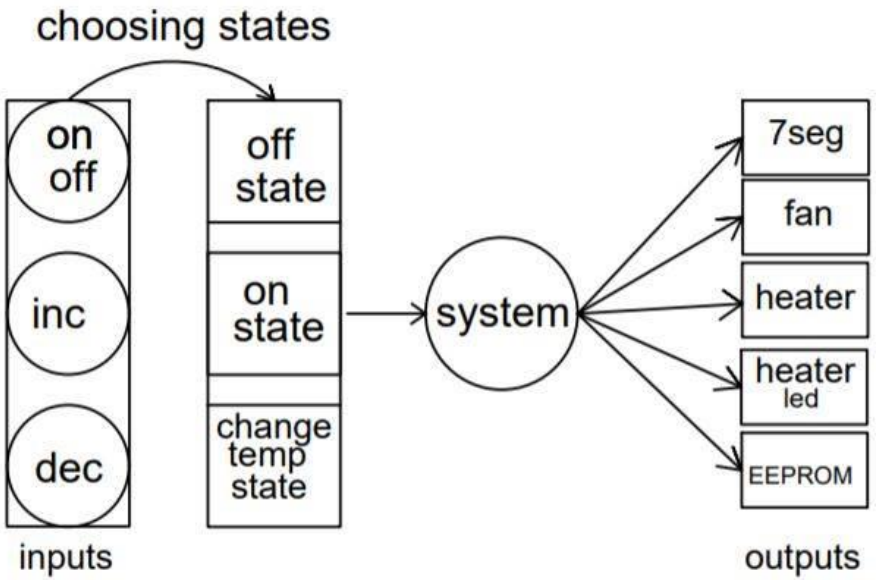
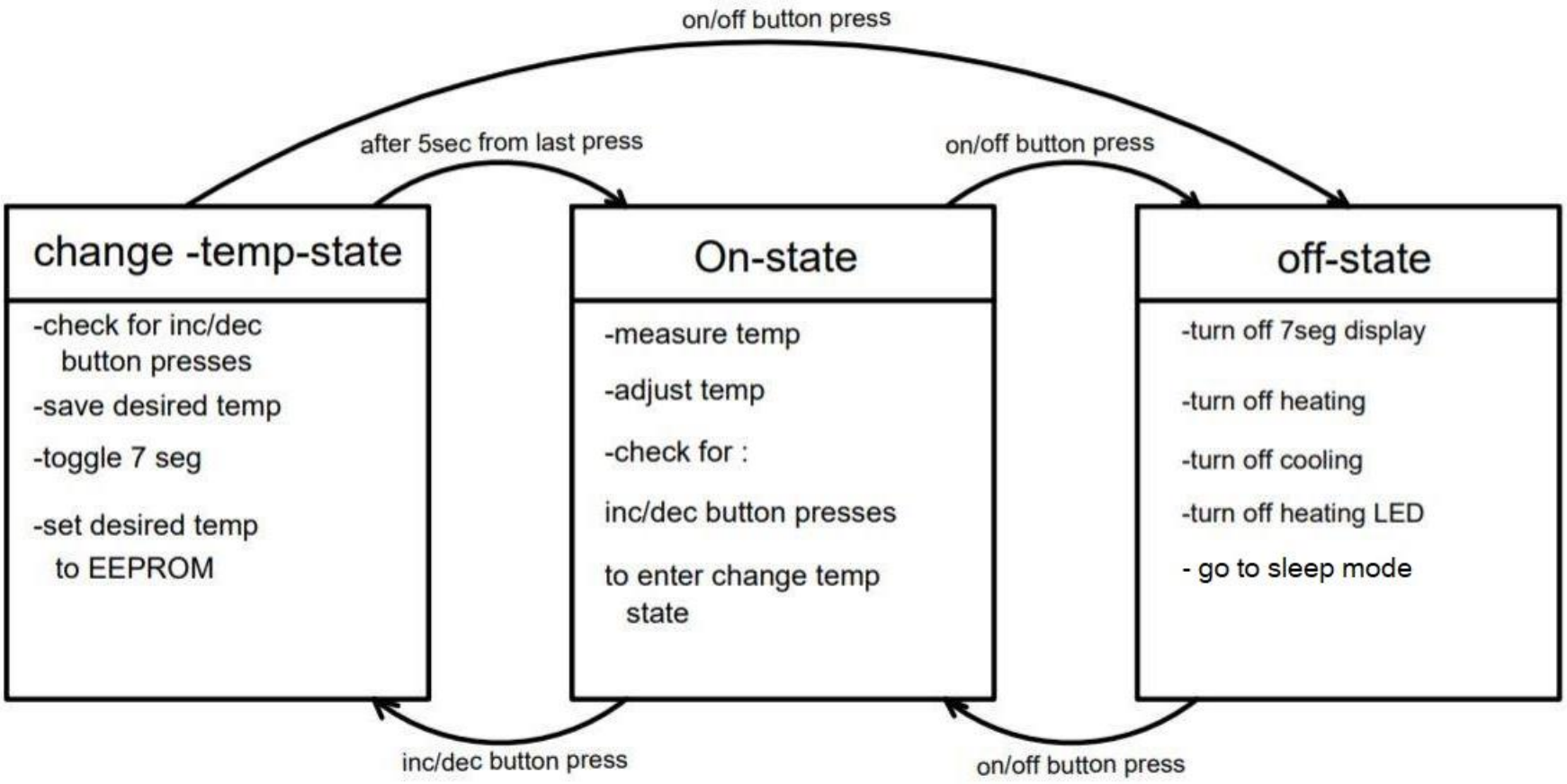
SWIFT ACT Internship Project

ELECTRIC WATER HEATER

System Design



State Diagram



Detailed Design

Buttons

- Button_Init
- ON_Button_EXTI_Init
- UP_Pressed
- Down_Pressed

Display

- Sev_Seg_Init
- Sev_Seg_Write
- Sev_Seg_Enable
- Sev_Seg_Disable
- Sev_Seg_Write_99

Fan

- Fan_Init
- Fan_Start
- Fan_Stop

EEPROM

- Includes I2C driver
- EEPROM_Init
- EEPROM_Write
- EEPROM_Read

I2C driver ：

- I2C_Init
- I2C_Hold
- I2C_Start
- I2C_Repeated_Start
- I2C_Stop
- I2C_Write_Byte
- I2C_Read_Byte

Heater

- Heater_Init
- Heater_Start
- Heater_Stop

Detailed Design “contd.”

LEDs

- Heating_LED_Init
- Heating_LED_On
- Heating_LED_Off
- Heating_LED_Toggle

Temp Sensor

- Temp_Sensor_ADC_Init
- Temp_Sensor_ADC_Read

Main Function :

- Initialize the system
- Check the State
- call the State Task

System

- Sytem_Init
- Adjust_Temp
- Add_New_Temp
- Calc_Temp_Avg

State Task Functions

- Task_OFF_State
- Task_ON_State
- Task_ChangeTemp_State

Detailed Design “contd.”

Configurable parameters

- MARGIN_TEMP = 1

Should be 5 degree but I used 1 for better performance

- MAX_TEMP = 75
- MIN_TEMP = 35
- INITIAL_DESIRED_TEMP = 60
- NUM_OF_TEMP_MEASUREMENTS = 10
- DEBOUNCING_INTERVAL = 75 ms “Defined in Buttons.h “

System Interrupts :

- External Interrupt (ON/OFF)
- Timer1 interrupt

  used for Toggling and Tracking 5 sec delays after last button press
- Timer 0 interrupt

  used to set a flag each 100ms to Measure the Temprature

Schedulability Check