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| **Architetture dei Sistemi di Elaborazione 02GOLOV [AA-LZ]** | Delivery date:  Sunday 19/1/2020 |
| **Extra-points Project**  **Part 2** | Expected delivery of **extrapoint\_02.zip** must include:   * The zipped folder of your project * A 1-page “application note” in pdf format: the application note is intended to technically describe: a) the structure of your project (i.e. source code organization, which functions implement the specifications); b) how the potentiometer works and source code is organized with respect to note selection. |

Purpose of Part 2: to acquire full confidence in the usage of the LANDTIGER Board.

This part is evaluated to assign a maximum of 2 extra-points for qualified students taking the exam with vote >= 18

Starting from the extrapoint\_01 project, implement an advanced version of the elevator for persons with limited mobility. You are asked to write a project for the LandTiger Board that implements the following additional functionalities with respect to the basic behaviour already implemented.

The manufacturer has renovated the elevator capabilities by adding: some emergency features (based on a loudspeaker and an extra button) and a control panel to customize the elevator behaviour (using a touch panel and a potentiometer).



1. Button INT0 is used to implement an **EMERGENCY BUTTON** included in the Elevator Controller, that can be pressed when the transported person is in difficulty and requires assistance. The button activates the following rescue measures:
   1. As soon as pressed, **Status LED** blinks at a 4Hz frequency.
   2. As soon as pressed, the loudspeaker alternates two tones (please see point B for more specifications) synchronously with the flashing frequency of the Status LED; **volume have to be limited to the 30% of the maximum amplitude**.
   3. **Alarm LEDs** at both request panels are switched on.

Since the Emergency Button can be also pressed accidentally:

* 1. If intentionally pressed (i.e., for at least 2 seconds),
     1. It makes the elevator stop at any point during the transportation.
     2. The Status LED, the Alarm LED and the loudspeaker hold the emergency behaviour if the button is released.
     3. The elevator moves again when it is called from a Request panel, meaning that someone is rushing to the rescue
        + The elevator moves in direction of the floor from which it was requested.
        + Loudspeaker stops emit sounds
        + LED works according to the usual behaviour when the elevator is normally requested.
  2. If accidentally, two scenarios are possible. If pressed while in **EMERGENCY MODE** the behaviours A.1, A.2, A.3 are suddenly interrupted and the normal one is resumed. Instead, if pressed during the normal operation for a period less than 2 seconds it must be ignored by the system.

**IMPORTANT**: in the equipment upgrade, the manufacturer decided to use/adapt the rescue protocol described above (A.1 to A.4) also for the regular Alarm triggered by 1-minute inactivity (as described in the extra-point track 1).

1. The renovated elevator is now also including a TfT (touch panel screen) and a potentiometer. The screen and the potentiometer are close each other and simply cached in the elevator structure (not to be used by impaired persons, but by a specialized operator).

The specialized operator can enter a **MAINTENANCE MODE** to setup the notes emitted by the loudspeaker when an emergency situation occurs. Maintenance mode can be entered only when the elevator is not used and waiting for a request; after entering into the maintenance mode, all LEDs of the elevator are switched off and all transportation functionalities suspended.



The visual information displayed in the example is just representative of the desired behaviour. The Graphical User Interface should permit to select a functionality by touching the panel.

Once a selected note functionality is entered, the operator can select a tone by turning the potentiometer wheel right (to go lower) or left (to get higher notes). Default notes at power on of the system are both middle A tones (440 Hz). Volume must not be changed from the default 30% amplitude required in the specification A.2).