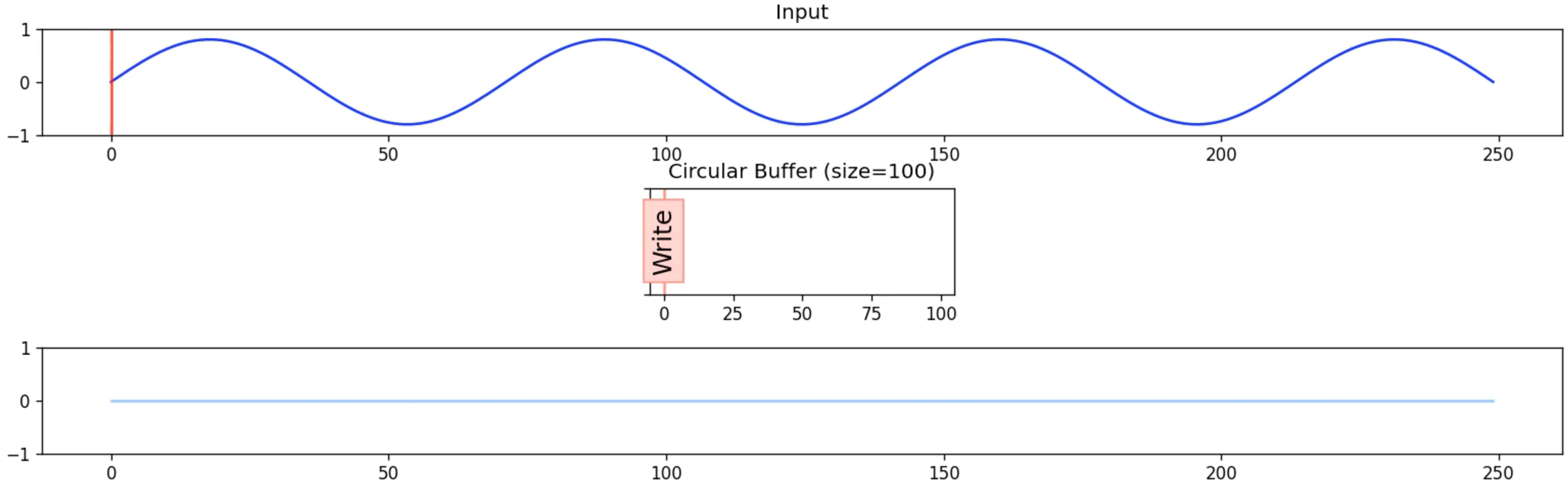
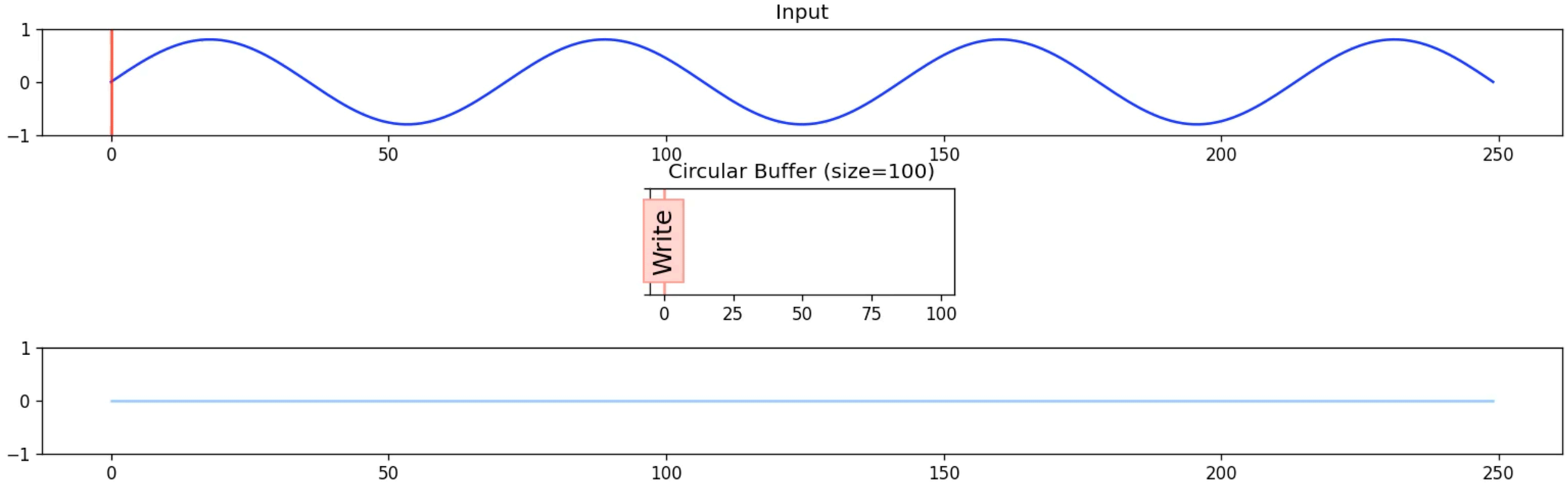
# Handling overruns and underruns

- Imagine we calculate the period of the pitch for every frame using auto-correlation
- When the read head is about to overtake the write head, we jump back by one period

# Using pitch detection


Input
1
0
−1
0
50
100
150
200
250
Circular Buffer (size=100)
Write
0
25
50
75
100
1
0
−1
0
50
100
150
200
250


Input
1
0
−1
0
50
100
150
200
250
Circular Buffer (size=100)
Write
0
25
50
75
100
1
0
−1
0
50
100
150
200
250

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## Using pitch detection

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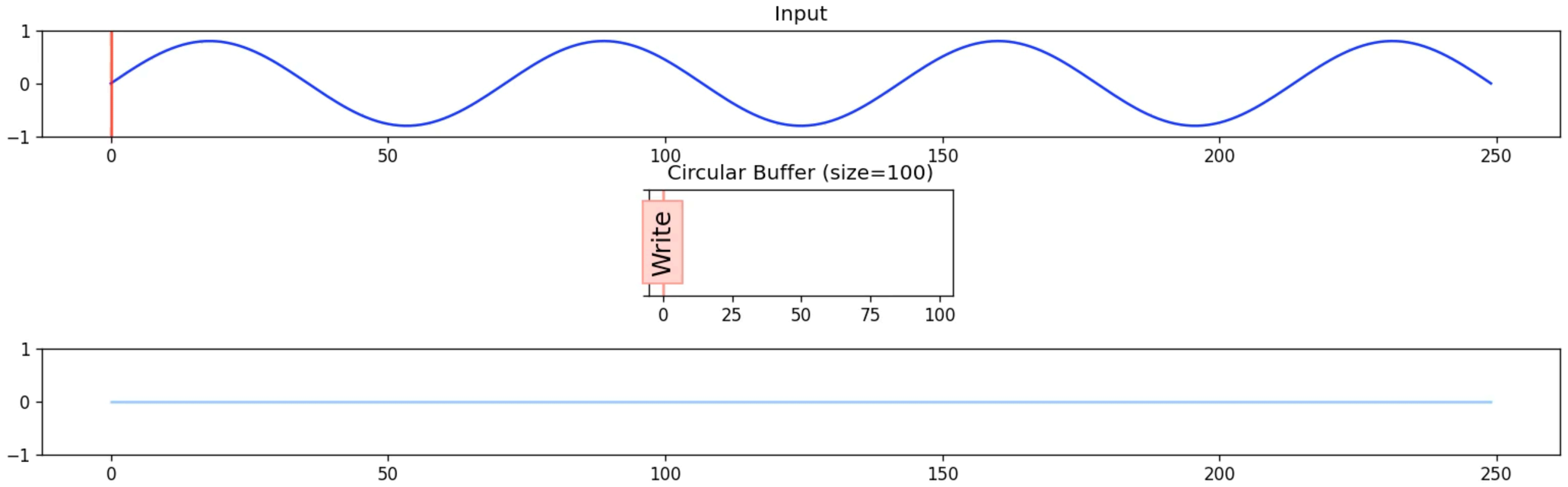

The method of this invention takes full advantage of precisely determining knowledge of the period of the data. The data is resampled at a new sample rate proportional to the desired change in pitch. In the case of making the pitch sharper (larger sample spacing than the input data), the output data pointer will occasionally move ahead of the input data pointer, in which case exactly one cycle period will be subtracted from the output pointer. This allows a cycle of data to be repeated. In the case of making the pitch flatter (smaller sample spacing than the input data), the output data pointer will occasionally fall significantly behind the input data pointer, in which case exactly one cycle period will be added to the output pointer. This causes a cycle of data to be dropped from the output. This resampling approach generates extremely high quality output.

**Column 6, Lines 9:23**