

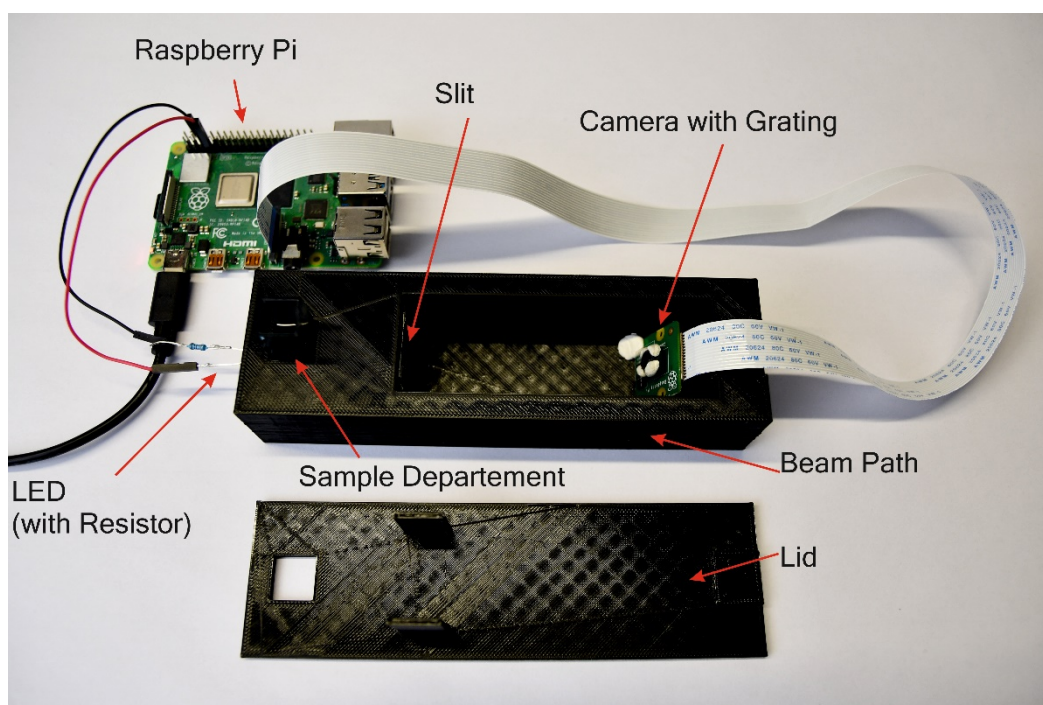
Instructions for the low cost Spectrometer

Materials

For the construction of the low-cost spectrometer you need the following materials:

- 3D printed housing and lid of the spectrometer
(Files: Spectrometer_BeamPath.stl und Spectrometer_Lid.stl)
- Two razor blades and some black fabric tape for the slit
- White light LED and at least one LED with a known emission wavelength (head diameter LED: 5 mm) and corresponding series resistors
- Diffraction grating film (1000 lines/mm)
- Raspberry Pi camera module with ribbon cable
- Raspberry Pi 4
- Adhesive dough (e.g. UHU patafix)
- Jumper Wire to connect the LED to the Raspberry Pi

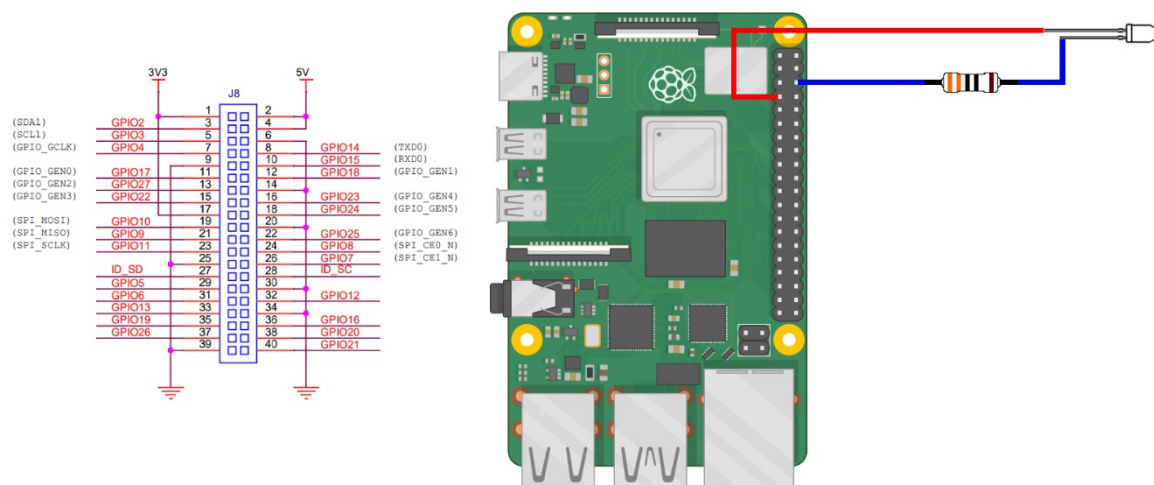
Setup



1. Either print the housing and the lid of the spectrometer with a 3D printer (recommended filament: PLA) or make a basic body with similar dimensions yourself (e.g. with terminal blocks).
2. Make a slit. Use, for example, two shortened razor blades, which you wrap with fabric tape (attention: risk of injury!). The slit should let through as little light as possible. Place the slit behind the sample department as shown in the figure. The slit must be aligned parallel to the base of the spectrometer.
3. Position a small piece of the diffraction grating film (pay attention to the direction of diffraction!) with some adhesive in front of the camera lens.



4. Then position the camera at an angle in the beam path as shown in the figure.
5. Connect the camera to the Raspberry Pi with a ribbon cable.
6. Insert an LED into the corresponding hole in the beam path and connect the LED to the Raspberry Pi as shown in the following figure:



You complete the setup with the calibration of the spectrometer. The instructions (text file: "Setup") for this final step can be found in the program folder of the Lambda software.