Exercise Sheet 3 (Theory)
(11 Points)

Please note: Solutions must be submitted (individually or in pairs) until 29.10.2018 at 10:00 AM (post box in OH16, ground floor, in front of room E16). Submitting solutions via mail is not possible. Discussion: 07.-09.11.2018.

1  Java (2 Points)

Which are the advantages and disadvantages of using Java for the design of embedded systems?

2  Aliasing (1 Point)

What is aliasing? Consider an input signal with frequency 20Hz, e.g., the song of a fin whale. Which is the minimum sampling rate required to avoid aliasing?

3  SDF vs. Petri Nets (2 Points)

What is the difference between SDF and Petri nets?

4  Successive Approximation Converter (3 Points)

Draw a circuit diagram of a successive approximation converter with a resolution of 8 bit. Explain in your own words how this successive approximation converter works.

5  Flash A/D Converter (3 Points)

The specifications of a flash A/D converter are as follows (A = least significant bit, B = most significant bit):

<table>
<thead>
<tr>
<th>$V_{in}$</th>
<th>$C_1$</th>
<th>$C_2$</th>
<th>$C_3$</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 0.25V</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.25 – 0.5V</td>
<td>0V</td>
<td>0V</td>
<td>12V</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0.5 – 0.75V</td>
<td>0V</td>
<td>12V</td>
<td>12V</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0.75 – 1V</td>
<td>12V</td>
<td>12V</td>
<td>12V</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Complete the given circuit diagram:

- Add an additional comparator that indicates an overflow condition if the analog input voltage exceeds $V_{in}$ 1V.
- Add all required wires.
- Annotate the positive and negative inputs of each comparator with $+$ or $-$, respectively.
General information: Further information about the exercises, exercise sheets, and the exam admission can be found at