Chapter 8

Digital and Analog Interfacing Methods

Lesson 17

Example of Industrial Process Control

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Process

• Series of actions or tasks such that a desired result is achieved.

For example, syrup-making process has to carry number of sequential actions before the syrup packed bottle is obtained.

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Process Controlling Actions

• Process initiates by sending or transmitting an output(s) (local or remote unit)

• Wait for the expected input(s) (local or remote)

• Actions sequentially performed till the process finishes and next process is to start.

MCU Actions

- Out-compares (for raising alarms and time-outs at the successive predefined intervals) and
- Input-captures (for noting the events)/out-compare modules

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MCU Actions

• On-chip multi channel ADC feature with sample hold, threshold, offset and reference voltages program abilities

•Remote as well as local serial IOs function

•Many IO lines for sharing with the external peripherals

MCU for Events processing and Timer Actions

• A high resolution and advanced EPA (Event Processor Array)- Intel EPA with a library of 20 and above timing functions)

• Motorola Timer Processors Unit

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MCU Remote controlling Actions

- Remote infrared control bits communications and analog signals shielded communication

Syrup Making Process
Valve V1 control

• A tank connects through a solenoid valve Vl to a water inlet

• V1 connects to a port pin Pn.0 of MCU through an output module OM1

• V1 switches on at the start or at the starting the next cycle for a prefixed period T1. The period is just sufficient to fill the tank with water.

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Heater On

• After T1, the V1 closes. A heater is switched on using output module OM2 through a port pin Pn.1

•A temperature sensor and its interfacing circuit give the analog input *v1*

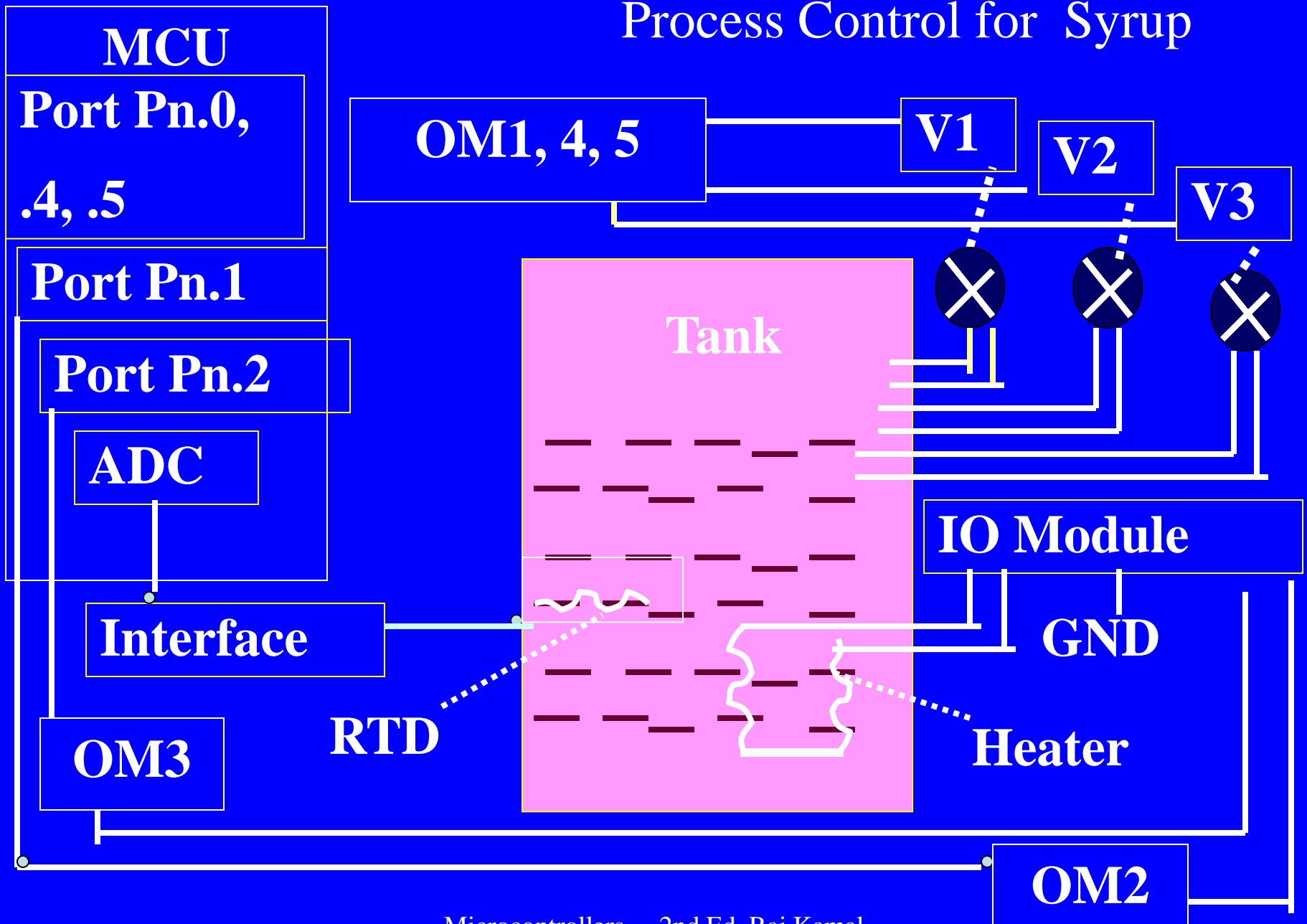•The analog input coverts through ADC and is compared with a programmed value

Temperature Control

- When the heater reaches a set temperature T0, the heater is switched off through the   port pin n.2 and module OM3. The control algorithm maintains the temperature at T0 within the specified limits.

ValvesV2 and V3

•V2 and V3 inlets the concentrated sugar (or its) solution inlet and essence
• Connect to a port pins Pn.4 and Pin n.5 of MCU through the output modules OM4 and OM5.

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Process Control for Syrup

MCU
Port Pn.0, .4, .5
Port Pn.1
Port Pn.2
ADC
Interface
OM3

OM1, 4, 5
V1
V2
V3

Tank

IO Module
GND

RTD
Heater

OM2

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Summary

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We learnt

MCU as Process Controller

- Controls the Valves
- Controls the IO Modules
- Reads the Physical parameters
- Runs the control algorithms
- Does events processing
- Out compares for alarms and outputs
- In-captures for actions on events

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End of Lesson 17

Example of Industrial Process Control

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THANK YOU

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Lesson 1

Key, keypad and keyboard

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