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ITASDI PROJECT

Innovative Teaching Approaches in development of Software Designed Instrumentation and its application in real-time systems

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Course "Advanced LabVIEW Applications"

Laboratory no. 10 - Student project.

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1 Sprinkler

1.1 Goal

Create an application, which will simulate a intelligent garden sprinkler.

1.2 General requirements

- Application should be hierarchical and scalable. Remember to use subVIs.
- Choose appropriate design pattern.
- Avoid using local, global or shared variables.
- Close all opened references and handles.
- Application shouldn't crash. Inform the user about errors using an error cluster or a dialog box.
- Remember to prepare well documented code. Especially remember about: labels on long wires, description showing in context help, tip strips of controls and labels of constant values.
- All subVIs should have intuitive icons and descriptions, which will be shown in context help.

1.3 Description

Description of actions:

- *Run mode* - a Boolean value, which determine if sprinkler should run in only one sequence (north-east-south-west-stop) or in continuous sequence.
- *Setup* - a button, which activates setup options. Before clicking on it, the *Zone Setup*, *Water Pressure Sensor* and *Weather* controls should be disabled and grayed out. After choosing the *Setup* button:
  - The *Zone Setup*, *Water Pressure Sensor* and *Weather* controls should be enabled.
  - Default options should be read from *configuration.ini* and uploaded to the *Zone Setup* control.
  - If the configuration file does not exist, application should generate error code equal 5000 and two button dialog box should appear. The user should choose if the setup should be repeated or if the application should stop working.
- *Start* - a button, which start the sprinkler:
  - The *Zone Setup* control should be disabled and grayed out.
  - The sprinkler should move from north-east-south-west if the weather is sunny and water pressure is higher or equal to 50%.
  - If single run mode is chosen, the sprinkler should stop working after west side.
  - If continuous run mode is chosen, the sprinkler should repeat the sequence until *stop* button is pressed.
  - The *Zone Setup* determines how long sprinkler should irrigate different zone.
  - If water pressure is smaller than 50%, application should generate error code equal 5001 and two button dialog box should appear. User should choose if the setup should be repeated or if the application should stop working.
- *Stop* - a button, which stop application working.

Please use a front panel from public folder.

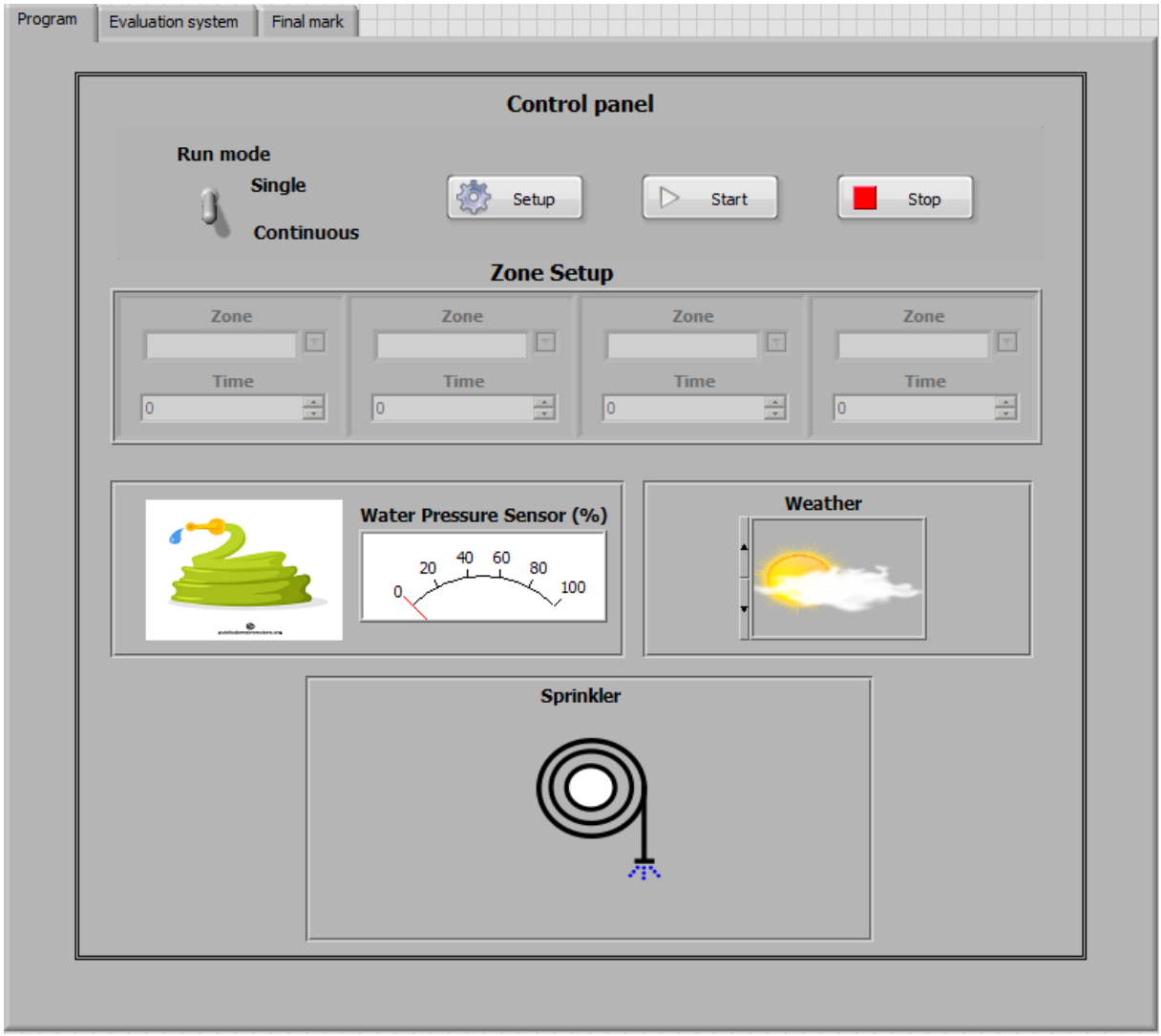

Figure 1: *Front panel* of a sprinkler simulator.

2 Evaluation Criteria

The project (also CLD exam) consists of 40 points divided in category:

- Programming style - 15 points
- Functionality - 15 points
- Documentation - 10 points

The following criteria are included in categories:

1. Programming style:
   (a) 1 pkt - choosing appropriate design pattern,
   (b) 1 pkt - appropriate use of design pattern,
   (c) 1 pkt - if the application is scalable and easy maintainable,
   (d) 2 pkt - if repeating code is a separated or an independent part of the code in subVI,

(e) 1 pkt - if application does not have unnecessary temporary variables,

(f) 1 pkt - if using unnecessary local and global variables is avoided,

(g) 1 pkt - block diagram well laid out,

(h) 1 pkt - unnecessary bends and overlapping wires are avoided,

(i) 1 pkt - error terminals wired to functions in VI,

(j) 1 pkt - error cluster used inside the subVI,

(k) 1 pkt - references appropriately closed,

(l) 2 pkt - the code is not overly complex.

(m) 1 pkt - controls are initialized to default values after starting the application.

2. Functionality:

(a) 1 pkt - application runs without errors,

(b) 2 pkt - application has implemented two run modes,

(c) 1 pkt - before setup is chosen, the *Zone Setup*, *Water Pressure Sensor* and *Weather* are disabled.

(d) 1 pkt - after setup is chosen, the *Zone Setup*, *Water Pressure Sensor* and *Weather* is enabled.

(e) 2 pkt - a configuration is read from file and transferred to *Zone Setup* control,

(f) 2 pkt - application generates error code if file does not exists. Dialog box appears and user can repeat necessary part of the code.

(g) 1 pkt - after start is chosen, the *Zone Setup* is disabled.

(h) 2 pkt - the sprinkler works only if weather is sunny and water pressure has appropriate value,

(i) 2 pkt - application generate error code if water pressure is too small.

(j) 1 pkt - stop button closes the application.

3. Documentation:

(a) 1 pkt - Main VI is documented in File→VI Properties,

(b) 1 pkt - subVIs are documented,

(c) 2 pkt - subVIs have well chosen connector pane patterns and connected terminals in an appropriate way,

(d) 2 pkt - subVIs have own customized icons,

(e) 1 pkt - long wires are documented by labels,

(f) 2 pkt - Main VI has necessary comments to easily understand the code,

(g) 1 pkt - front panel controls have tip strips,