

2. Material and Method

Ultrasonic Speaker UST-40T; Ultrasonic Microphone UST-40R
Wire Wrap boards with Arduinio Nano, ORANGE RC, and PCB HP-BP
Measuring distances 0.5, 1, 1.5 and 2 m indoor (Laboratory conditions)
Speaker and Mic face to face
Software Duc013 (FSK +/-2%, 39.216 and 40.816 kHz)

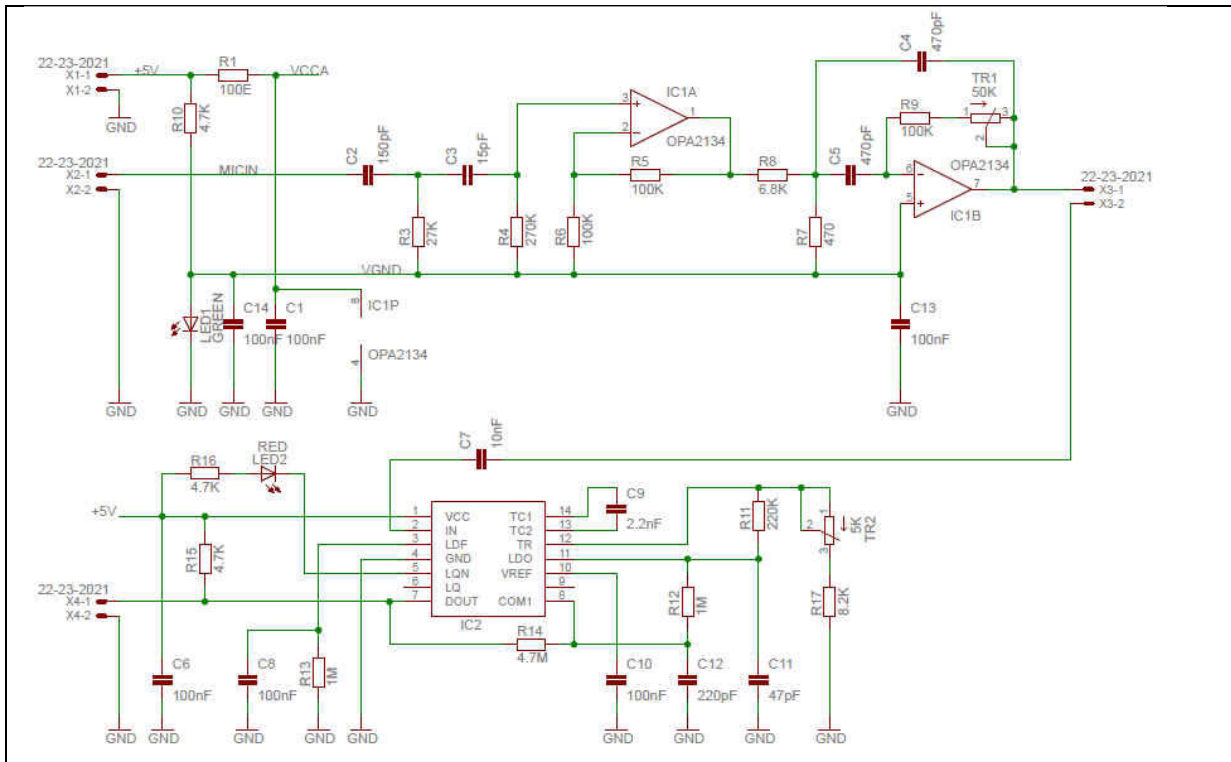


Fig.1. Circuit HP BP for Piezo Mic, Layout by Miru, Changed: R1=0E



Fig. 2. Test Setup, Speaker and Mic face to face, indoor with reflections

2. Experimental Results

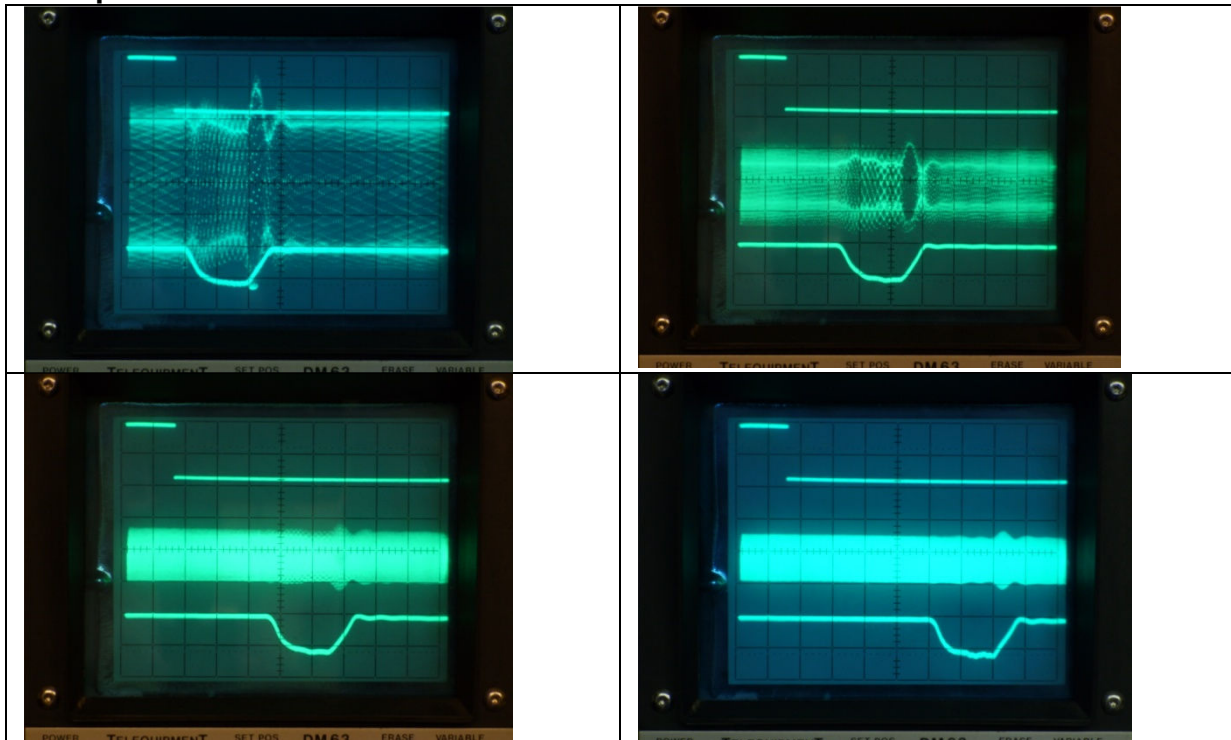


Fig. 3. Signals at 40kHz +/-2% at 0.5, 1, 1.5 and 2 meters, settings 1msec/Div
 Top: Synch., 2V/Div; Middle: BP out, 50mV/Div, Bottom PLL (Pin 8!), 1V/Div
 Note: Pin 8 shows the analog PLL out, should be measured with a 10x probe.

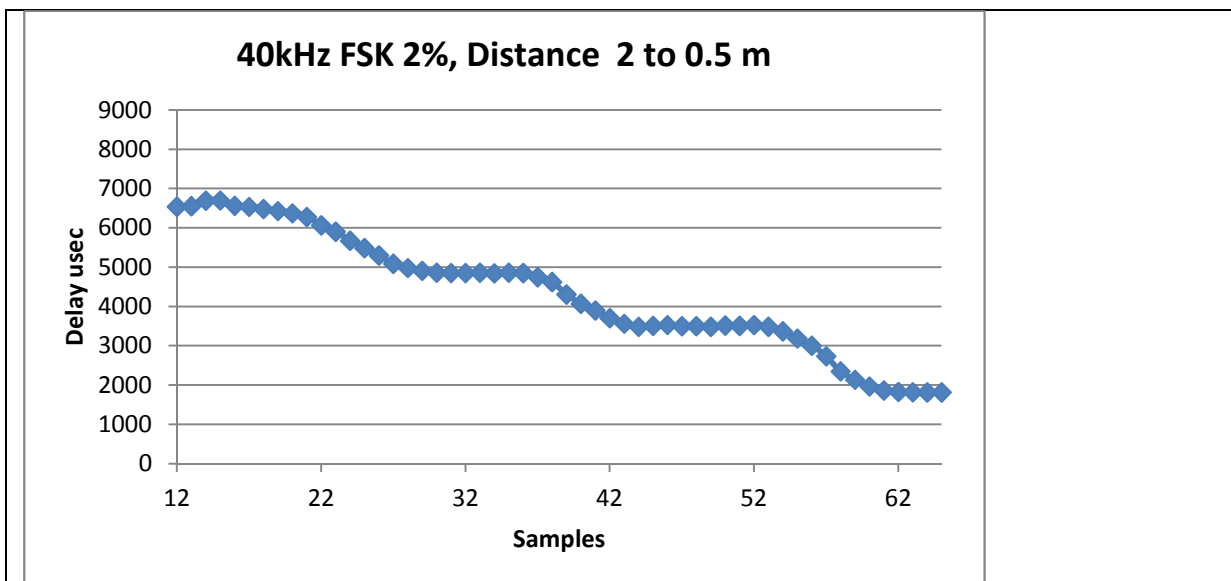


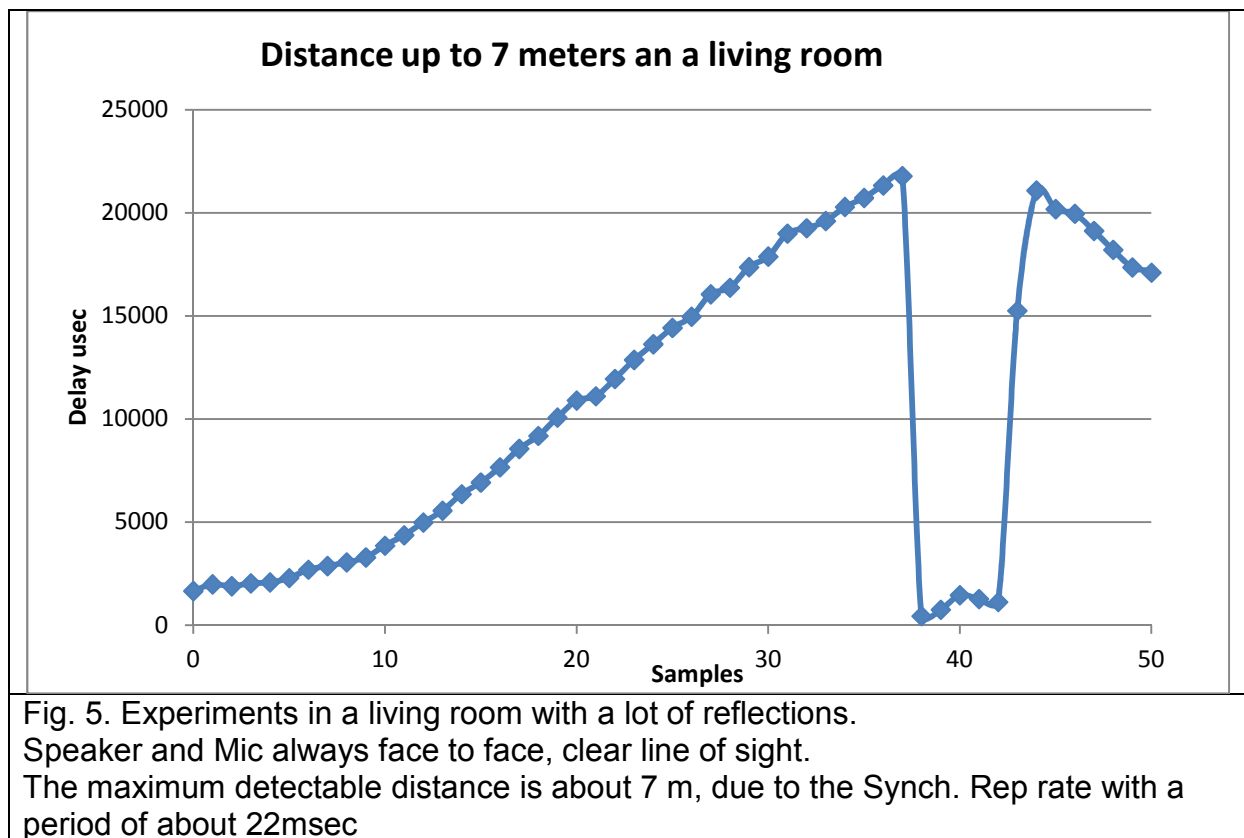
Fig. 4. HyperTerminal data a slow variation of the distance from 2 to 0.5 meters

3. PLL Investigation for FSK 40 kHz +/- 2% (39.216 / 40.816 kHz)

Lock-in Range	FSK Discrim. at 23°C	FSK Discrim. at 45°C
38.27 kHz	39.383 kHz	39.37 kHz
41.56 kHz	40.505 kHz	40.40 kHz

Tab. 1. PLL for FSK 40 kHz +/- 2%: looks ok, FSK signal well within the discrimination range, stable with temperature.

4. Additional experiments in a living room



5. Discussion

These results look really good!

The next step will be investigations with speaker and Mic not face to face