

4. Platform Device Driver and sysfs Interface for HC-SR04

key words: gpio pin multiplexing, TSC clock, software structures of kernel timer, gpio interrupt, Linux sysfs interface, platform device initiation.

- develop a platform driver/platform device infrastructure for HC-SR04 sensors.
- Any HC-SR04 devices defined as platform devices can be instantiated and bound with a platform driver, named as “HCSR_of_driver”.
- User-space dev interface is enabled for any platform HC-SR04 devices.
- Sysfs interface is enabled for any platform HC-SR04 devices.
- The implementation ends up with two loadable modules:
 1. One is to instantiate HC-SR04 devices based on platform device definitions (including multiple HC-SR04 devices).
 2. The other one is the driver for HC-SR04 devices where the user-space dev interface and sysfs interface are realized.
- The sysfs interface is defined as follows:
 - /sys/class/HCSR/HCSR_n/
 - /trigger ... the digital IO pin of Arduino Connector to HC-SR04 trigger pin
 - /echo ... the digital IO pin of Arduino Connector to HC-SR04 echo pin
 - /number_samples ... number of samples per measurement
 - /sampling_period ... sampling period
 - /enable ... storing 1 to start a measurement, 0 to disable measurement
 - /distance ... the most recent distance measure
- The modules are loadable and can be loaded in any order.
- To test the sysfs interface, develop a Bash script file to access HC-SR04 devices.

