with((in)(out)) collaboration between 4 artists

- tracy hill
- dan wilkinson
- matthew birchall
- tao lashley-burnley
manifold exhibition

• group show at the pyramid art centre warrington
• the 4 artists plus magda stawarska-beavan
the piece

• sonic hemispheres
• projection mapping
• sensor based a/v changes in a gallery context
• unique experience in the gallery
• voyeur vs participant
sonic hemispheres

• sound behaves very differently when your head is inside a hemisphere
• as you move your head around, the sound changes, as reflections become localised and amplified
• the transducer is attached to the hemisphere and acts as a speaker cone
• certain resonances are hugely amplified through the sonic characteristics of the hemispheres
the technology

- passive infrared sensor (pir) detection sensors
- sonic hemispheres that have inbuilt transducers
- arduino microcontroller
- max-msp – visual programming
- resolume – projection mapping software
ultrasound sensors

• initially ultrasound range-finding sensors were used (the HC-SR04)
• the sensors proved to be too sensitive
• and needed smoother power than could be supplied over long cables
• sensors were changed to standard pir sensors
• low power and consistent
• and needed smoother power than could be supplied over long cables
6 sensors connected to an arduino microcontroller
surface transducers

• transducers are connected directly to the hemispheres, thus making the hemisphere akin to a speaker cone
amplifiers

- 20w amplifiers
- digital or analogue (controls)
setup
// input pins (for PIR sensors)
int inputPin1 = 3;
int inputPin2 = 4;
int inputPin3 = 5;
int inputPin4 = 6;
int inputPin5 = 7;
int inputPin6 = 8;

// variables for reading the pin statuses
int val1 = 0;
int val2 = 2;
int val3 = 4;
int val4 = 6;
int val5 = 8;
int val6 = 10;

void setup() {
    // declare sensor inputs
    pinMode(inputPin1, INPUT);
    pinMode(inputPin2, INPUT);
    pinMode(inputPin3, INPUT);
    pinMode(inputPin4, INPUT);
    pinMode(inputPin5, INPUT);
    pinMode(inputPin6, INPUT);
}
```cpp
Serial.begin(9600);

void loop()
{
  val1 = digitalRead(inputPin1);
  if (val1 == HIGH) {
    Serial.println("1");
  } else if (val1 == LOW) {
    Serial.println("0");
    delay(5);
  }

  val2 = digitalRead(inputPin2);
  if (val2 == HIGH) {
    Serial.println("3");
  } else if (val2 == LOW) {
    Serial.println("2");
    delay(5);
  }

  val3 = digitalRead(inputPin3);
  if (val3 == HIGH) {
    Serial.println("5");
  } else if (val3 == LOW) {
    Serial.println("4");
    delay(50);
  }
}
```

```c
//sensor 4
val4 = digitalRead(inputPin4);
if (val4 == HIGH) {
  Serial.println("7");
} else if (val4 == LOW) {
  Serial.println("6");
  delay(50);
}

//sensor5
val5 = digitalRead(inputPin5);
if (val5 == HIGH) {
  Serial.println("9");
} else if (val5 == LOW) {
  Serial.println("8");
  delay(50);
}

//sensor6
val6 = digitalRead(inputPin6);
if (val6 == HIGH) {
  Serial.println("11");
} else if (val6 == LOW) {
  Serial.println("10");
  delay(50);
}
```

max-msp project
with((in)(out))