

Audio Programming with Chuck

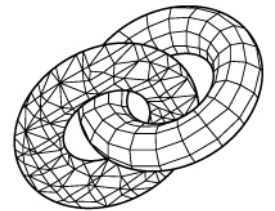
Session 2: MIDI, Chuck Libraries, and Arrays

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Mini-course Schedule

08/01/2019	Session 1: Basics: Sound, Waves, and ChuckK initiation
Today	Session 2: MIDI, ChuckK Libraries, and Arrays
15/01/2019	Session 3: Sound File Manipulation
17/01/2019	Session 4: Functions
22/01/2019	Session 5: Unit Generators and Physical Models
24/01/2019	Session 6: Multi-Threading and Concurrency
29/01/2019	Session 7: Classes and Object-Oriented Programming

Session 2: MIDI, ChuckK Libraries, and Arrays

Live Coding

Introduction to MIDI

Standard Library

Math Library

Panning & Multi-channel Audio

Arrays

Example: make melody

Live Coding

Performing art

On the fly or real-time

Musician(s) + computer(s)

Animation / Video

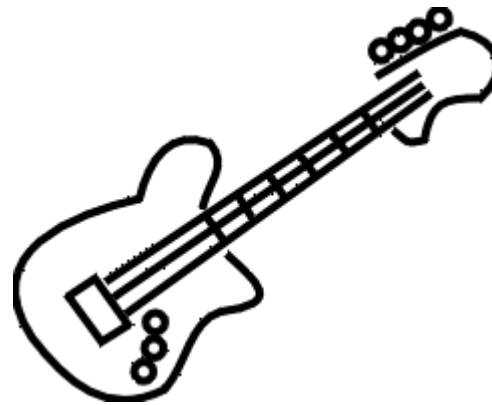
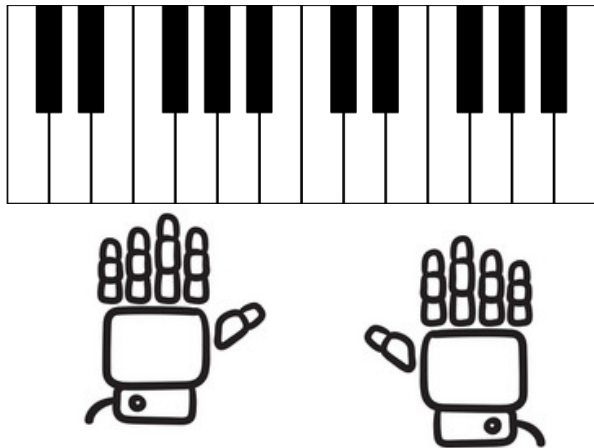
Pedagogical / learning purpose

Robotic Pianos

Andrew Sorensen

Impromptu language \Rightarrow 

Two piano hands + guitar + hi-hat



Original: <https://www.youtube.com/watch?v=yY1FSsUV-8c>

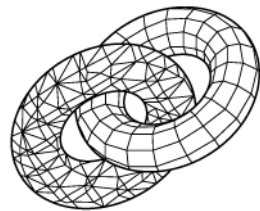
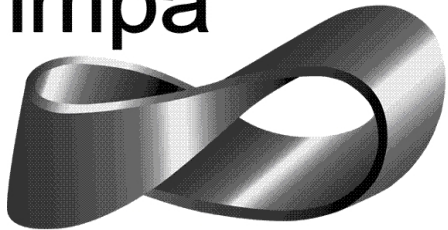
Chuck translation: www.impa.br/~vitorgr/livecode

Live Coding Music Conference

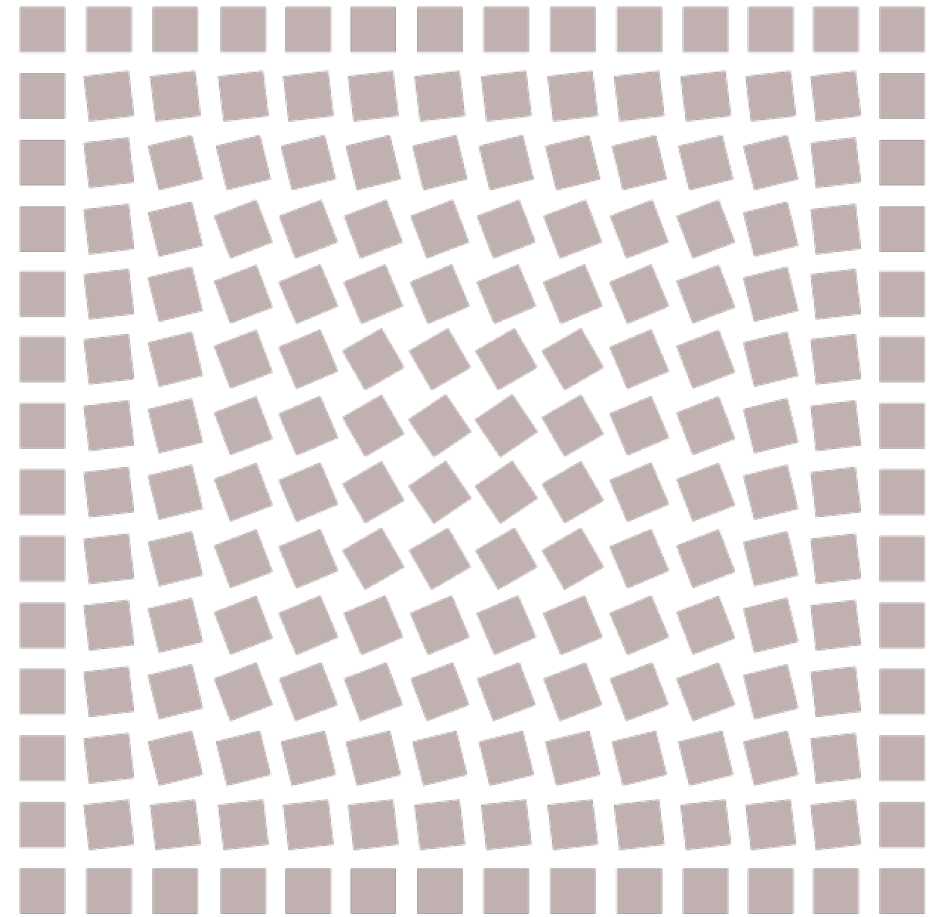
February 4th - 6th 2019

visgraf.impa.br/livecode

impa

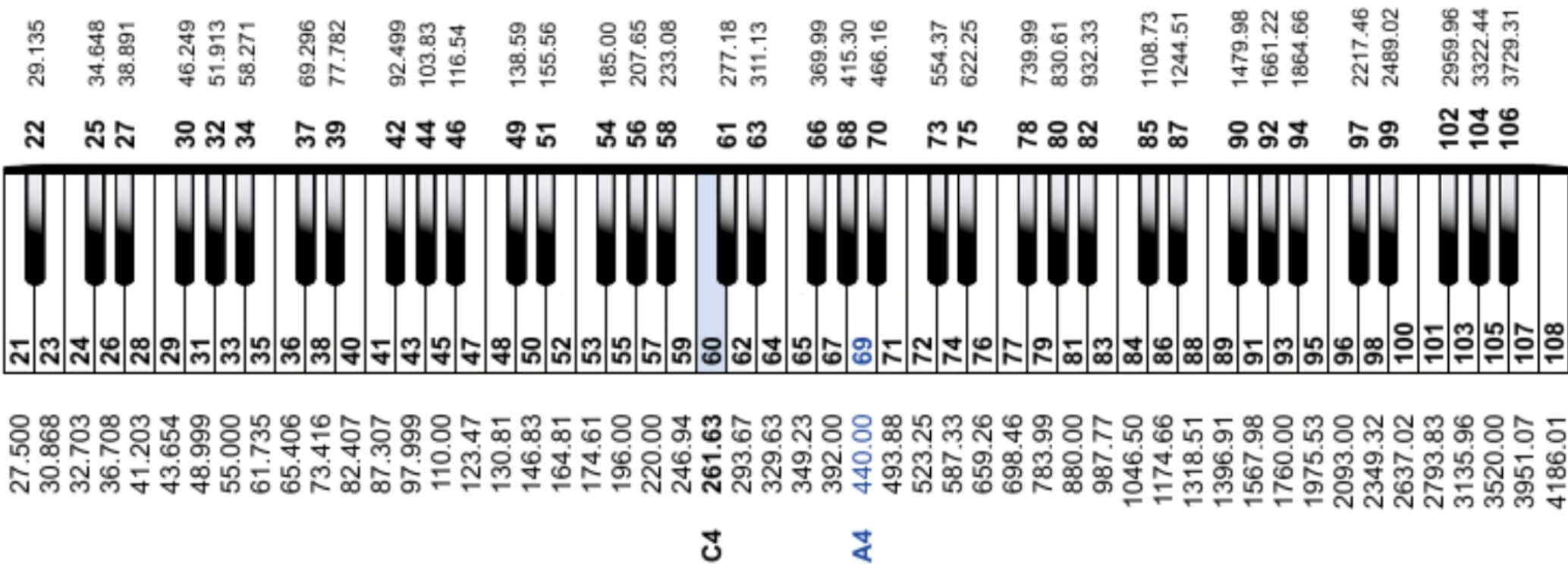


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live => coding music;

MIDI Introduction



Std.mtof() and Std.ftom()

MIDI Introduction

Octave #	Note Numbers											
	C	C#	D	D#	E	F	F#	G	G#	A	A#	B
-1	0	1	2	3	4	5	6	7	8	9	10	11
0	12	13	14	15	16	17	18	19	20	21	22	23
1	24	25	26	27	28	29	30	31	32	33	34	35
2	36	37	38	39	40	41	42	43	44	45	46	47
3	48	49	50	51	52	53	54	55	56	57	58	59
4	60	61	62	63	64	65	66	67	68	69	70	71
5	72	73	74	75	76	77	78	79	80	81	82	83
6	84	85	86	87	88	89	90	91	92	93	94	95
7	96	97	98	99	100	101	102	103	104	105	106	107
8	108	109	110	111	112	113	114	115	116	117	118	119
9	120	121	122	123	124	125	126	127				

Std Library - Unit Conversion

Method	Output	Description
Std. powtodb (float value)	float	Converts signal power ratio to decibels (dB)
Std. rmstodb (float value)	float	Converts linear amplitude to decibels (dB)
Std. dbtopow (float value)	float	Converts decibels (dB) to signal power ratio
Std. dbtorms (float value)	float	Converts decibels (dB) to linear amplitude
Std. atoi (string value)	int	converts ascii (string) to integer (int)
Std. atof (string value)	float	converts ascii (string) to floating point value (float)
Std. itoa (int value)	string	converts integer(int) to ascii (string)
Std. ftoa (float value)	string	converts floating point value (float) to ascii (string)

Math Library – Random Numbers

`Math.random()`

int

`Math.random2(int min, int max)`

in between int

`Math.randomf()`

float in the range [0,1]

`Math.random2f(float min, float max)`

in between float

`Math.srandom(int)`

Math Library

Method	Output	Description
Math. sin (float x)	float	computes the sine of x
Math. cos (float x)	float	computes the cosine of x
Math. tan (float x)	float	computes the tangent of x
Math. asin (float x)	float	computes the arc sine of x
Math. acos (float x)	float	computes the arc cosine of x
Math. atan (float x)	float	computes the arc tangent of x
Math. atan2 (float x, float y)	float	computes the principal value of the arc tangent of y/x
Math. sinh (float x)	float	computes the hyperbolic sine of x
Math. cosh (float x)	float	computes the hyperbolic cosine of x
Math. tanh (float x)	float	computes the hyperbolic tangent of x

Math Library

Method	Output	Description
Math. hypot (float x, float y)	float	computes the euclidean distance of the orthogonal vectors (x, 0) and (0,y)
Math. pow (float x, float y)	float	computes x taken to the y-th power
Math. sqrt (float x)	float	computes the nonnegative square root of x
Math. exp (float x)	float	computes e^x , the base-e exponential of x
Math. log (float x)	float	computes the natural logarithm of x
Math. log2 (float x)	float	computes the logarithm of x to base 2
Math. log10 (float x)	float	computes the logarithm of x to base 10

Audio Panning

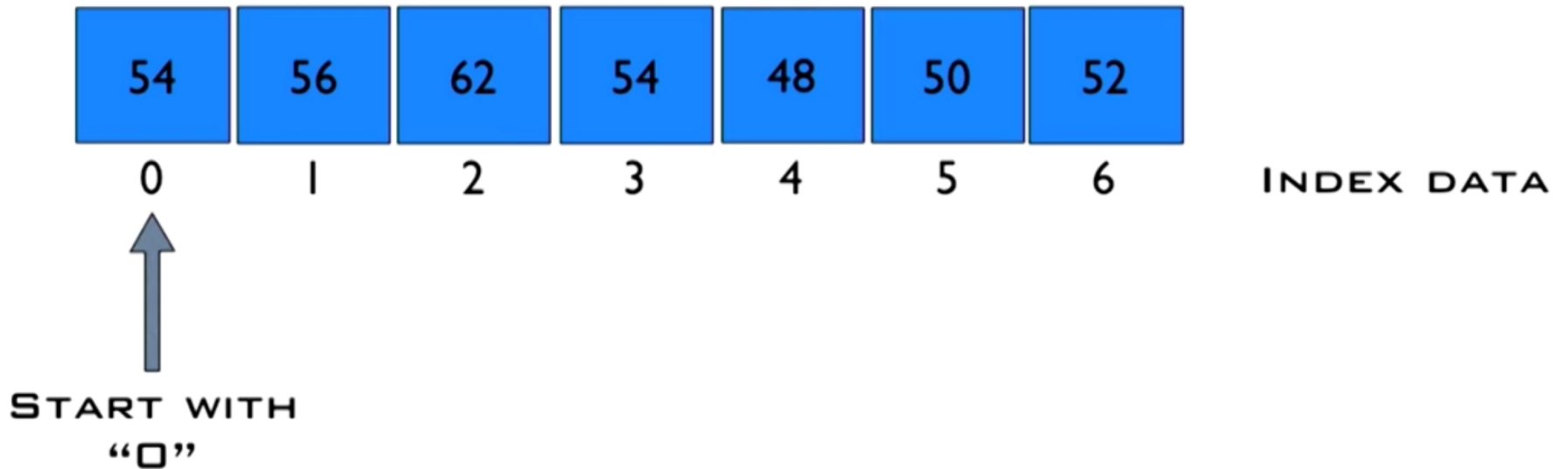
`dac.left & dac.right & dac.chan(int)`

`Pan2` `[-1.0, 1.0]`

`Math.sin(float x)`

Arrays

Block of memory stringed together used to make a “list” or “group” of data.



Array Loop

```
<<< A.cap() >>>;
```

```
for(0 => int i; i < A.cap(); i++){ ...
```

Make Melody

Homework: make your own melody

Arrays with the same length => figure out with
different lengths