

## The sensor for letters (H, S , U)

- The sensor is a scanner with 8 image points.
- The sensor was controlled by a PIC 16F1826/7. Programmable by e.g. a „PIC-Kit3“.
- The IR-LEDs are lighted for approximately 100us each and the quantity of light reflected by the walls will be measured through the fototransistors on 8 analogue input pins. The LEDs are turned on only for a short time, because the intense light of the LEDs is able to damage the retina, if it is continuously illuminated. (It is NO Laser, but infrared and therefore not visible. **CAUTION!**) The sensor was encapsulated, first to prevent it from other light, second to minimize the danger of being hurt by the light. The stl-file is possible to download on this website.
- The LEDs are switched with the help of the 8-stage shift-and-store bus register (4094) and connected to the correspondent transistors. Therefore we need only 3 pins of the PIC to switch.
- The sensor has an input pin for an encoder, which is helpful for computing the pattern of the bits. (char Encoder\_count)
- On the board also the thermo sensor (MLX90614) is fixed.
- There are two connectors for I2C, supply incl.. **CAUTION:** Do not use the wrong polarity! There is no protection on the board.
- For using the sensor you have to mount two jumpers (JP1) and to unplug them before programming.
- The addresses of the two sensors are 0x16 and 0x17, but, of course, you can change, if you can.
- The sensor gets two bytes from the master. If the first one is 0xFF a command follows, else e.g., you should send distances of the robot to the wall.
- The sensor even sends one byte back. That might be pattern of the bits, but if you are able to program, this could be the analysis of the values.
- Basically, the pattern of the bits will be returned to the master. (You might order the programmed chips at [robocup@uni-kassel.de](mailto:robocup@uni-kassel.de) The price will be the value of the chips plus the freight charges. Boards You might order e.g. at [https://www.seeedstudio.com/fusion\\_pcb.html?utm\\_source=homepage&utm\\_medium=homepagebanner&utm\\_campaign=hp\\_0413](https://www.seeedstudio.com/fusion_pcb.html?utm_source=homepage&utm_medium=homepagebanner&utm_campaign=hp_0413) Price: about 20€, 10 peaces. It will last about 3 weeks. There will be a downloadable file for the board on this website.)
- The functions Next\_LED(void) und void LEDs\_clear (void) are functions who should protect your eyes from being hurt and so they mustn't be changed. Also the TMR0-Interrupt has only to be changed to this effect. (There will be a new version of the sensor where just less illumination is needed, so that this functions may be deleted.)
- The sensor has to be calibrated: A vertical line like the „H-Line“ only longer, has to be fastened to the wall and the vehicle has to drive or be driven along this line in „ideal“ distance. Therefore you have to send 0xFF and 0xFF to it. After that, you have to send 0xFF and 0xFE and the sensor returns the pattern of the bits. (In the new version the calibration will be no longer necessary. But the sensor then slows down, the setting time will take ca. 100ms. More software will be needed to handle it.
- The sensor will generate a new value every ms.
- You have to mount the sensor in between the wheels. The thermo sensor should have a height of 7cm.
- If you have any questions ask in the forum or write directly to [robocup@uni-kassel.de](mailto:robocup@uni-kassel.de). Relevant questions and answers I will post in the forum.
- I don't give any guarantee, of course, not for the functionality, not for your health.