LED Sequence V1.0

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Project Description

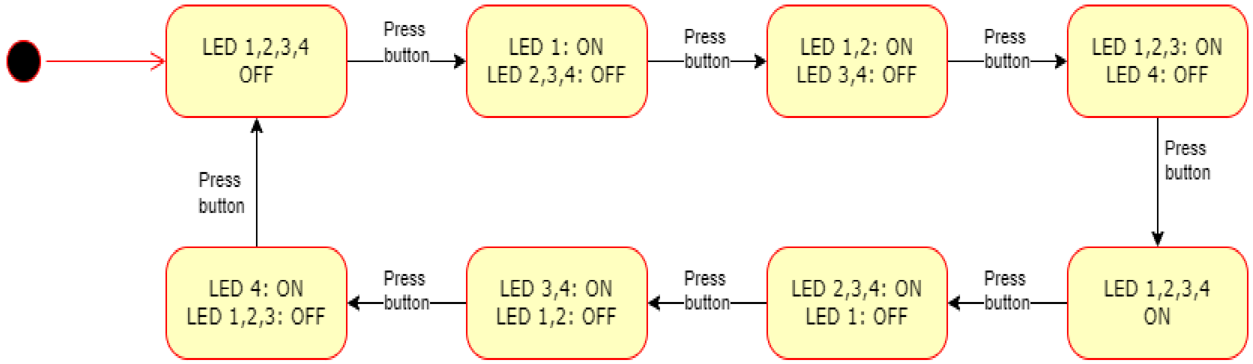
An App designed to display the following sequence:

1. Initially (OFF, OFF, OFF, OFF)
2. Press 1 (ON, OFF, OFF, OFF)
3. Press 2 (ON, ON, OFF, OFF)
4. Press 3 (ON, ON, ON, OFF)
5. Press 4 (ON, ON, ON, ON)
6. Press 5 (OFF, ON, ON, ON)
7. Press 6 (OFF, OFF, ON, ON)
8. Press 7 (OFF, OFF, OFF, ON)
9. Press 8 (OFF, OFF, OFF, OFF)
10. Press 9 (ON, OFF, OFF, OFF)

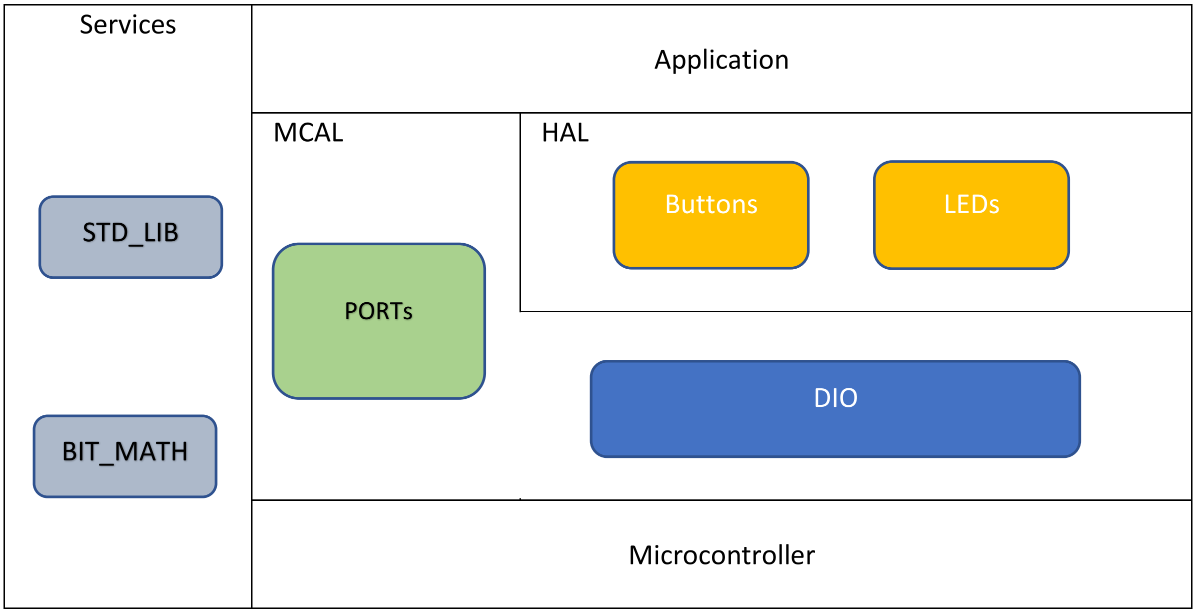
on four LEDs at each press of a push button where the sequence will be repeated forever.

The system is divided into layers and modules as follows.

Project State Machine



Layered Architecture



Modules & APIs

MCAL

- **Ports APIs:**

```
/**
 * @def function to configure the direction of all IO ports
 *            and set the initial values for pins
 */
void PORT_voidInit(void);
```

- **DIO APIs:**

```
/**
 * @def function to configure a single DIO pin as input/output
 * @param Copy_Port the port of the required pin
 * @param Copy_Pin the pin number in the given port
 * @param Copy_Value desired value (high or low) to set the pin to
 * @return error status
 */
EN_DIOErrorState_t DIO_SetPinVal(uint8_t Copy_Port,uint8_t Copy_Pin, uint8_t Copy_Value);

/**
 * @def function to configure a single DIO pin as input/output
 * @param Copy_Port the port of the required pin
 * @param Copy_Pin the pin number in the given port
 * @param Copy_Value desired value (high or low) to set the entire port to
 * @return error status
 */
EN_DIOErrorState_t DIO_SetPortVal(uint8_t Copy_Port, uint8_t Copy_Value);

/**
 * @def function to get the value of a single DIO pin whether high or low
 * @param Copy_Port the port of the required pin
 * @param Copy_Pin the pin number in the given port
 * @param Copy_pu8Val pointer to a variable to store pin value (0-255)
 * @return error status
 */
EN_DIOErrorState_t DIO_GetPinVal(uint8_t Copy_Port, uint8_t Copy_Pin, uint8_t*
Copy_pVal);

/**
 * @def function to toggle the value of the given pin
 * @param Copy_Port the port of the required pin
 * @param Copy_Pin the pin number in the given port
 * @return error status
 */
EN_DIOErrorState_t DIO_TogglePin(uint8_t Copy_Port,uint8_t Copy_Pin);
```

HAL

- ### LEDs APIs

```
/**
 * enables displaying output on given led
*/
EN_LEDErrorState_t LED_EnableLED(ST_LED* Copy_LED);

/**
 * Disables displaying output on given led
 */
EN_LEDErrorState_t LED_DisableLED(ST_LED* Copy_LED);

/**
 * Set the state of the given led to On/Off
 */
EN_LEDErrorState_t LED_setState(ST_LED* Copy_LED, EN_LEDState Copy_LEDState);

/**
 * Toggles the given given led
 */

EN_LEDErrorState_t LED_Toggle(ST_LED* Copy_Led);
```

- ### Buttons APIs

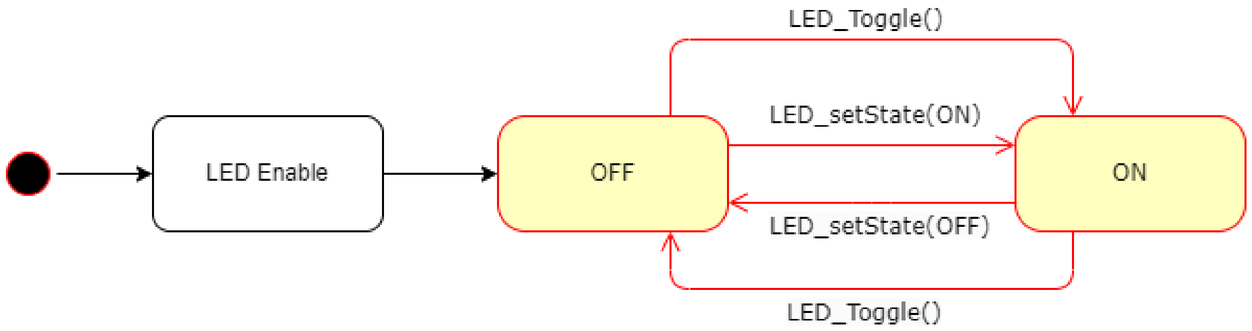
```
/**
 * enables reading from given switch
 */
EN_SWError_t SW_u8EnableSwitch(ST_Switch* Copy_Switch);

/**
 * Disables reading from given switch
 */
EN_SWError_t SW_u8DisableSwitch(ST_Switch* Copy_Switch);

/**
 * Read the value on the switch pin and stores it in given reference
 */
EN_SWError_t SW_u8ReadSwitch(ST_Switch* Copy_Switch, EN_SWValue_t* Copy_SwitchValue);
```

APPLICATION

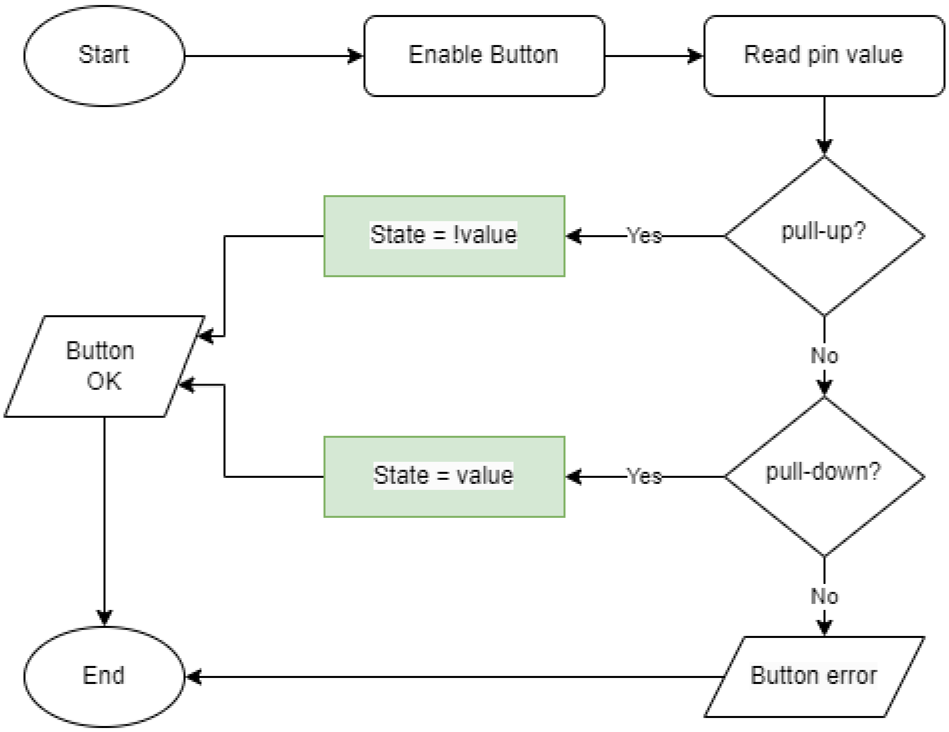
```
/**
 * initialize the configured io ports
 */
void App_Init(void);

/**
 * The app main logic
 */
void App(void);
```

API Design Diagrams

- **LED API State Machine**



- **Button API Flow Chart**



Start
Enable Button
Read pin value
State = !value
Yes
pull-up?
Button OK
No
State = value
Yes
pull-down?
No
End
Button error