Glove Synthesizer Project Proposal

Nathan Bryant with N. Sayre, J. Peirce, and A. Alavi

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Team formation

Our group of four consists of Nicholas Sayre, Steve Peirce, Ali Alavi, and Nathan Bryant. We formed as two groups of two in week one. Bryant and Sayre having worked together previously and Alavi and Peirce. In week two we formed a single group and scheduled several brain storming meetings and one exploratory trip to Surplus Gizmos for a cost of goods estimates.

One of our first priorities was to agree on our selection criteria. We readily agreed that the two most important criteria for our group was (a)out of pocket cost and (b)our personal interest/ excitement in/ toward the project idea. Using the ranking system on page 21 of the text we were able to then assign the values for the rest of the criteria as follows; interest and cost being moderately more important than time requirements, and strongly more important than novelty.

Project ideas

Over the course of several meeting we brainstormed multiple ideas just to get the following starting list.

1. Control Process for a thermal evaporator -Sayre
   The thermal evaporator in FAB 60-12 need an updated/ automated control panel to control vacuum, valves, pumps and gages.

2. Tesla Touchpad -Alavi
   Using a touchscreen device like an old Android phone and apply extra current to the capacitive screen creates a tactile response system. We would then create physical pictures or perhaps even a maze game for touch.

3. 20 Questions Game -Bryant
   Using an I^2C driven LCD screen and the MCU memory to create a fun, snarky version of a 20 questions game.

4. Path Finding Robot -Bryant
   Using cheaply obtained RC cars and senors to showcase and contrast several path-finding algorithms.

5. Ambient Frequency Visualizer -Peirce
   Using a TI quadrature chip to detect several ambient frequencies in the room and then creating some form of display to show and compare the magnitude.

6. Laser Light Show -Sayre
   Create vector graphics system using up to 3 lasers and galvos. We could then program several key sequences and a method of interaction.

7. Ultra-sonic Tape Measure -Alavi
   Using ultrasonic sensors to create a digital tape measurement system.

8. Bit Crusher/ Synthesizer -Bryant/ Sayre
   Creating an 8-bit audio synthesizer with sound effects created by bit crushing.

In the final decision meeting we narrowed our choices down to four (5-8) by rejecting ideas as follows. 1. for complexity, undefined scope and difficulty demonstrating. 2. Start up cost of obtaining 4 touch screens. 3 and . General lack of group interest.

AHP; Weighted Decision Matrix

team; great_411_practicum

Members: A. Alavi, N. Bryant, J. Peirce, N. Sayre

BCS= Bit Crusher/ Synth

USM=Ultra Sonic Measure

AFV=Ambient Frequency Visualization

LLS= Laser Light Show

NOTE: Interest was determined by vote

Pairwise compairison of selection criteria

	Cost	Time	Novelty	Interest	GeoMean	Weight
Cost	1	3	5	1	1.97	0.39
Time	1/3	1	3	1/3	0.76	0.15
Novelty	1/5	1/3	1	1/5	0.34	0.07
Interest	1	3	5	1	1.97	0.39
				Sum	5.04	1.00

Pairwise novelty evaluation

	BCS	USM	AFV	LLS	GeoMean	Weight
BCS	1	3	1/3	1	1.00	0.20
USM	1/3	1	1/5	1/3	0.39	0.08
AFV	3	5	1	3	2.59	0.52
LLS	1	3	1/3	1	1.00	0.20
				Sum	4.98	1.00

Pairwise cost evaluation

	BCS	USM	AFV	LLS	GeoMean	Weight
BCS	1	1	5	9	2.59	0.43
USM	1	1	5	9	2.59	0.43
AFV	1/5	1/5	1	3	0.59	0.10
LLS	1/9	1/9	1/3	1	0.25	0.04
				Sum	6.02	1.00

Pairwise interest evaluation

	BCS	USM	AFV	LLS	GeoMean	Weight
BCS	1	3	3	1	1.73	0.38
USM	1/3	1	1	1/3	0.58	0.13
AFV	1/3	1	1	1/3	0.58	0.13
LLS	1	3	3	1	1.73	0.38
				Sum	4.62	1.00

Pairwise time evaluation

	BCS	USM	AFV	LLS	GeoMean	Weight
BCS	1	1/3	3	5	1.50	0.25
USM	3	1	5	9	3.41	0.58
AFV	1/3	1/5	1	3	0.67	0.11
LLS	1/5	1/9	1/3	1	0.29	0.05
				Sum	5.87	1.00

Pairwise cost evaluation

	Weight	BCS	USM	AFV	LLS
Cost	0.39	0.43	0.43	0.10	0.04
Time	0.15	0.25	0.58	0.11	0.05
Novelty	0.07	0.20	0.08	0.52	0.20
Interest	0.39	0.38	0.13	0.13	0.38
Score		0.37	0.31	0.14	0.18

Project proposal

Needs Statement: Dunderheads Misfits and Cretins inc. recently identified through survey that 3 out of 5 MIDI users and hobbyists desire more freedom of movement, feeling tied to their computers. Additionally DMC inc. found that 50% of those users that had identified themselves as dissatisfied, also expressed the desire to have a portable device for practicing and performing music on the go.

Objective: The objective of this project is to create a self-contained virtual synthesizer capable of producing multiple effects like bit crushing, delay, distortion and tone controls in addition to producing at least two octaves of simple tones. Our proto-concept device is packaged as a glove (similar to a Nintendo Power Glove) and will use the Atmel Atmega328 (microcontroller). The entire system will create digital tones and effect as well as use analog to digital conversion at 8 bit resolution. It may additionally accept an audio jack input and will have an output to a speaker (actuator). The system will also output signals based on the input of buttons and dials (sensors) contained on the hand-glove interface.