https://goo.gl/zbirzw

Buskerud and Vestfold University College

Compulsory Coursework

Part 2: Music box

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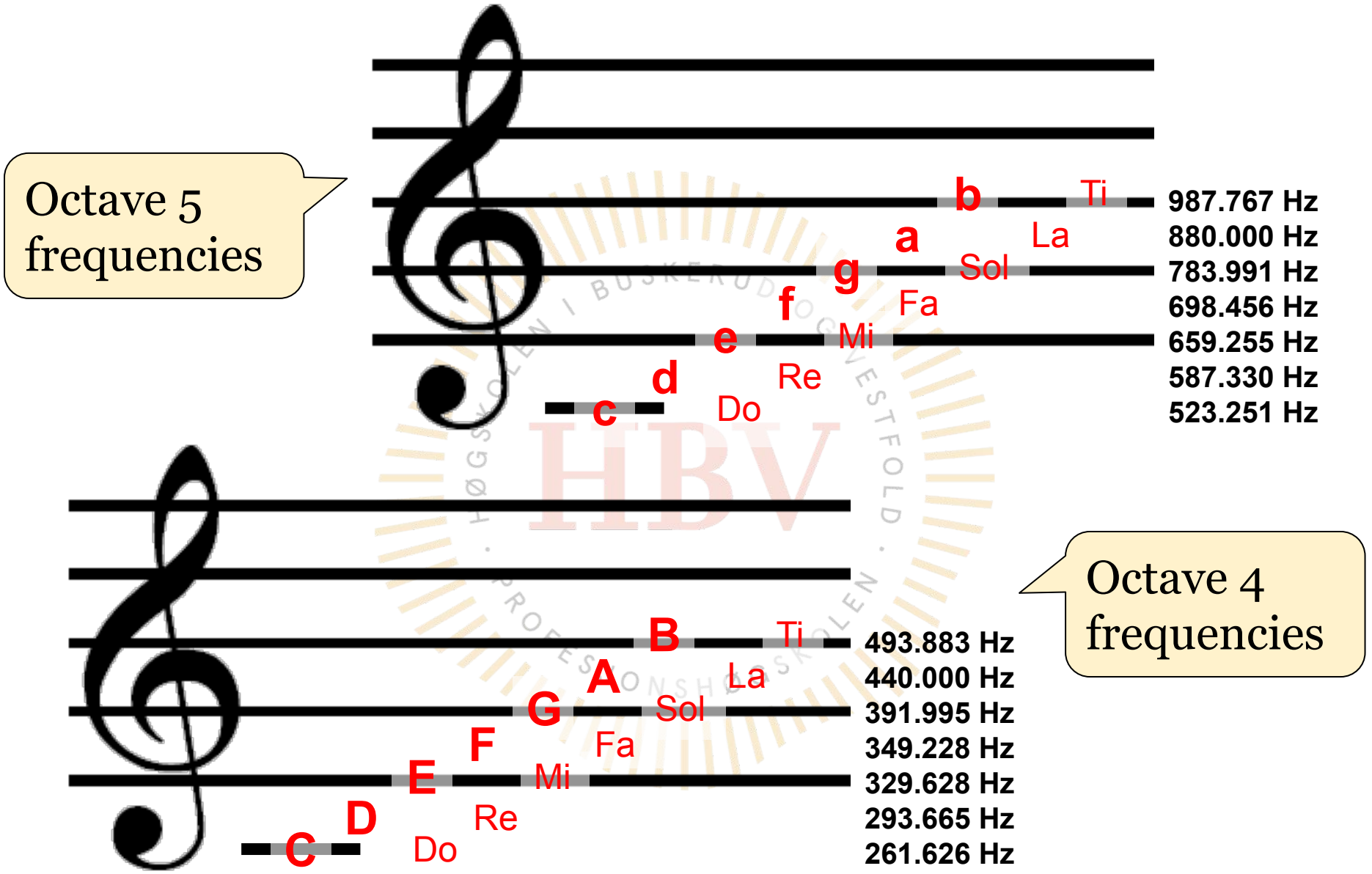
Learning outcomes

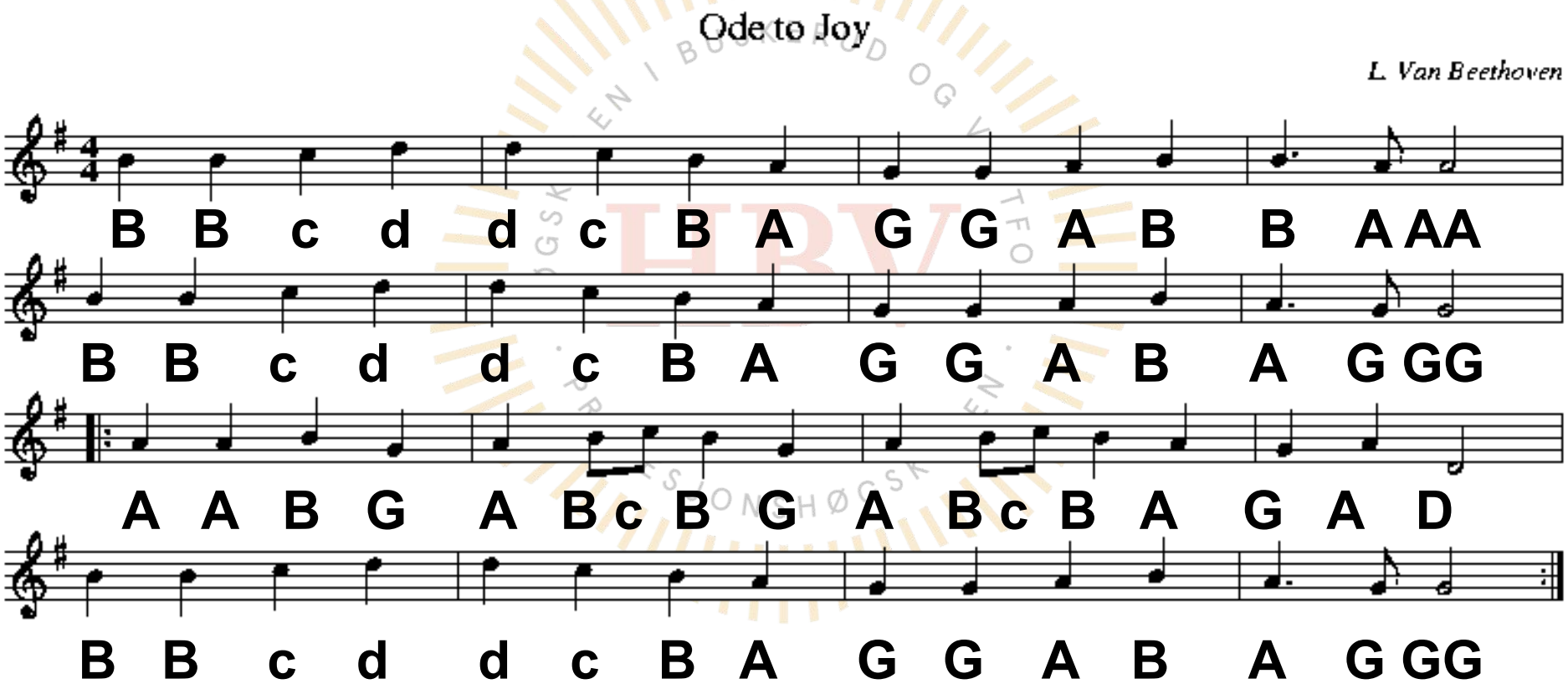
You'll be able to:

- Work with the very basics of music notation
- Explain the functional specification of the required music box
- Identify the main design tasks and divide them among the group members
- Set up a plan for the development work



(for the full range corresponding to an 88-key piano, see Wikipedia at https://goo.gl/P9FG0u)

Beethoven's "Ode to Joy" sound--alike melody using octaves 4 and 5



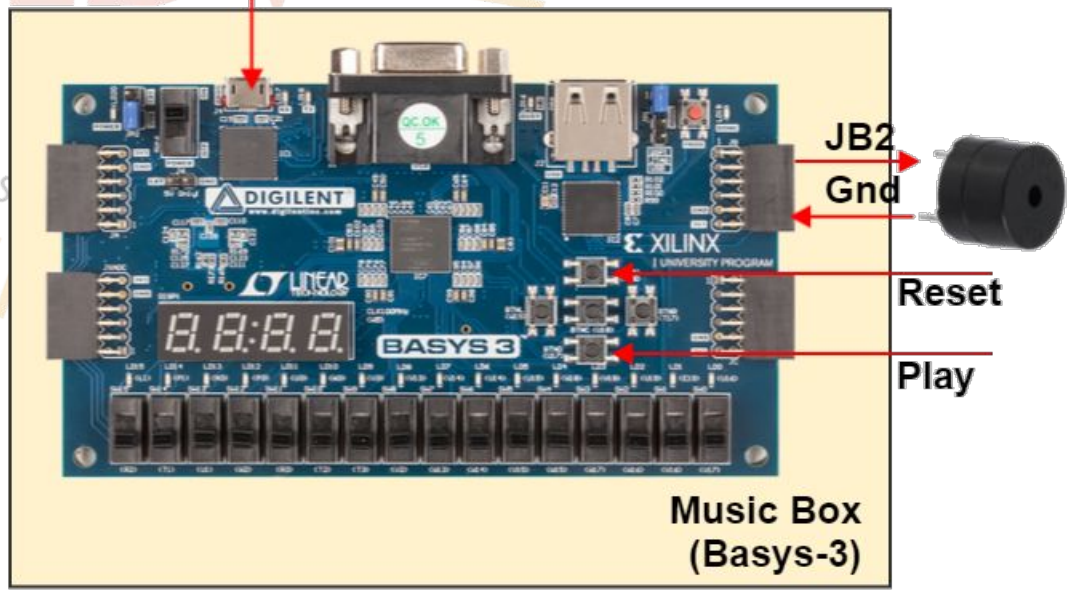
Overview of the music box

Check section 11.4 of P. Chu's book

- Store the melody a local RAM as a sequence of ASCII characters typed in the computer keyboard
- Press "Play" to listen

(RS232)

e.g. PuTTY or Hyperterminal



Simplifying assumptions

- Octaves 4 and 5 only (frequency range from 261.626 Hz to 987.767 Hz)
- Fixed duration for all notes (e.g. double duration will be achieved by repeating the note)

Recommended approach

- Define the architecture of the **FSMD datapath** (what blocks need to be present)
- Design the **ASMD chart**
- Build the **VHDL description**, simulate, and try it out in the Basys-3 board

Proposed roadmap

- Group: Define FSMD architecture and design ASMD chart
- Individual: Build the VHDL description from the chart
- Group: Design verification (simulation) in Vivado
- Individual: Allocate FPGA pins, generate .bit file, program the FPGA and check operation in the Basys-3 board

Deliverables (deadline is 23:59, Sunday March 18th):

- A presentation (5～10 min.) explaining your work and results, including simulation waveforms and experimental demo (video)
- The Vivado project folder