Turn Taking with Blumps

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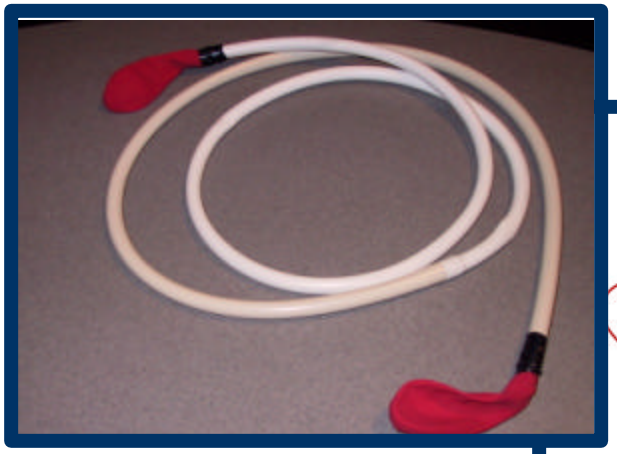
Problem Space

- Turn taking a problem in teleconferencing
- Delays
- Lack of body language
- Need cues
- Need to be subtle and discreet
- Otherwise unsolicited interruptions lead to poor user experience and bad feeling

Initial Idea: Volume

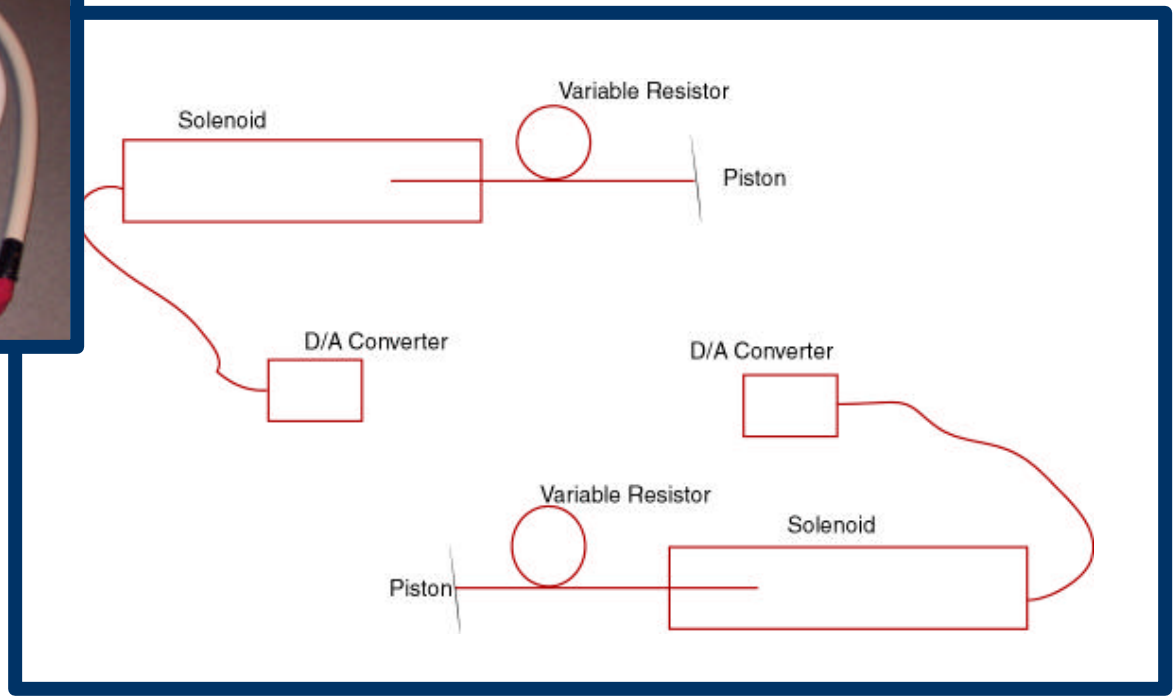
- Transmit discreet cues
- Need range of expression
- Balloon blumps – two balloons on a piece of tubing
- Physical transmission of volume change
- Use a solenoid assembly to actuate volume change
- Variable resistors to measure change
- D/A converters to transmit resistance value

First Sketches



Prototype Volume Version

Operational Sketch for Analogue Volume Version



Volume to Vibration

- Volume version can be difficult
- Time constraints
- Electrical vibration solution easier to implement
  - Variable resistor – conductive foam
  - Crickets – easy to program, built in DA, modular
  - Substitute vibration for volume change
  - Wireless based scalability – (Infra Red)

Prototype: Idea

- Resistance change in one handset affects vibration in other handset
- Hence strength of grip translates to vibration
- D/A converter on cricket converts it to series of digits
- Digits to IR
- At Rx – IR to digits to vibration intensity

Prototype: Pictures

Prototype: Details

- Hand Grip
- Resistive Foam
- Vibration
- Small motor with offset weight
- Cricket – acts as D/A and A/D at each end and Tx/Rx

Prototype: Cricket Code

```
global [temp squeeze vibrate time]

    to take_turn
            if sensorb [ beep ]
            b, setpower 3 onfor 1
            when [newir?] [
                        setvibrate ir
                        setpower vibrate
              ifelse vibrate > 1 [
                                  settime vibrate / 2
                        ] [
                                  settime 1
                        ]
                        b, onfor time
            ]
            loop [
                        setsqueeze sensorb
                        settemp squeeze

                        if squeeze > 80 [

                        setsqueeze squeeze / 20
                        setsqueeze squeeze - 3
                        send squeeze

                        ]
            ]
    end
```

Results Encouraging!

- Initial trials limited to line of sight trials
- Group was limited to three - number of prototypes
- People learned to use it intuitively
- Concept works

Problems

- Design
  - General - construction, durability
  - Coverings - foam, cloth? – influences approach and emotional response, affects grip, dampens vibration
  - Range - IR makes it short distance - line of sight
- If the number of participants is high, formal moderation will still be desirable

Future

- Internet capability – ability to have blumps in different locations
- Add wireless chips to enable non line of sight operation and hence discreet
- From portable to wearable?
- Deployment and field trials