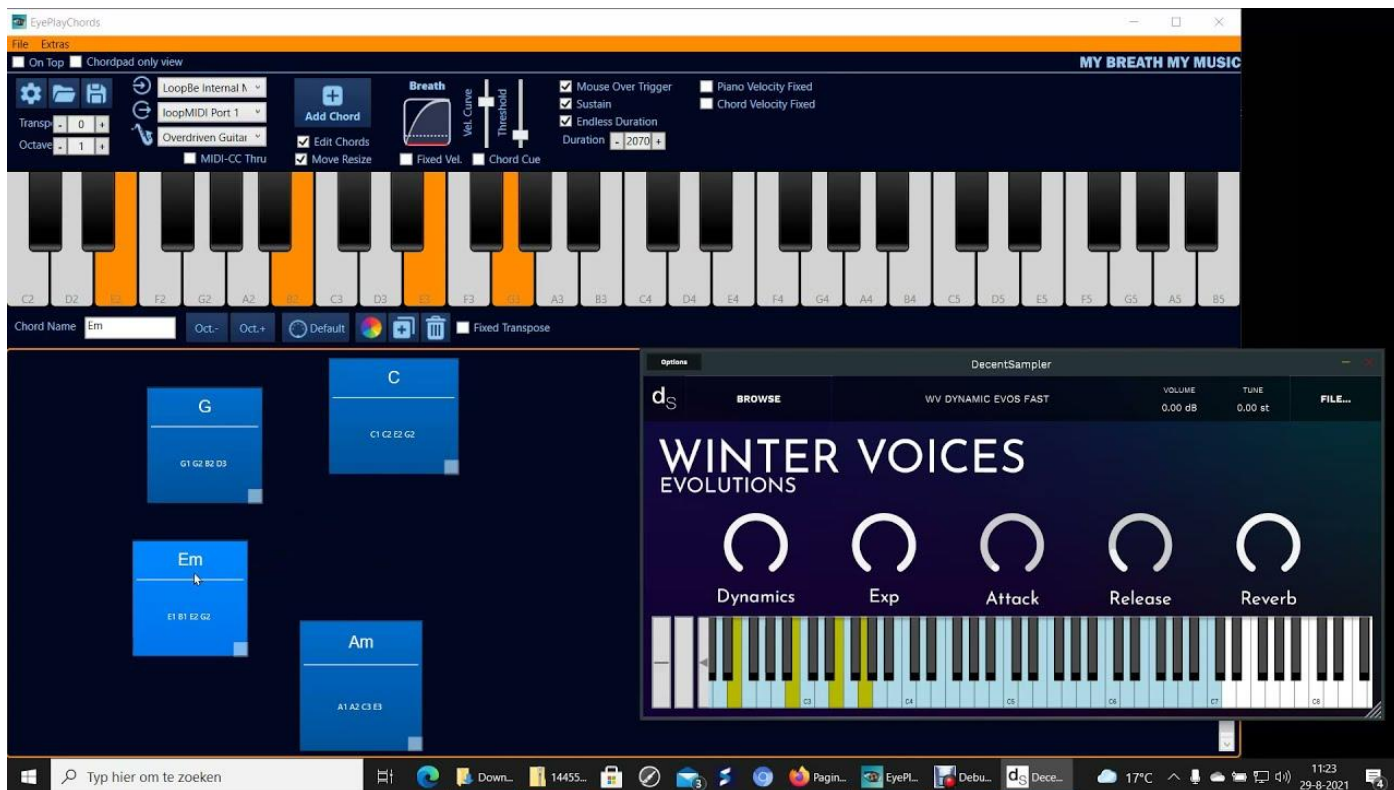
…and My Switch Music: https://mybreathmymusic.com/en/schakelaars from My Breath My Music in the Netherlands.

Connecting MIDI software internally on a single PC:

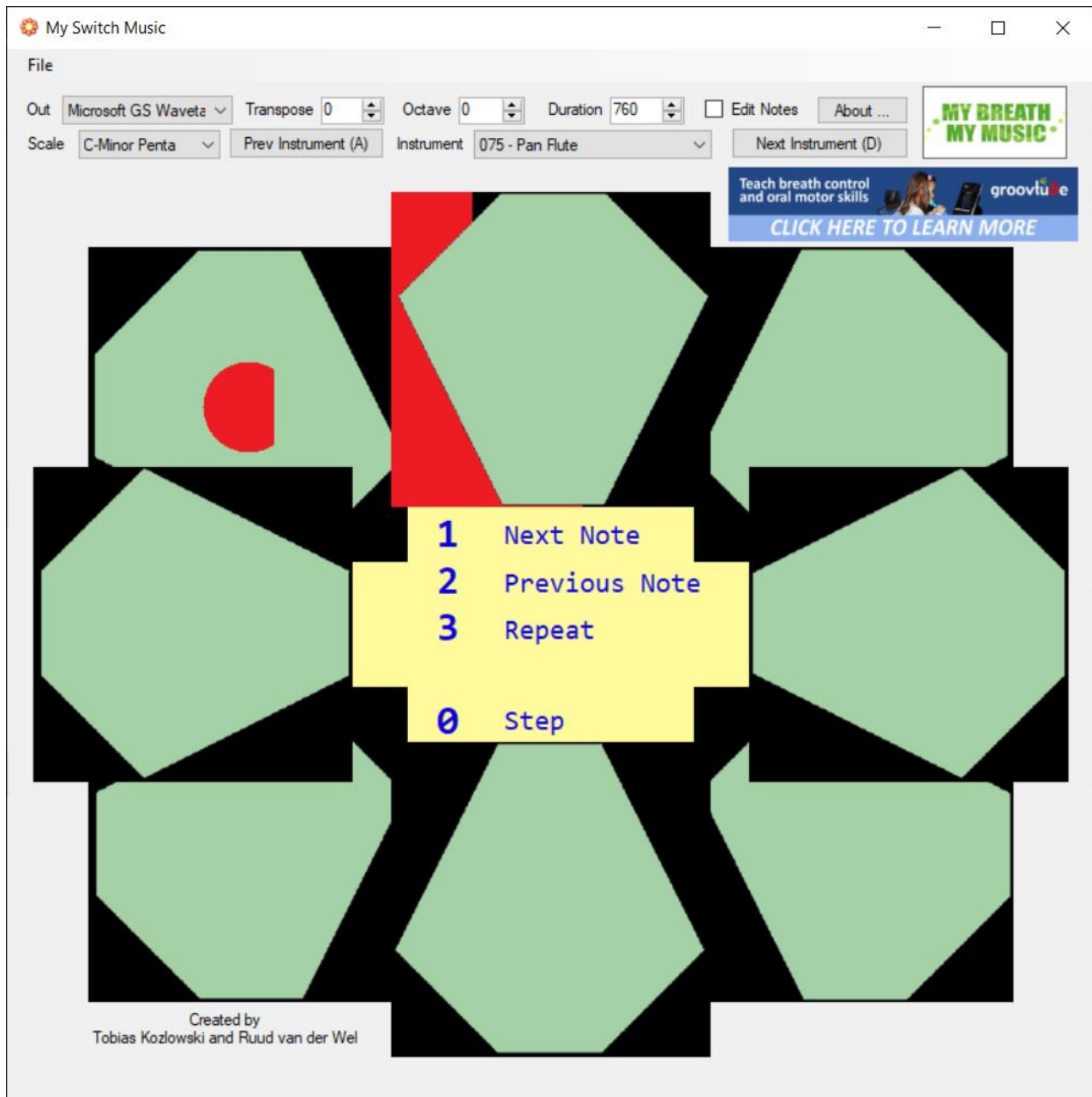If using MIDI compatible software (such as EyePlayChords), you may like to link it to the unlimited sounds possible with a Digital Audio Workstation (DAW). You can do that on a PC using the LoopBe1 free virtual MIDI driver from: https://nerds.de/en/loopbe1.html. Mirror here. No cables required. See also loopMIDI.

Connecting MIDI 5-PIN instruments to a PC:

I can personally ecommend the Tie Studio Midi 1i1o USB MIDI Interface. Around £15 from Gear4Music (Jan 2024).
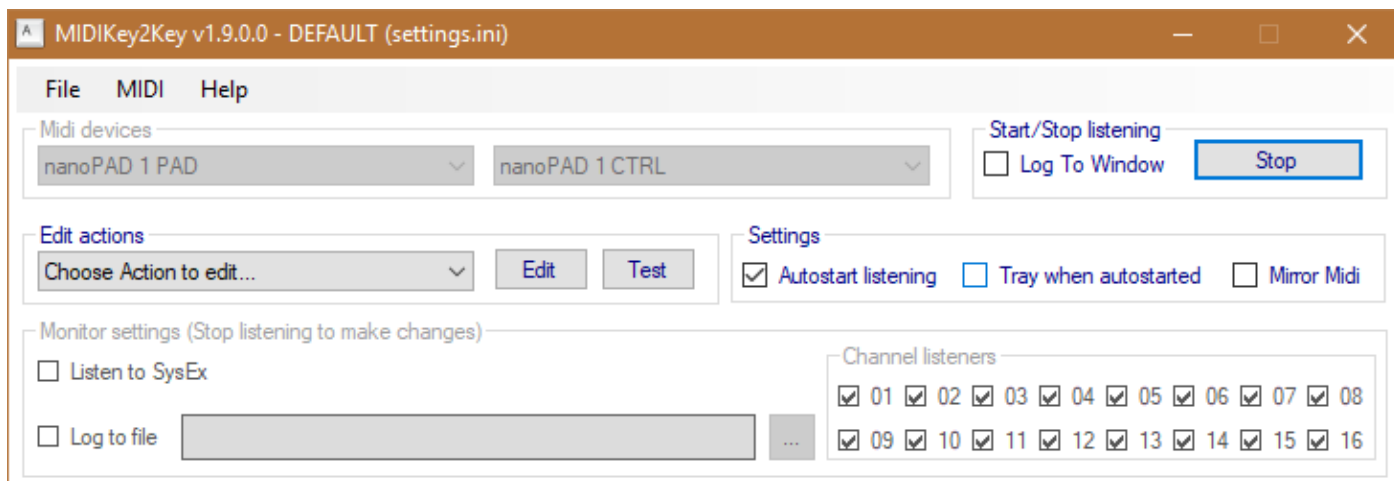
Advanced: Using MIDI instruments to trigger keypresses:

Midikey2Key: https://midikey2key.de/ can run in the back-ground and convert MIDI events to key-presses. This can opens up all sorts of computer control. This even includes playing games (they give an example of a Train Simulator).

Using a suitably configured Titan Two adapter (such as the Game Control Mixer XAC adapter), it's possible to link this set-up to many different game consoles. Back to gaming again.

Just one example of a fascinating MIDI controller that might be suitable includes the Le Strum device: https://six4pix.net/product/lestrum/ that led to these "hacks-du-strum". All can be played with the stylus alone if needed (hold MODE + Em to sustain till change of chord"). Brilliant.

See also the likes of Fego JoystickMIDI which is one of a variety of ways to send MIDI commands from a gamepad. This will not have all the powers of JoyToKey, but may be useful to use alongside it. If you are aware of better methods, please let me know at oneswitch@gmail.com.

4. Extras
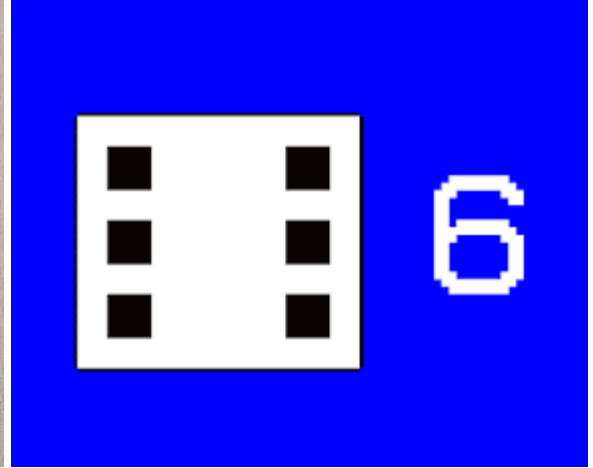
Dice and other random number generators can be used with music creation rules. For someone who finds it difficult to make clear choices, this approach can help. Some examples can be seen on the next page.

Switch accessible dice come in many shapes and sizes:
https://switchgaming.blogspot.com/search/label/dice

A free **on-line system can be found here** for generating random numbers. Use the BREAK and ESCAPE keys to exit/restart. Use a switch set to "1" to select. And a switch set to any key from A-Z to scan.

Helper Non-interventionism:

This is an ideal difficult to achieve, but important to aspire to: To use systems that take all creative influence away from the helper, and give it back to the artist.

YES ✓   NO ✗

FLUID / solo one-switch-musician / DEMONSTRATION SYSTEM 1:

requires: one switch; Playstation; Interface; 'Fluid' CD; Electronic dice (see page "5. Contacts"):

Standardise an image and short sound to always represent the idea of music creation. Present this (and their switch) to the potential artist before starting. If they respond in a positive way carry on:

Ask the musician to roll a die. Strictly follow the corresponding set of rules below:

1. "Drums": Swim to the 'Groove Editor'. Set the speed*. Turn the top 4 tracks on, and the bottom 4 tracks off (as pictured). Give the musician a switch/sensor connected to **L1**. Stop after 5 minutes (use a stop watch).

2. "Play an instrument": Throw 2 dice then go the 'Cruise Stage' with that number (eg. throw a 5, go to "TUBE"). Exit to the 'Groove Editor'. Set the speed*. Turn all 8 sounds off. Exit and swim back into the 'Cruise Stage'. Roll one die. Plug a switch into the corresponding socket:

1= ●; 2 = ●; 3 = ●; 4 = ●; 5 = **select**; 6 = **down** (with ● held down by helper)
N.B. 1-4: Whenever the musician blinks, briefly move the joystick in the direction of their eyes.

3. "Play on others' music": Roll two dice, swim into that 'Cruise Stage'. Roll a die. Refer to instrument selection guide directly above. Stop after 4 minutes (use a stop watch).

4. "Create your own Groove (basic)": Swim to the 'Groove Editor'. Set the speed*. Turn on all 8 tracks. Give the musician **L1** and let them press that switch as many times as they like within a minute, counting down the last 10 seconds. Switch the interface off. Turn all 8 sounds off. Plug the musician's switch into ●. Switch the interface back on. Press down every 10 seconds, whispering "different" as you do (use a stop watch for accuracy). Play for 4 minutes then stop.

5. "1 track experiment": Swim to the 'Groove Editor'. Set the speed*. Turn all the tracks off. Ask the musician to roll one die. Turn that number track on (1-6) (1. bass drum - 6 melody A). Give the musician '**L1**'. Stop after 4 minutes (use a stop watch).

6. Insert your system here!

★ : Setting Beats Per Minute: Roll a die: 1= 80 2= 100 3=110 4=120 5=130 6=150

The system above is just a set of conditions enabling one person to create music in a certain limited way. These rules are in effect the same as those which govern how a musical instrument is made and tuned. Once these are in place, the musician has the freedom to create their own music.

The more systems or instruments a musician has available to them, the greater the scope of music they can create. Experiment creating your own systems, try to make them clearer to the musician, using demonstrable examples. Contact Barrie Ellis (see 5. contacts) for information on my current progress, or to share yours!

Extra ideas:

- Massively broaden the range of sounds from your Playstation by connecting it to an external **multi-effects processor** (available from musical instrument shops). Brilliant with 'Fluid'!
- Add microphone sounds and extra instruments by using a **mixer** or **multi-track recorder**.
- Record CDs of your own music via a PC **CD-Writer**, then distribute them to friends etc.
- Record **MP3** files of your own music using a PC, then download them to internet music sites.

One example from this system is for setting Tempo. Roll a die to decide: 1 = 80, 2 = 100, 3 = 110, 4 = 120, 5 = 130 and 6 = 150 beats per minute with a drum machine: **https://www.oneswitch.org.uk/art.php?id=221**

Apple iOS
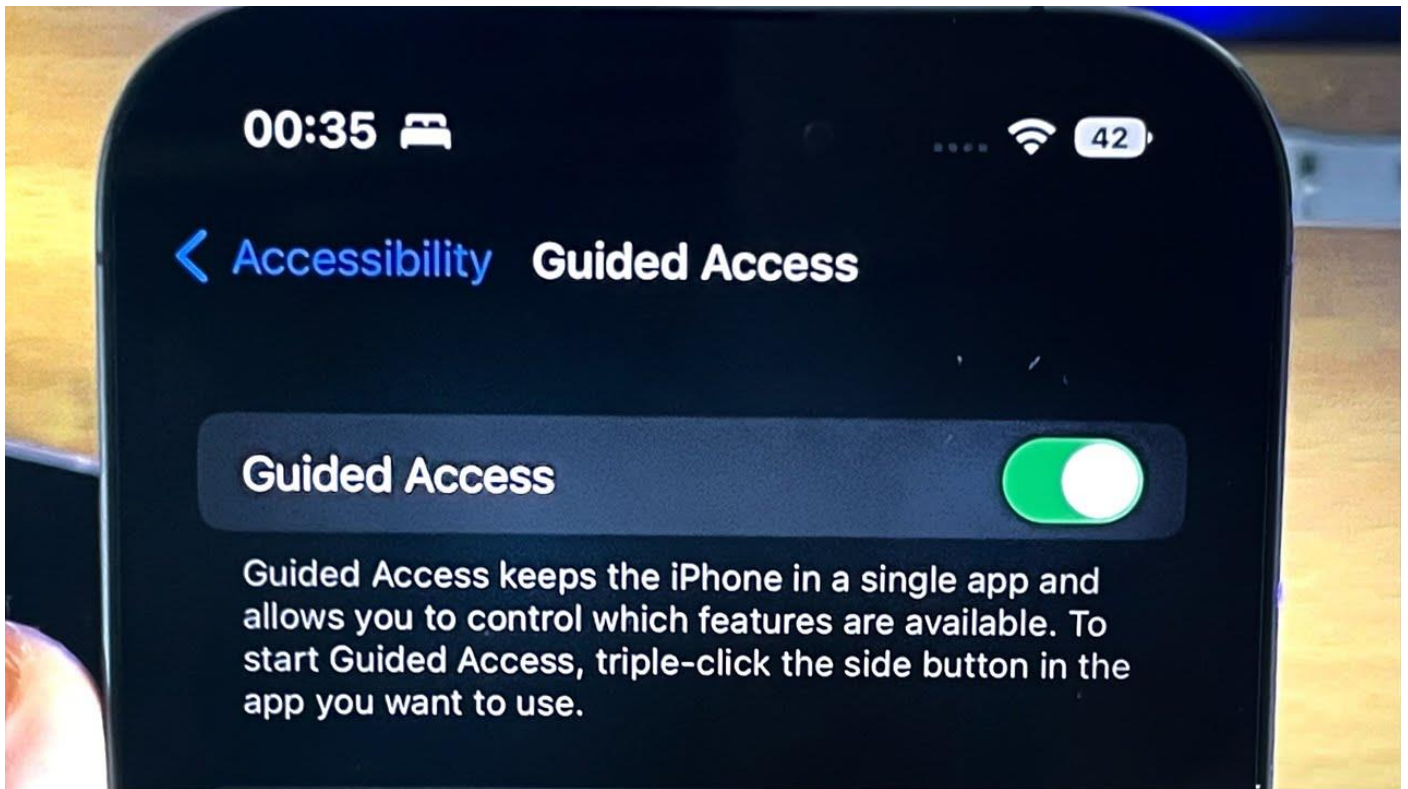
iOS accessibility includes some options that can be very useful for music creation.

iOS Gamepad Mouse to Touch: This is a little bit erratic (Jan 2024), but can be very useful.

Hold at Point: This allows an accessibility switch to press repeatedly at a fixed point on the screen. This allows for the possibility of accurate timing which was impossible before on iOS. It came from **this request** including the Beamz musical app being played with a single switch.

Guided Access: This option can be used to lock a user to a single app, and shield off parts of the screen that are likely to cause confusion. **More info here**.

More at Apple: **https://support.apple.com/en-gb/accessibility**.

Android

For Android use things are a bit less developed, but for almost all , it is possible using a Titan Two adapter to convert gamepads to mouse input like this: **https://www.youtube.com/watch?v=DDxRO8eV0HU**. Depending on the model, it may be possible to do something like this via BlueTooth now. Things are ever changing.

For more help contact oneswitch@gmail.com

Barrie Ellis, OneSwitch.org.uk