CSCE 489 SPRING 2008 – UNL
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DANCING ROBOTS!

Final Report

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Overview

- Dancing Robots! Goals
- Competitor Designs
- Dancing Robots! Design
- Dancing Robots! Demo
- Cost
- Vision
- Conclusions

Dancing Robots! | Goals

- Educational Toy
- Music and Technology
- Relatively Cheap
- Anthropomorphic

Competitor Designs | Beatbots

- BeatBots (Keepon)
  - Reacts to Music
  - Limited Actions
  - It's a Ball
  - Not Programmable

Source: BeatBots.org

Competitor Designs | I-Dog

- I-DOG
  - Cheap - $20
  - Reacts, not intelligently
  - Limited Actions
  - Not Programmable

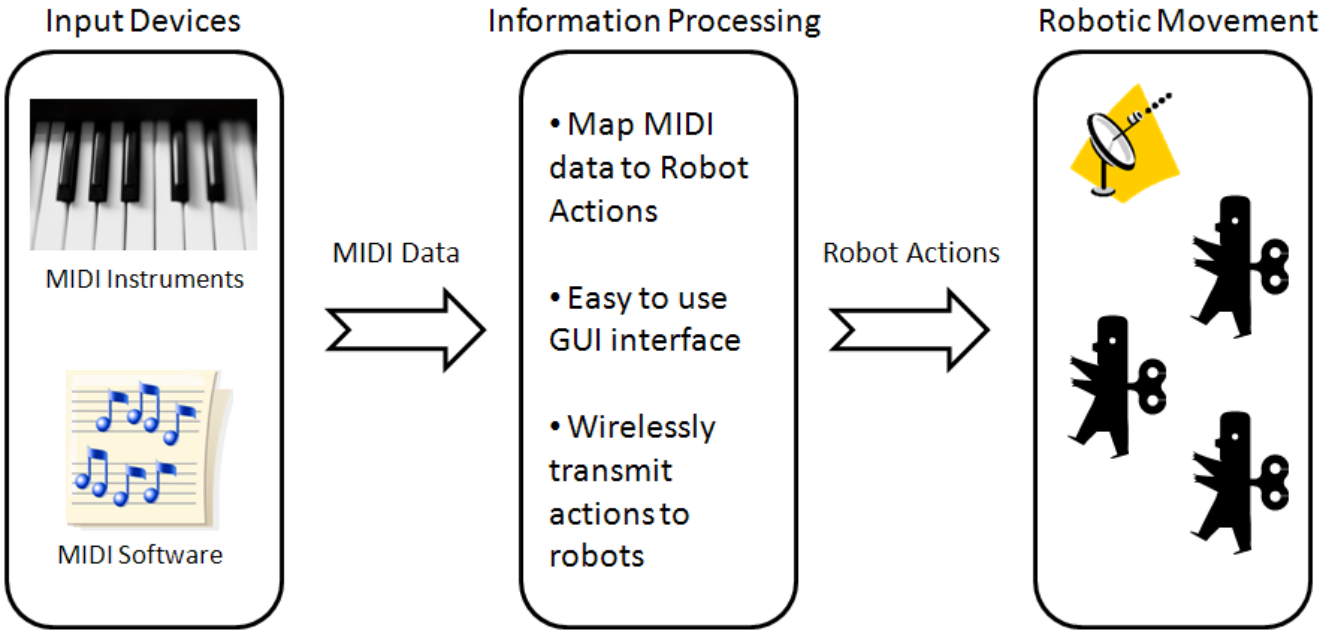
Source: Tiger Electronics

Competitor Designs | SDR

- Sony Dream Robot (SDR)
  - Expensive - $60k-80k
  - Programmable
  - Reacts to Music/People
  - Anthropomorphic

Source: Sony

Dancing Robots! | Design



Design | Music

- Software interpreted
  - No filters, hardware necessary
- Live and saved performances
- MIDI
  - Keyboards, synthesizers
  - Extensive libraries
  - Well-defined digitized format

Design | Hardware

- Robot
  - Want many available actions
  - Multiple degrees of freedom
  - Robosapien
- Wireless Communications
  - Clear up clutter
  - Scalability
  - Bluetooth with BlueSMiRF/BasicStamp

Source: WowWee Ltd.

Design | Software

- Support multiple modes of operation
  - Manual
  - Automatic
- Fully map between music and dancing
- Listen/Repeat Game
  - Simon Says

Dancing Robots! | Demo

- Goal: Dance to a song
- Load song
- Split into segments
- Assign actions
- Dance

Dancing Robots! | Demo

- Load a song
  - "Town" from Microsoft Windows
- Show in piano roll
  - Rows = notes
  - Columns = time
  - Colors = tracks

Dancing Robots! | Demo

- Split song into segments
  - Add breaks in piano roll
- Why segments?
  - Reactivity
  - Teaching tool
    - E.g. chorus, verses

Dancing Robots! | Demo

- Assign actions
  - Both robots
  - Multiple degrees of freedom
- System memorizes choices
  - Tailor to users
  - Score after performances
  - Thumbs up or down

Dancing Robots! | Demo

- Automate segmentation
  - Grouper from CMU
  - Rule-based
- Automate action selection
  - Random
  - Learned
    - Max score and fill

Dancing Robots! | Demo

- Dance!

Dancing Robots! | Demo

- Listen/Repeat Game
  - Teacher plays, student repeats
  - Piano teachers
- Dance based on accuracy
  - Correct, close, wrong

Dancing Robots! | Cost

- Actual Cost
  - $140 per robot
- Projected Manufacturing Cost
  - $70 per robot
- Projected Market Price
  - $100 per robot

Component	Our Cost
Robot (Robosapien)	$50
Bluetooth (BlueSMiRF)	$65
Microcontroller (BS2)	$20
Batteries ((4) D cells)	$5
	$140

Dancing Robots! | Vision

- Dancing Robots! 2.0
  - Improve interoperability
    - USB controllers
  - Interrupt driven microcontroller
    - Save power
  - Direct Connection to Internal Servos
    - Reaction / Actions

Conclusion

- Dancing Robots!
  - Educational yet fun
  - Very programmable
  - Many actions
  - Interactive with users
  - Relatively cheap

Questions?

Acknowledgments

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