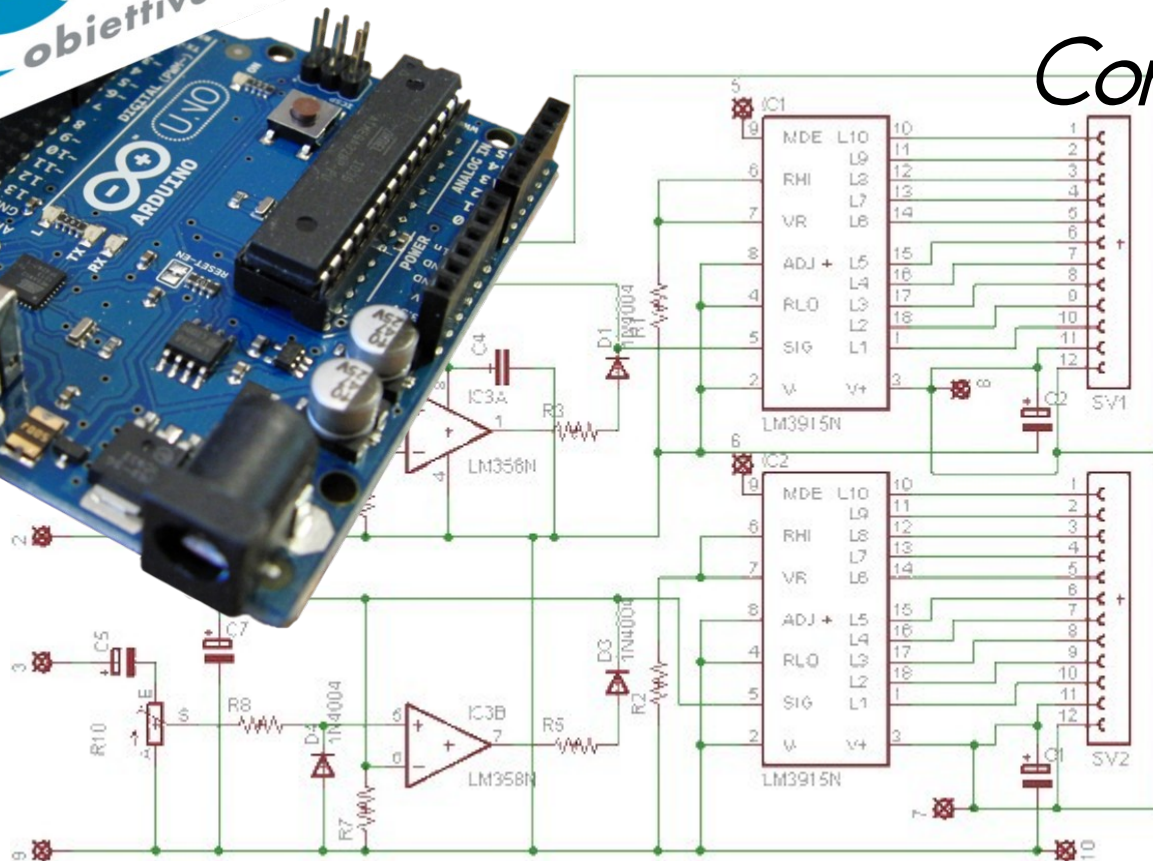
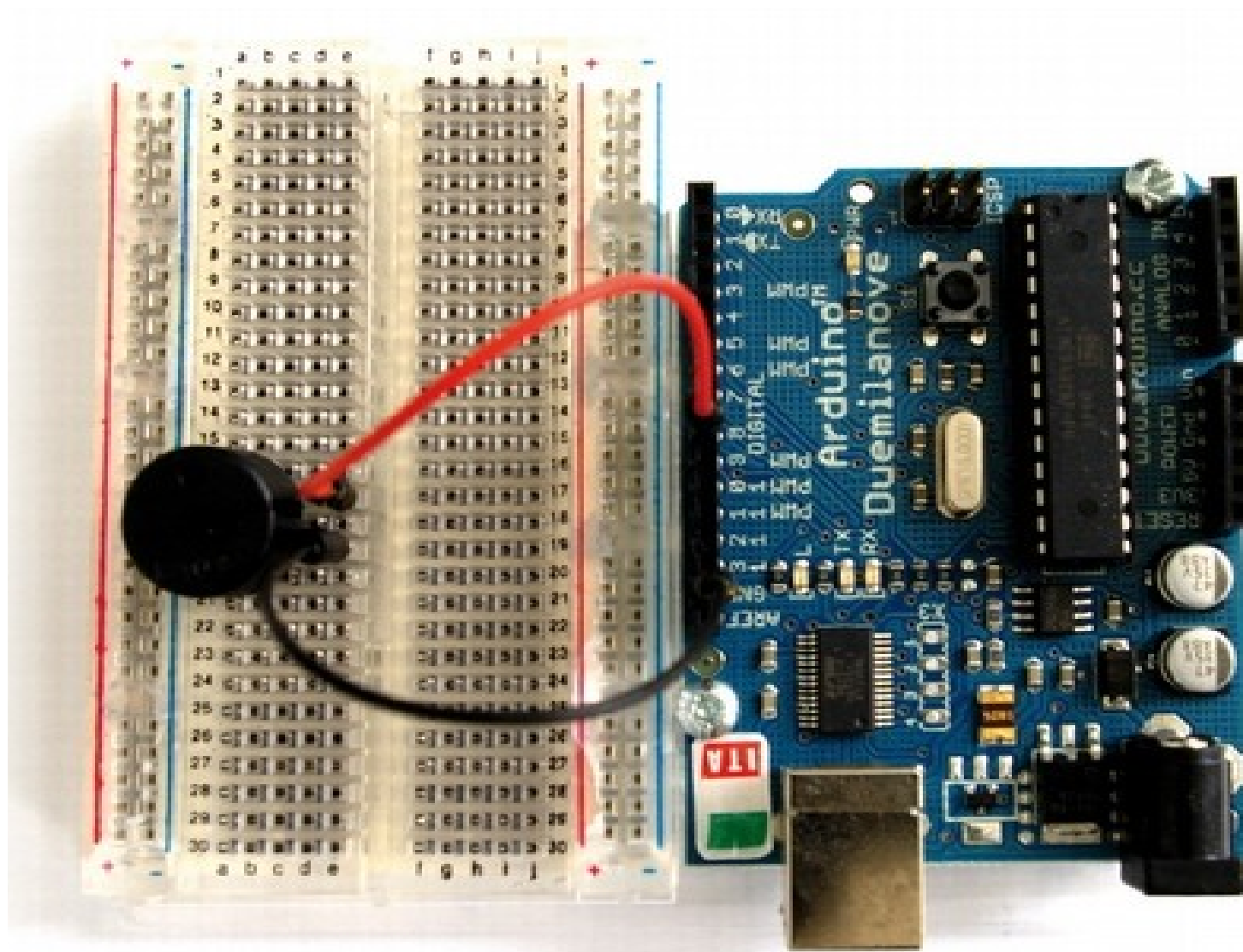
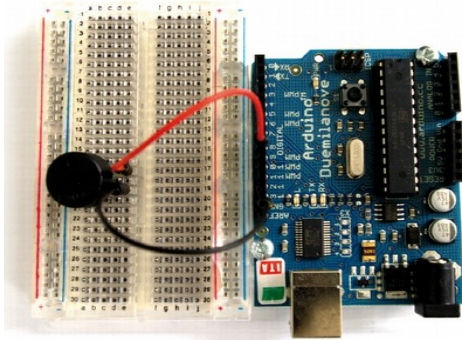




Tone





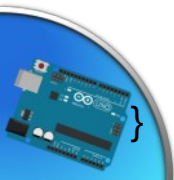
Tone

- Il metodo più semplice per fare suoni;
- Consiste nel generare un'onda quadra a frequenza impostabile;

```
#define BUZZER_PIN 3
#define MELODY_LENGTH 9
unsigned int melody[MELODY_LENGTH] =
    { 262, 294, 330, 349, 392,
      349, 330, 294, 262 };

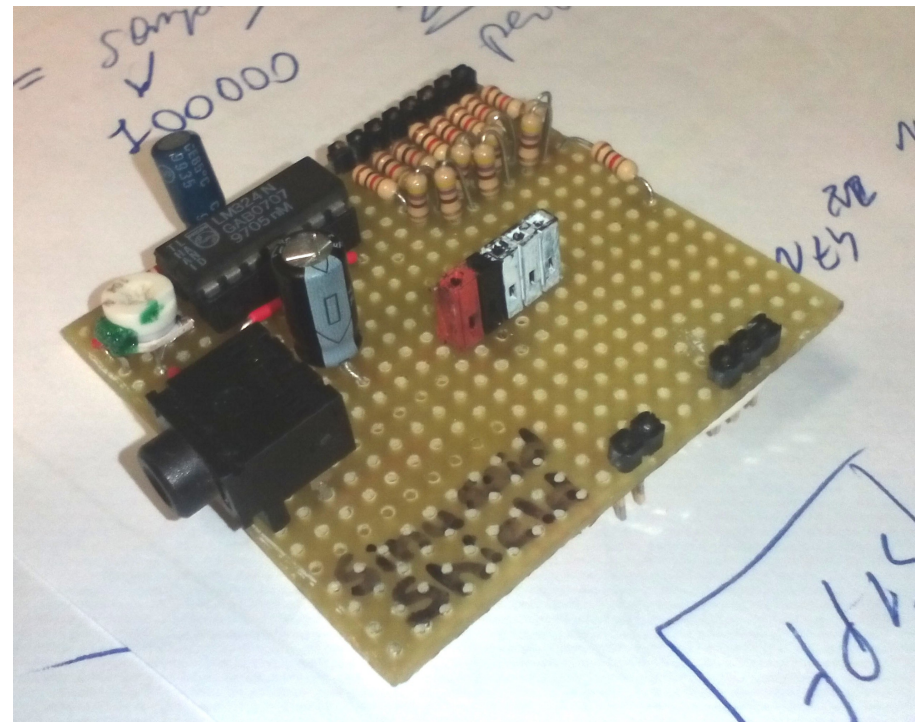
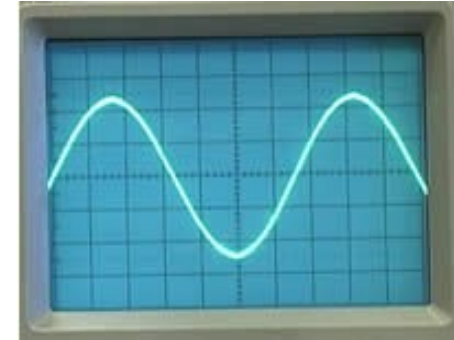
void setup() {
}

void loop() {
    for (short c = 0; c < MELODY_LENGTH; c++)
        tone(BUZZER_PIN, melody[c], 300);
    delay(1000);
}
```

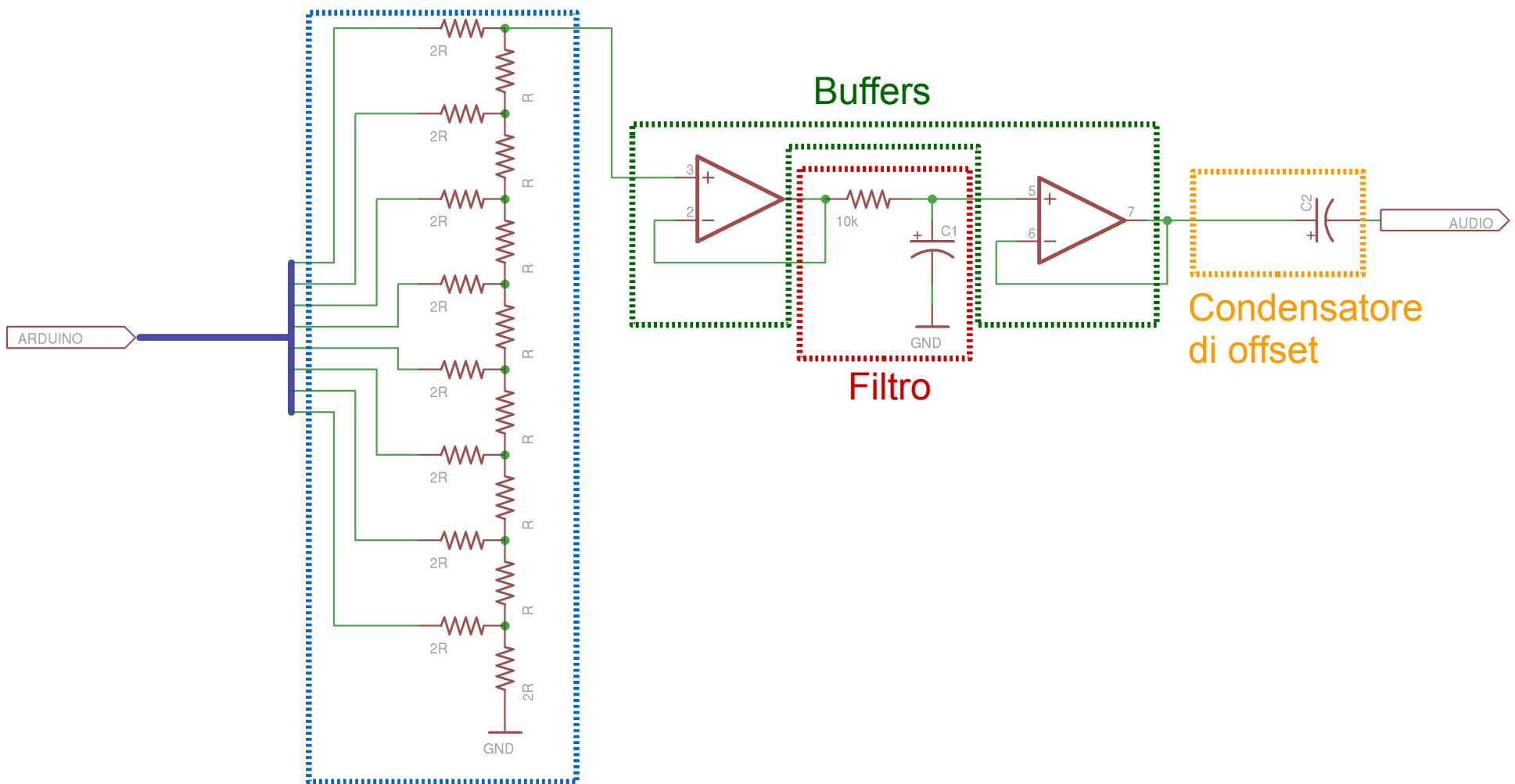


Waveform Generation

- Con una scala di resistenze è possibile convertire segnali digitali in un più complesso segnale analogico, come una sinusoide;
- Ha bisogno di un timer dedicato, e di diversi pin per essere più accurata.

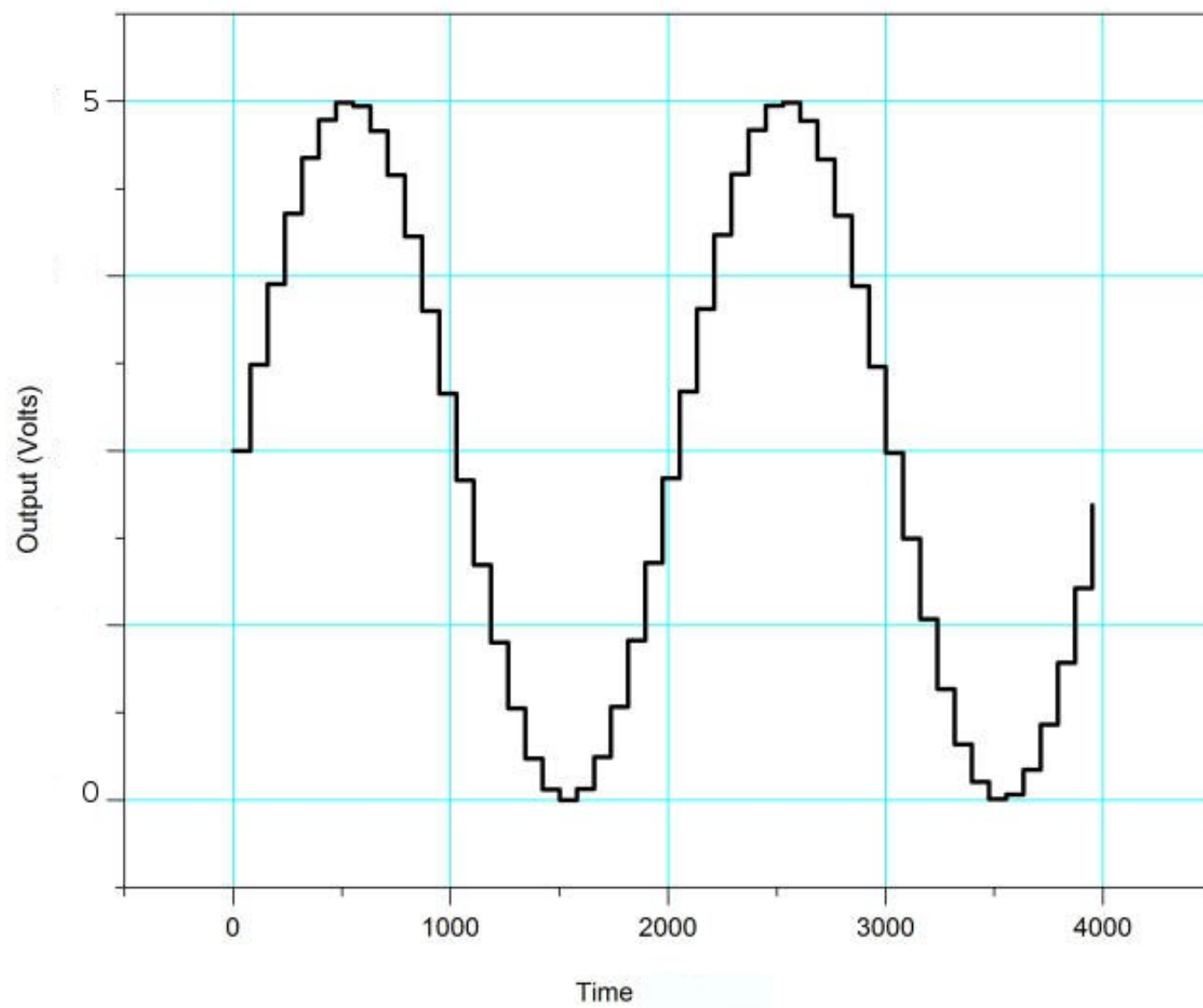


Waveform Generation - schemi



Scala di resistenze



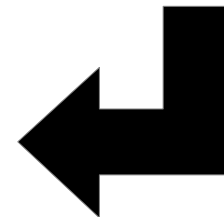
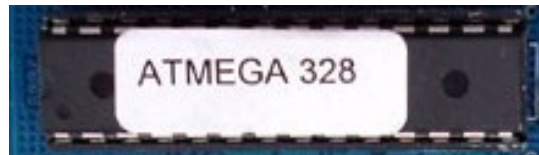
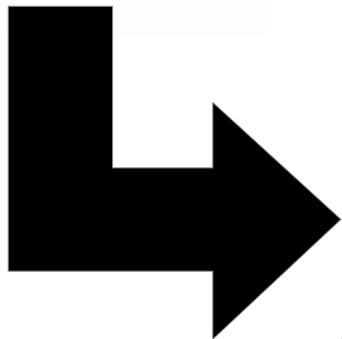
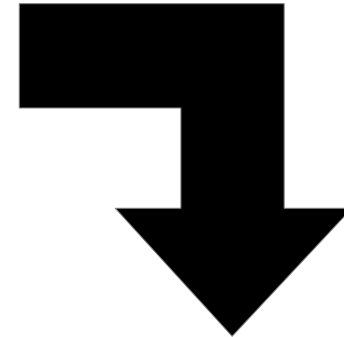
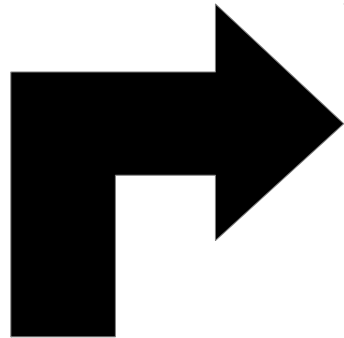


Wave Shield

- Questa scheda legge files audio dalla scheda SD, e poi li riproduce sullo speaker;
- Ha un'uscita mono, e può riprodurre solo un file alla volta.



Wave Shield: block diagram



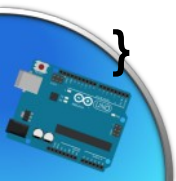
Wave Shield: listato

```
void loop() {  
    uint8_t i, r;  
    char c, name[15];  
    card.reset_dir();  
    // scroll through the files in the directory  
    for (i=0; i<tracknum+1; i++) {  
        r = card.get_next_name_in_dir(name);  
        if (!r) {  
            // ran out of tracks! start over  
            tracknum = 0;  
            return;  
        }  
    }  
    putstring("\n\rPlaying "); Serial.print(name);  
    // reset the directory so we can find the file  
    card.reset_dir();  
    playcomplete(name);  
    tracknum++;  
}
```

loop() estratto dall'esempio

PlayAllLoop

della libreria **AF_Wave**

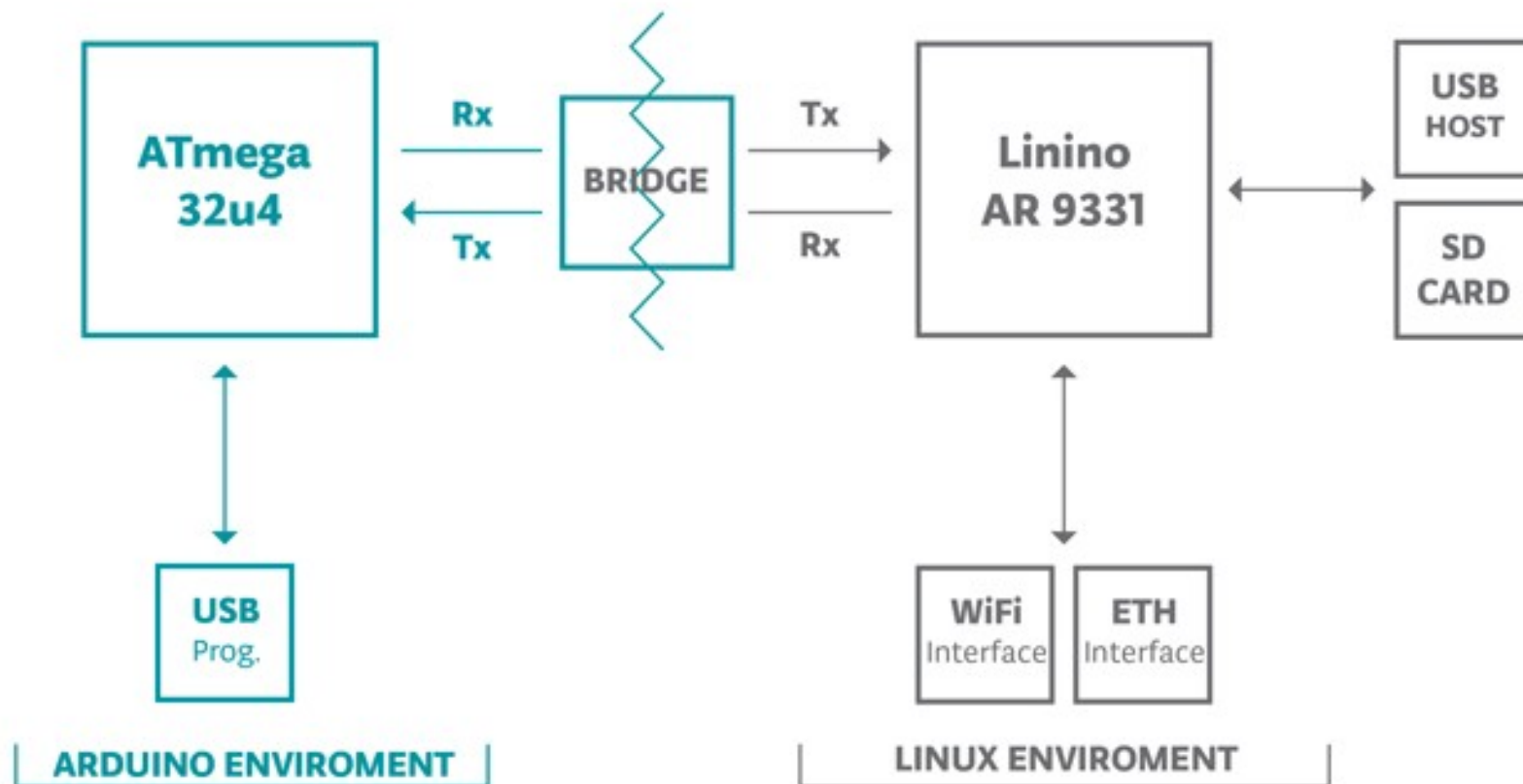


Wifi & internet: Arduino Yún

- Scheda che integra due processori:
 - ATmega 32u4 per il controllo dei pin;
 - AR 9331 che esegue il sistema operativo Linino (derivata di OpenWRT)



Dialogo fra processori: la classe Bridge



Progetti di IoT



Grazie per l'attenzione



Stefano Panichi



Giulio Fieramosca



s.panichi@yahoo.it

giuliofieramosca@gmail.com



it.linkedin.com/in/stefanopanichi/

it.linkedin.com/in/giuliofieramosca



@StefanoPanichi

facebook.com/giulio.fieramosca



google.com/+StefanoPanichi

google.com/+GiulioFieramosca

