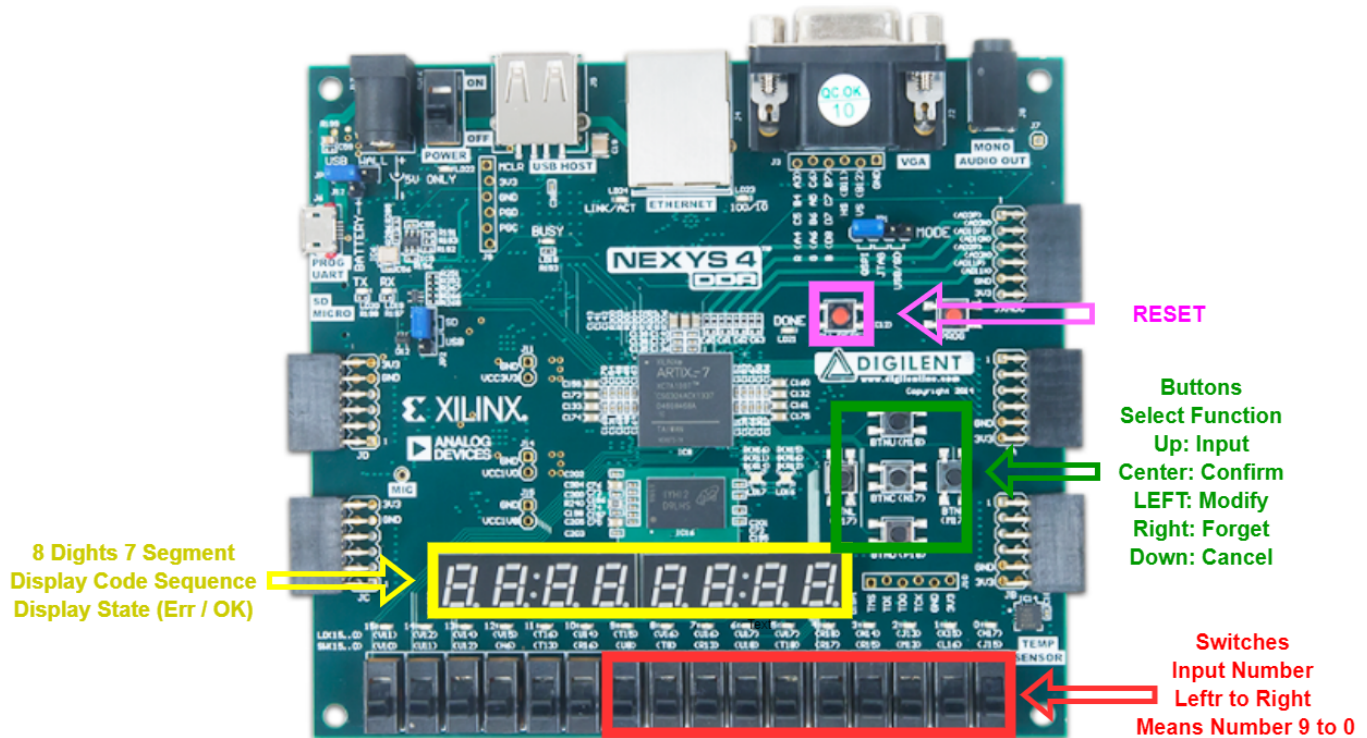# University of Birmingham, 2020 Digit Design Assigment: An Combination Lock

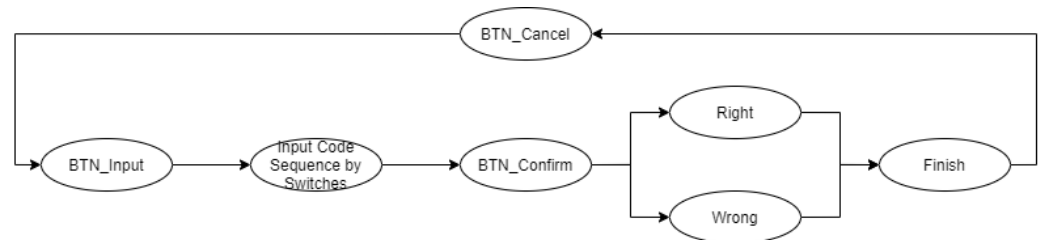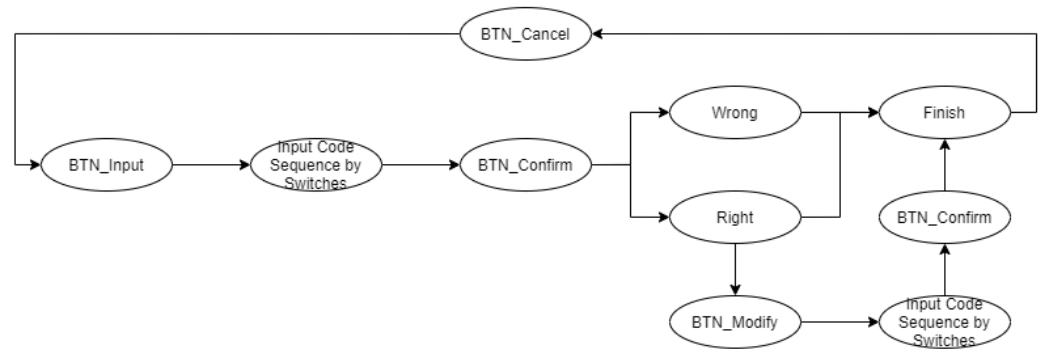Using VHDL language and implement on Nexys4 DDR ,design by Yifan Du, Check it on Github

Hardware Specification

- **RESET**: Reset all value, code sequence and password

- **Buttons**: Use button to entry differnet function (mode).

  - **UP**: Normal input mode
  - **Left**: Modify password mode, only working afer input right code sequence
  - **Center**: Confirm button, when user finfish input, push this button to confirm input code sequence.
  - **Right**: Forget password mode / Admain mode
  - **Down**: Cancel / exit button.

- **8 Dight 7 Segments**: Initial state will display "_"

- **Switches**: Push up then push down same switch, its means input one number

  - *e.g*: push up switch [4] then push down, its means input deciaml number 4

Button Function Specification

Normal Input Mode

```
                        BTN_Cancel
    ┌──────────────────────────────────────────────────────────┐
    │                                          ┌──► Right ──┐    │
    ▼                                          │            ▼    │
BTN_Input ──► Input Code ──► BTN_Confirm ──────┤          Finish ┘
              Sequence by                      │            ▲
              Switches                         └──► Wrong ──┘
```

Modity Password Mode

```
                        BTN_Cancel
    ┌──────────────────────────────────────────────────────────────────┐
    │                                          ┌──► Wrong ──► Finish     │
    ▼                                          │                ▲        │
BTN_Input ──► Input Code ──► BTN_Confirm ──────┤                │        │
              Sequence by                      └──► Right    BTN_Confirm  │
              Switches                              │            ▲
                                                    ▼            │
                                              BTN_Modify ──► Input Code
                                                             Sequence by
                                                             Switches
```

Forget Passowrd Mode

```
                        BTN_Cancel
    ┌──────────────────────────────────────────────────────────────────┐
    │                                          ┌──► Wrong ──► Finish     │
    ▼                                          │                ▲        │
BTN_Forget ──► Input Code ──► BTN_Confirm ─────┤                │        │
               Sequence by                     └──► Right        │
               Switches                            │             │
                                                   ▼             │
                                             BTN_Modify ──► Input Code ──► BTN_Confirm
                                                            Sequence by
                                                            Switches
```
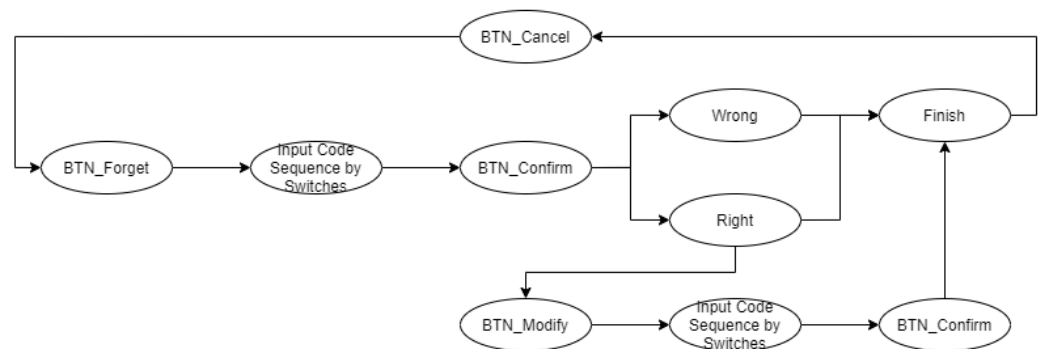
> Input whole code sequence then push confirm (center) button
>
> *e.g* Input code sequence 0123, switch[0]-up-down -> switch[1]-up-down -> switch[2]-up-down -> switch[3]-up-down -> confirm