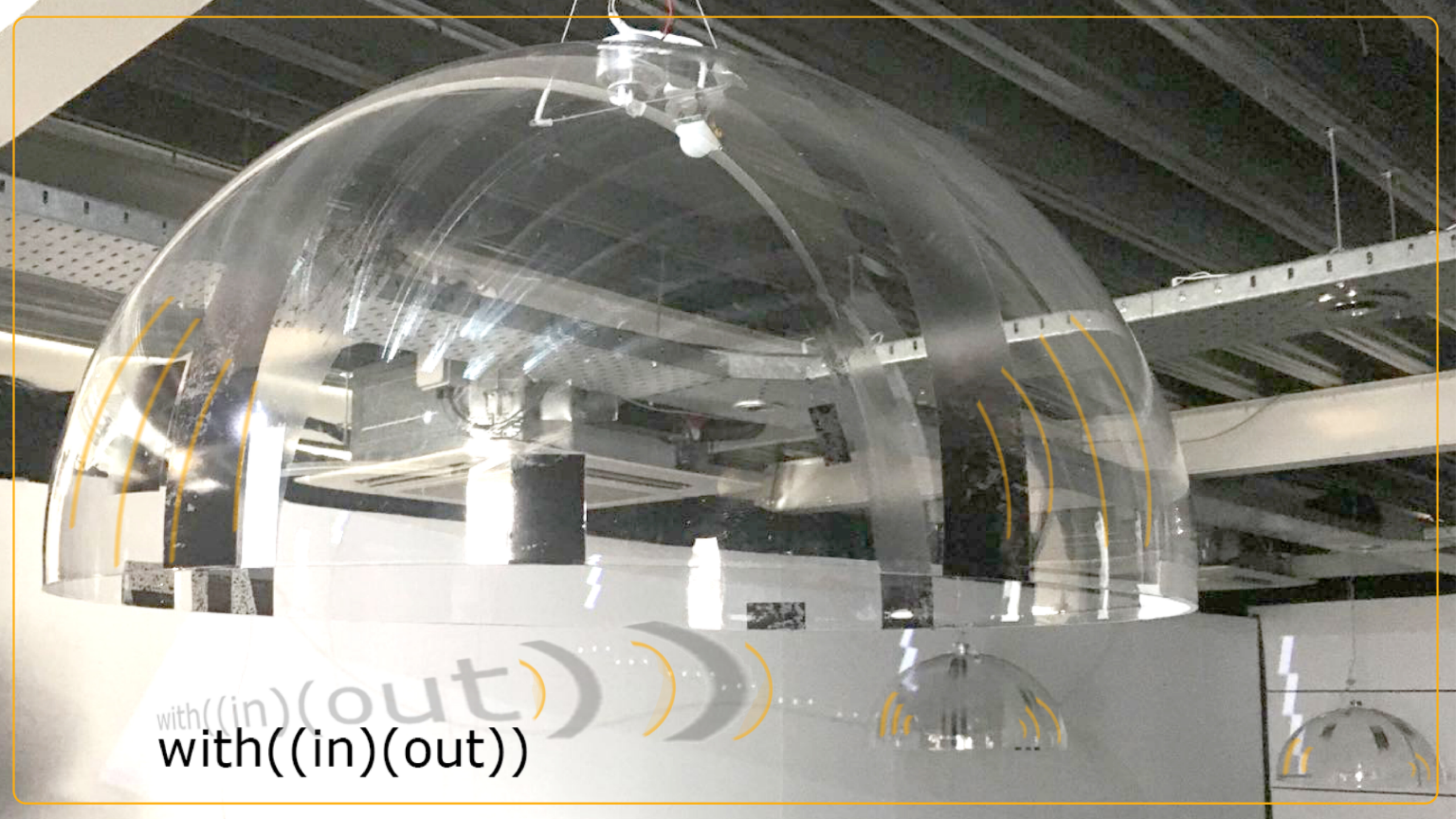

with((in)(out))

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

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

manifold exhibition

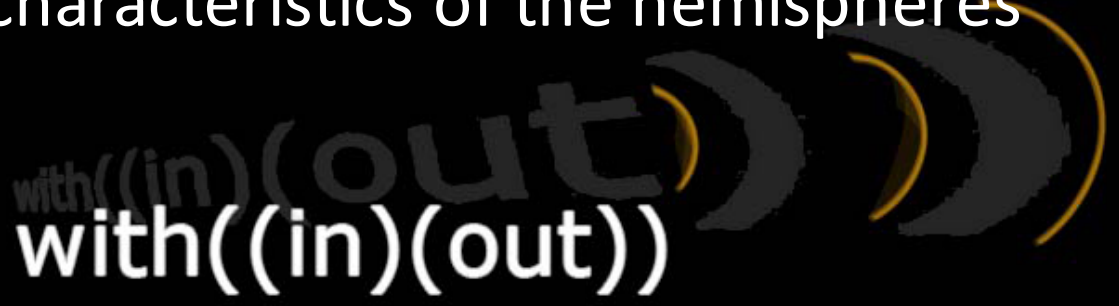
- group show at the pyramid art centre warrington
- the 4 artists plus magda stawarska-beavan

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

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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

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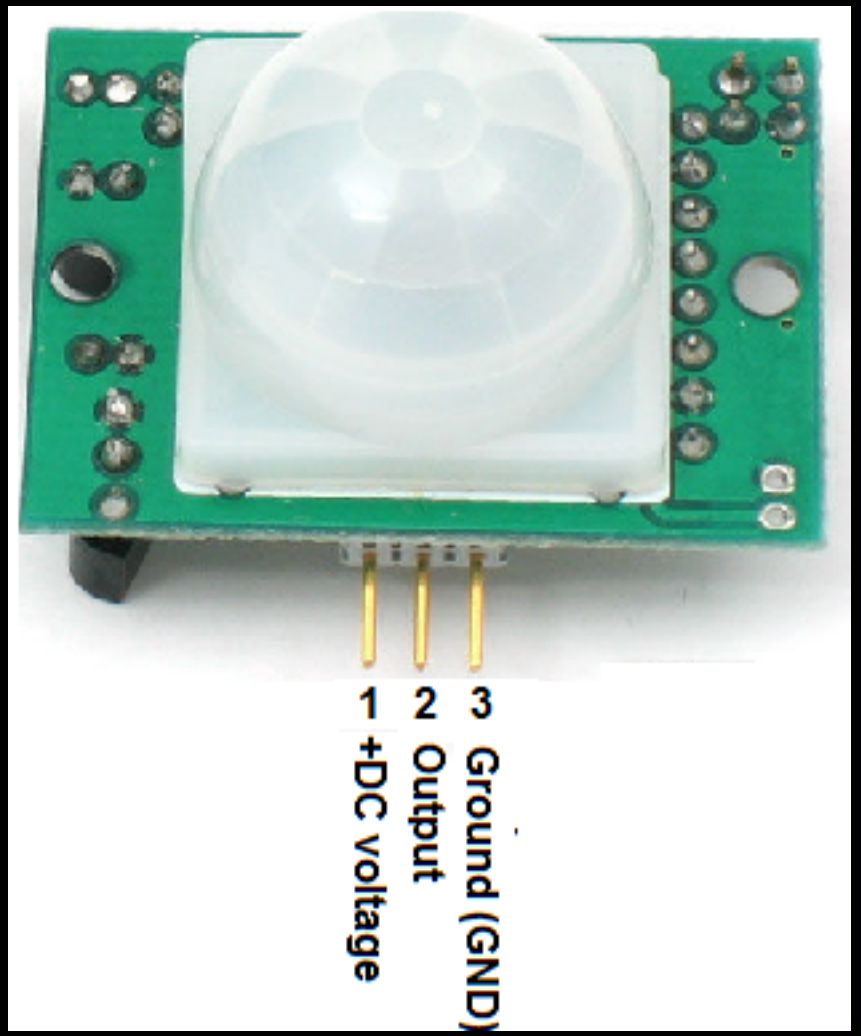
pir sensors

- sensors were changed to standard pir sensors
- low power and consistent
- and needed smoother power than could be supplied over long cables



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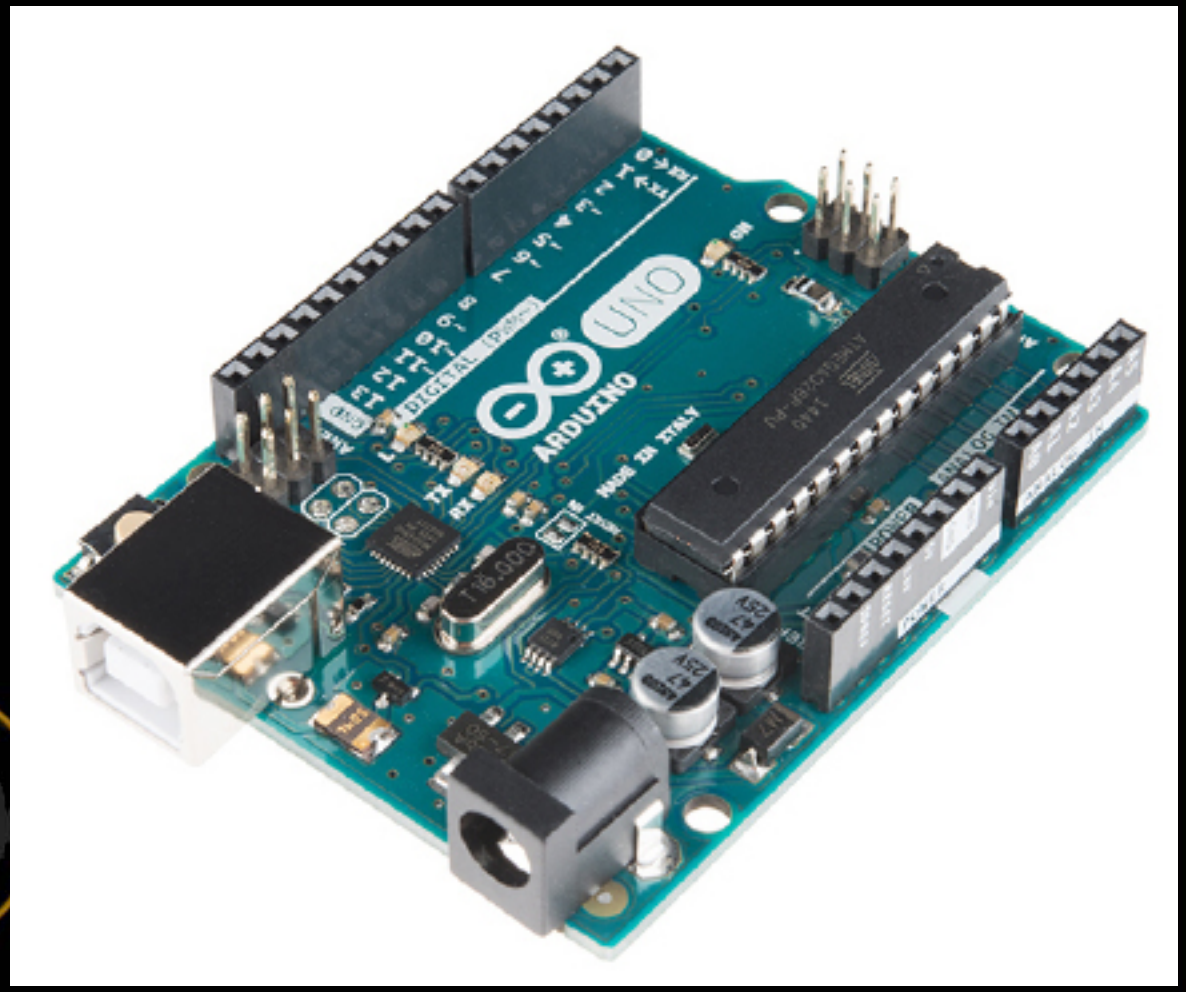
arduino microcontroller

- 6 sensors connected to an arduino



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surface transducers

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

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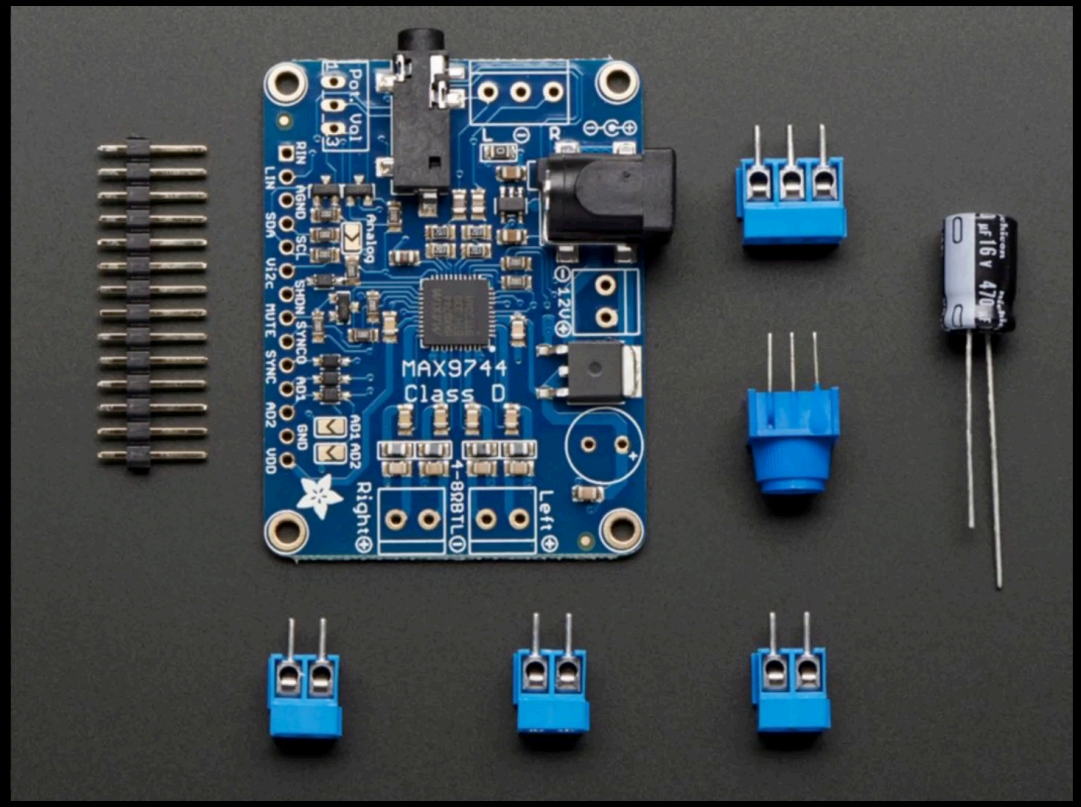
amplifiers

- 20w amplifiers
- digital or analogue (controls)



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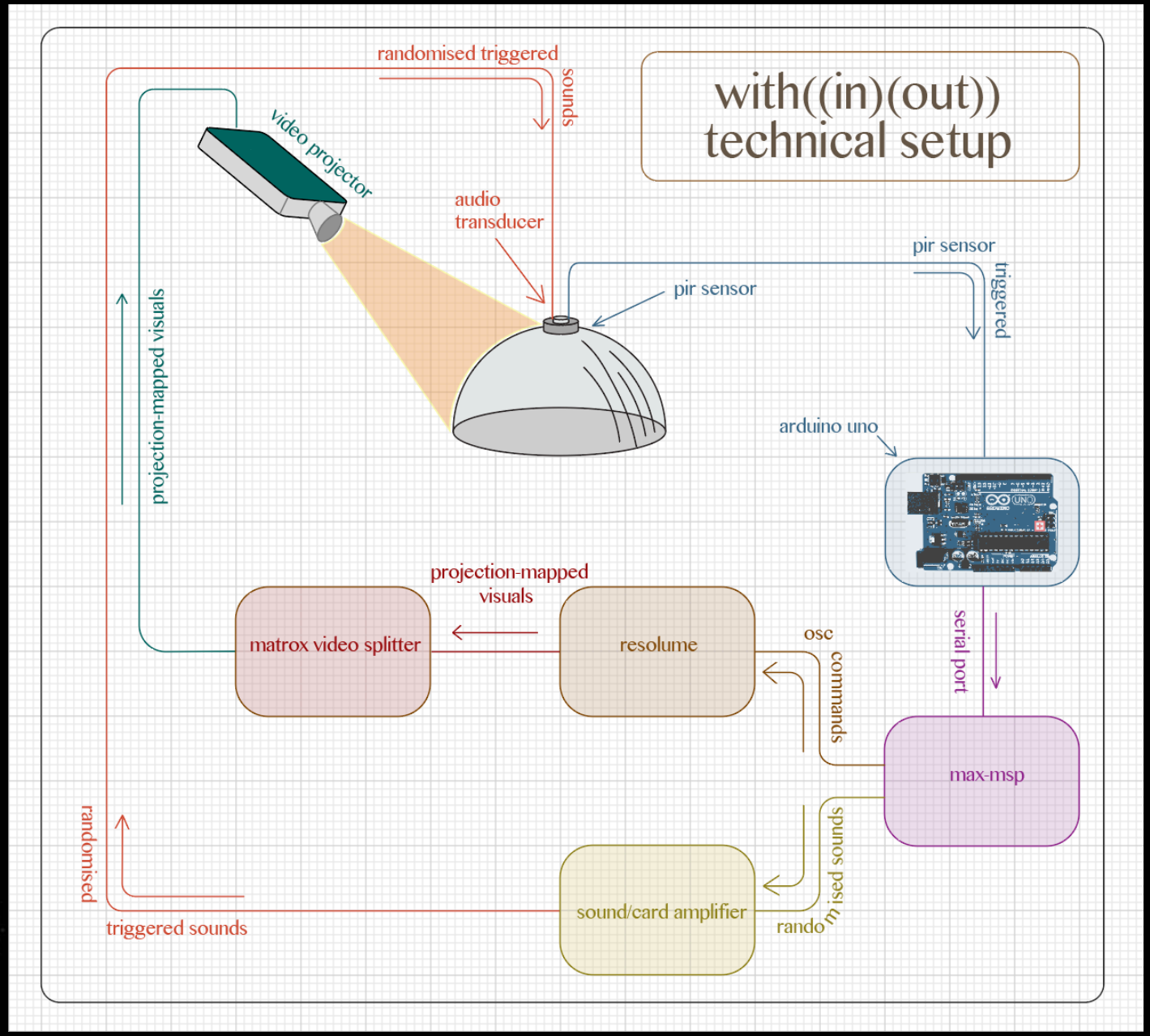
setup



with((in)(out))

arduino code

with((in)(out))

arduino code

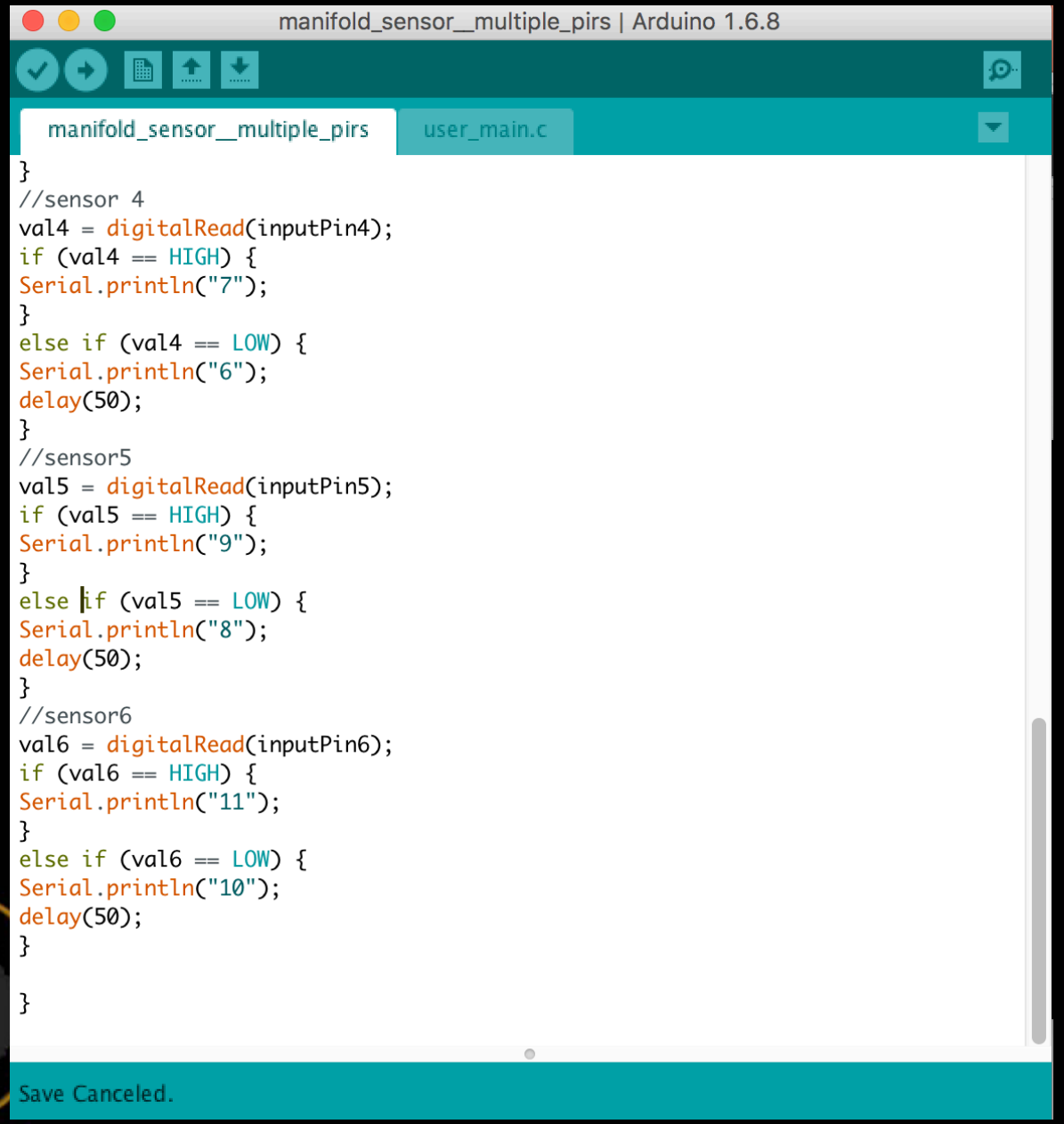
manifold_sensor__multiple_pirs | Arduino 1.6.8

manifold_sensor__multiple_pirs | user_main.c

```
Serial.begin(9600);
}
//sensor 1
void loop(){
val1 = digitalRead(inputPin1);
if (val1 == HIGH) {
Serial.println("1");
}
else if (val1 == LOW) {
Serial.println("0");
delay(5);
}
//sensor 2
val2 = digitalRead(inputPin2);
if (val2 == HIGH) {
Serial.println("3");
}
else if (val2 == LOW) {
Serial.println("2");
delay(5);
}
//sensor 3
val3 = digitalRead(inputPin3);
if (val3 == HIGH) {
Serial.println("5");
}
else if (val3 == LOW) {
Serial.println("4");
delay(50);
}
```

with((in)(out))

arduino code



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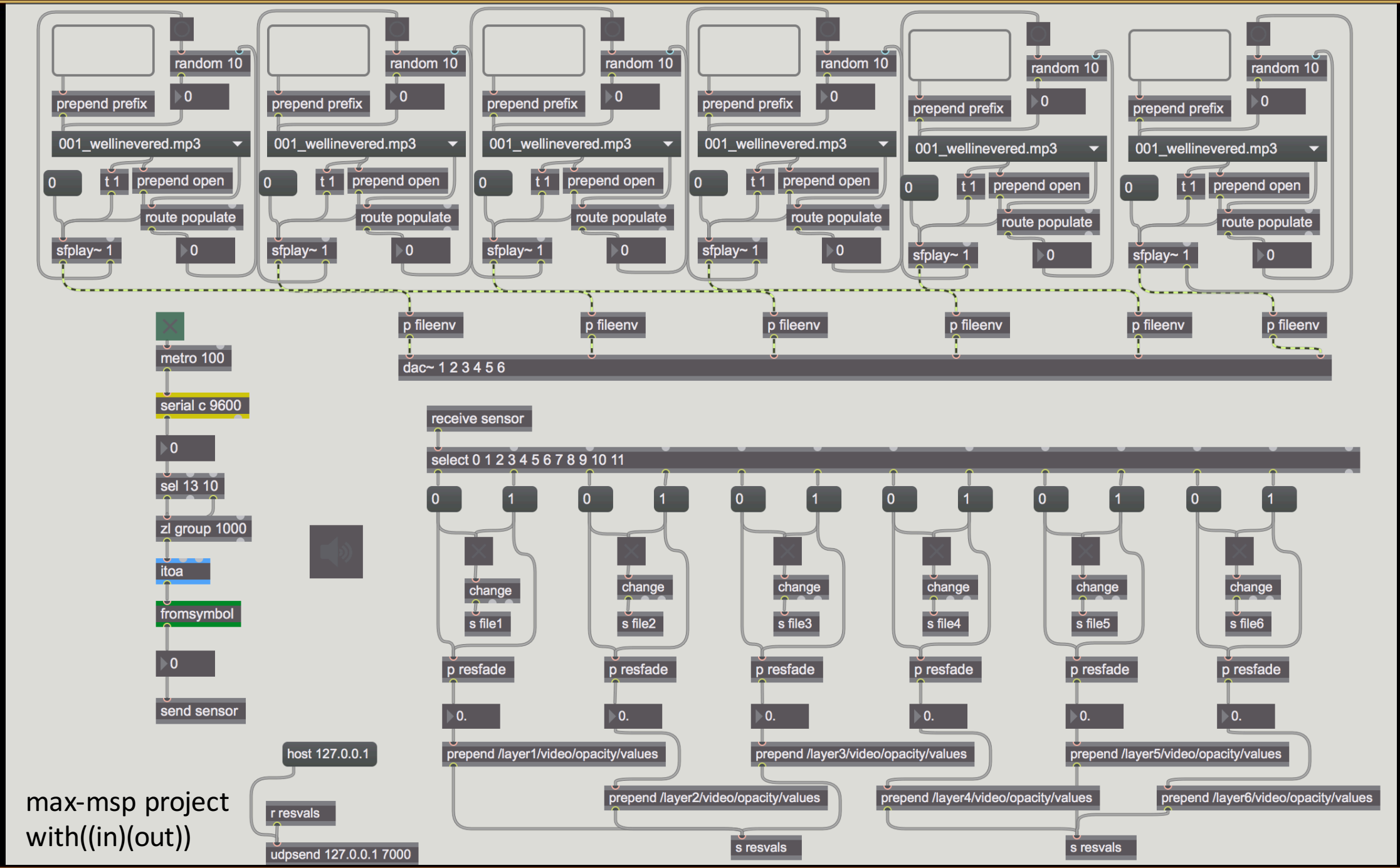

max-msp project
with((in)(out))