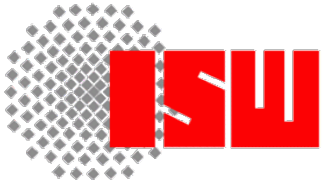

Universität Stuttgart
Institut für Steuerungstechnik der Werkzeugmaschinen und Fertigungseinrichtungen

MEDIS – Module 2

Microcontroller based systems for controlling industrial processes

Lab 3.2: Analog I/O

M. Seyfarth, Version 0.1

Aims of the lab

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- Learn analog I/O-system of microcontroller
- Program analog I/O-system of microcontroller
- Extended use of simulation system
- Build up simple electric circuits

Work orders

1. Write a sketch that writes and reads an analog signal and present the result to the serial monitor. Directly wire the output (PWM-output and DAC-output) to an input-pin. Compare your results.

2. Check the processing time of the function analogRead() and analogWrite(). Use the function millis() and/or micros() from the Arduino core library. Make a table which shows your results.

Work orders

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3. Use the simulation system of the water tank and automate it with the following function:
   Start the tank system with a push on a button.
   Empty the tank at first. Signal the empty tank to the user (via Serial Monitor).
   Another push on the button starts the filling procedure: the filling level is measured by an analog sensor. The power of the pump is adapted smoothly according to the filling level. Find an appropriate rule. After reaching 60% filling level, the mixer and heating starts, after reaching 95% filling level the mixer stops, the water is heated till 60°C and then the tank is emptied.
   The user can now start another filling procedure.
   If the user pushes the button during the filling procedure, the tank is emptied immediately.

Conclusion

1. Know the programming of analog I/O-System
2. Know in detail the usage of the simulation environment
3. Know the wiring of simple circuits