Dancing Driving Robots (DDR)

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Summary

DDR is a time-trial based game in which a user interacts with a GUI and Leap Motion to control an iRobot.

If you can travel the goal distance before the song ends, then you win. Else you lose!

Inspired by popular arcade game: Dance Dance Revolution
Demo Time!
How it works

User & Leapmotion
GUI
Laptop Bluetooth Transmitter
BlueSMiRE
mbed
iRobot
The Leap Motion and GUI

Leap Motion is a motion sensor that sends data to a computer via USB.

Using this data and the Leap Motion Python SDK, we constructed the GUI
The iRobot

**iRobot Navigation State Chart**

Init / currSpeed := 0

Goal := goalDist

GameOver OR victory / currSpeed := 0

drive / currSpeed := speed, currDirection := direction

Inputs: init: pure
        drive: pure
        gameOver: pure
        speed: [Forward, Backward, absent]
        direction: [Forward, Backward, absent]
        victory: [true, false, absent]
        goalDist:

Outputs: None

Design inspired by: http://developer.mbed.org/cookbook/iRobot-Creat-Robot
Communication

Packet transmission via Bluetooth
   Created custom Bluetooth protocol for transactions

Packets formatted as such:
[OpCode] [Packet ID] [Packet Data] [Checksum]

Transmitter code in GUI, uses LightBlue – Bluetooth API

Receiver code on mbed uses mbed API to read serial data from BlueSMiRF

Transmission latency ~ 34ms
Overall System Model

Synchronous Composition

Inputs: song: {Fireflies, Head Over Heels, absent}
method: pure
gameOver: pure
quit: pure

Continuous Variables:
currSpeed: Z
currDirection: {Forward, Backward, absent}

Reaction latency ~78 ms
Issues Raised

Where to do distance calculation?

Faulty iRobot clock

Commanding the iRobot Create

ISR
Where do we go from here?

Increase user experience
- smarter scoring algorithm
- notes appearing in rhythm, not just each quarter note

Perform distance calculations on mbed/iRobot
- decreases computation on GUI
- can do through multithreading

Multiplayer experience?
- need multiple systems
- single system with split screen and two robots would require more calculations on GUI
Questions?