DYNAMIC DESIGN

EGFWD ADVANCED EMBEDDED SYSTEMS
SCHOLERSHIP

EMBEDDED SW DESIGN PROJECT

Prepared by
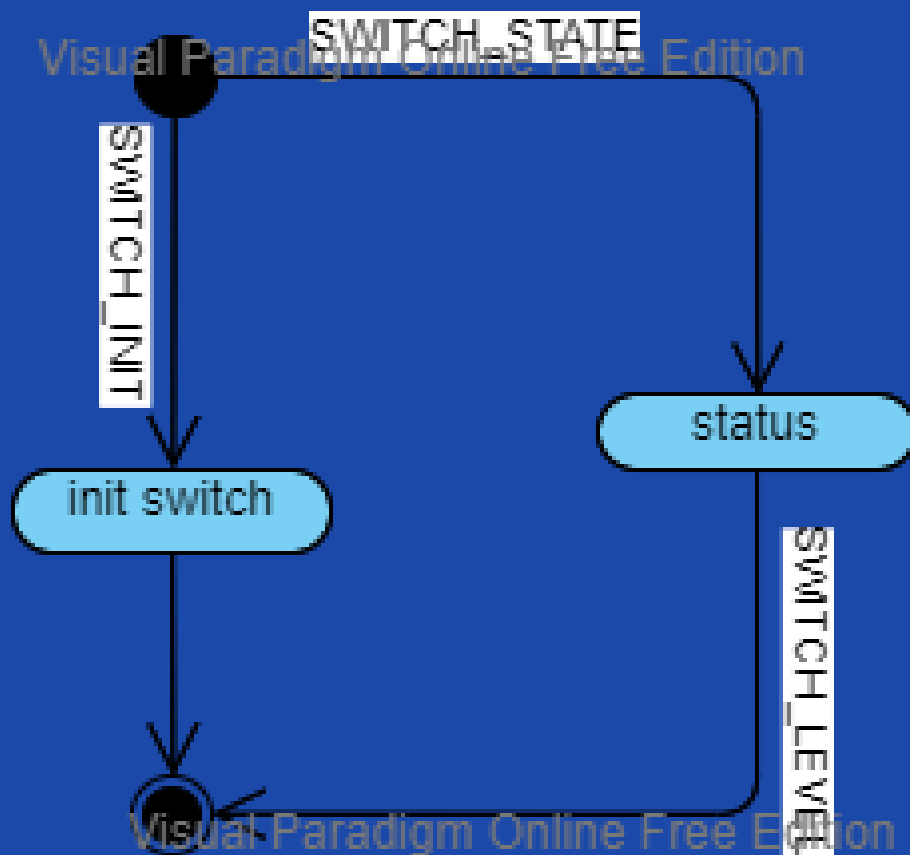
MOHAMMED RASHAD

Ministry of Communications
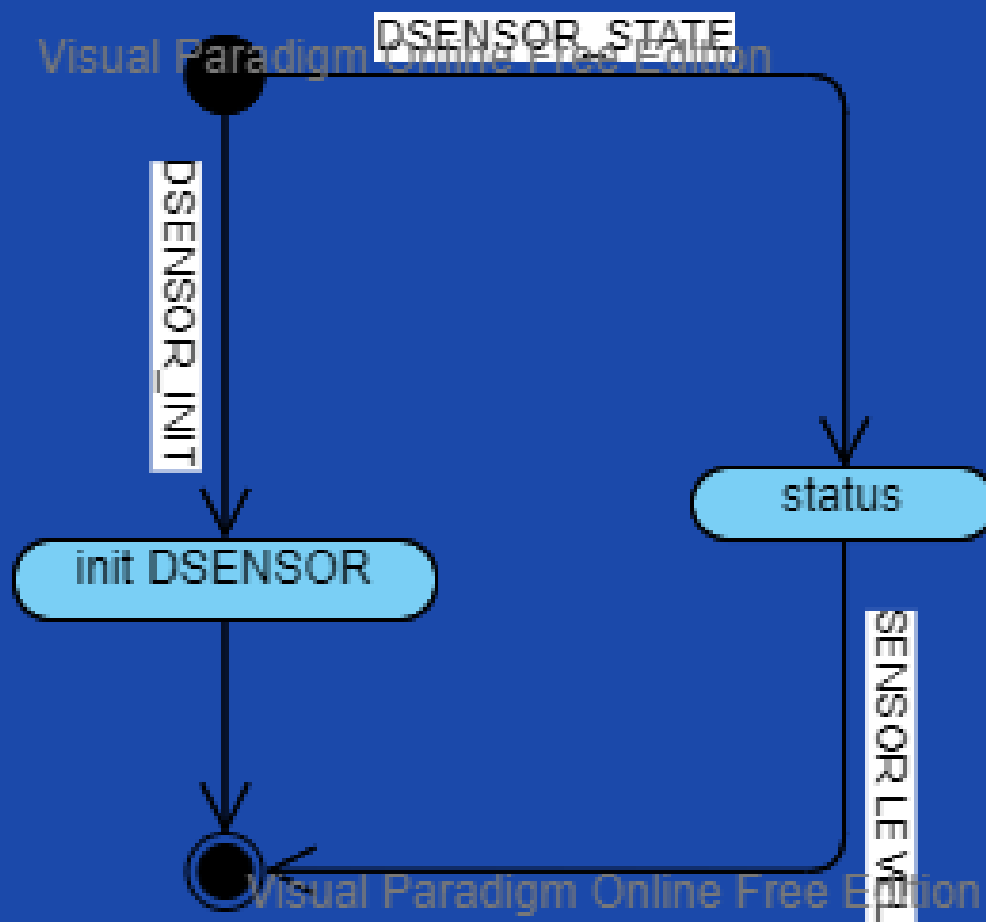and Information Technology

ECU1 COMPONENTS STATE MACHINE

SWITCH

SWITCH_STATE

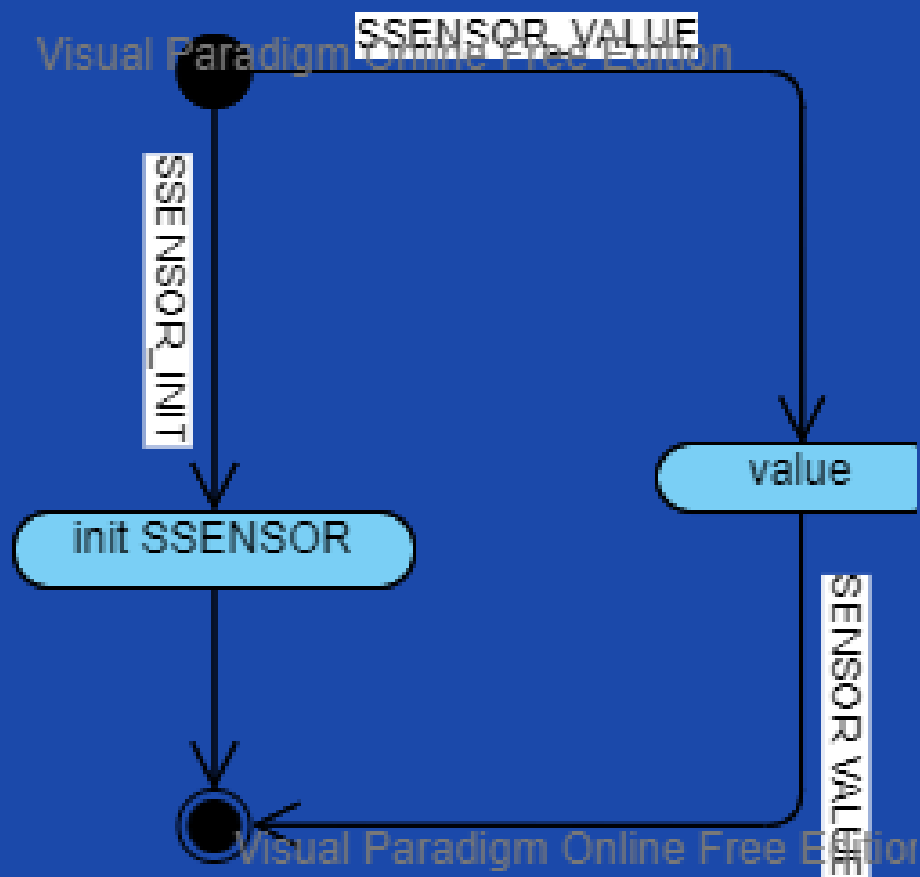SWITCH_INIT

init switch

status

SWITCH_LEVEL

DOOR SENSOR

SPEED SENSOR

ECU1
STATE MACHINE

INIT

IDLE
READING SENSORS

NO TASK

%10 =0
DOORSTATE MSG SEND

TICK ISR
EVERY 5MS

%5 =0
SPEED MSG SEND

%20 =0
SWITCHSTATE MSG SEND

SENDING

ECU1
SEQUENCE DIAGRAM

APP SSENSOR DSENSOR SWITCH BCM GPIO GPT CAN ADC

CREAT INSTANCE
CREAT INSTANCE
CREAT INSTANCE
CREAT INSTANCE
CREAT INSTANCE
CREAT INSTANCE
CREAT INSTANCE
CREAT INSTANCE
SET CALLBACK
GET SPEED SENSOR DATA
GET ADC VALUE
SENSOR DATA
ADC VALUE
GET DOOR SENSOR STATE
GET SENSOR LEVEL
DOOR STATE
SENSOR LEVEL
GET SWITCH STATE
GET SWITCH LEVEL
SWITCH STATE
SWITCH LEVEL
5MS TRIGGERED
5MS CALLBACK
SEND SSENSOR
CAN WRITE SPEED MSG
10MS TRIGGERED
10MS CALLBACK
SEND DSENSOR
CAN WRITE DOOR MSG
20MS TRIGGERED
20MS CALLBACK
SEND SWITCH
CAN WRITE SWITCH MSG

ECU2 COMPONENTS STATE MACHINE

LIGHT

BUZZER

BUZZER_OFF

BUZZER_ON

BUZZER_INIT

OFF

init buzzer

ON

ECU2
STATE MACHINE

INIT

IDLE
**LIGHT & BUZZER
WORKING**

NO TASK

%10 =0
DOORSTATE MSG RECEIVE

TICK ISR
EVERY 5MS

%5 =0
SPEED MSG RECEIVE

%20 =0
SWITCHSTATE MSG RECEIVE

RECEIVING
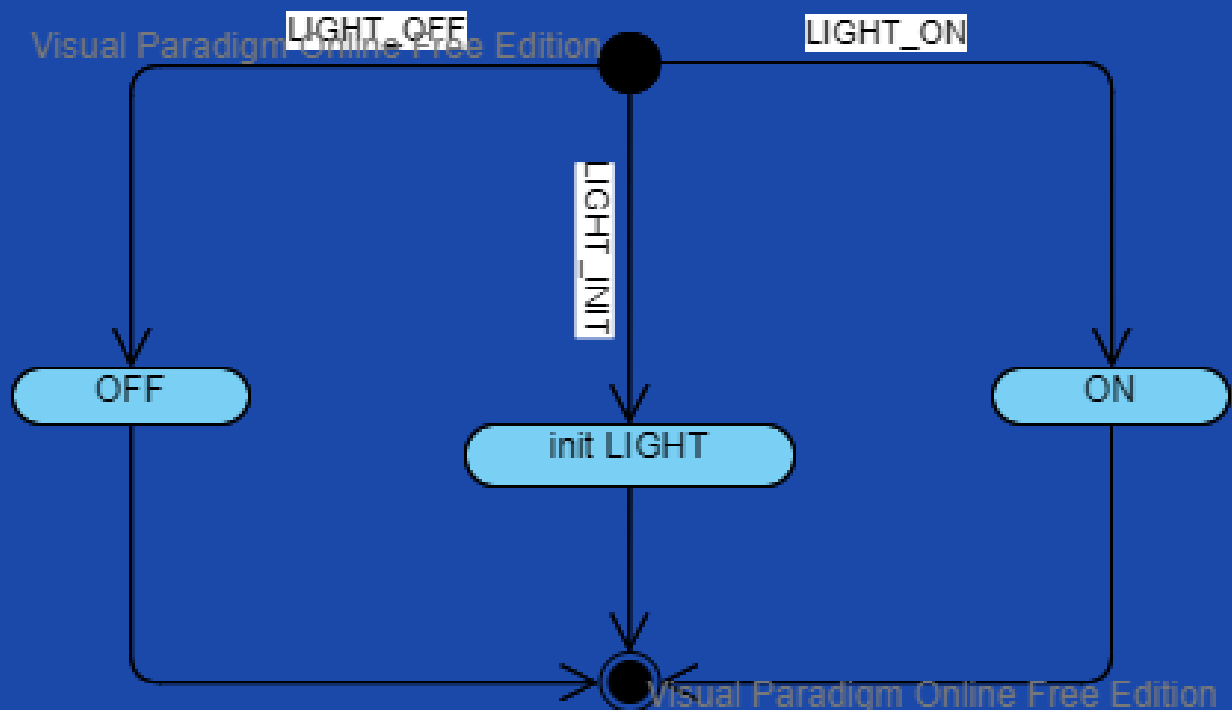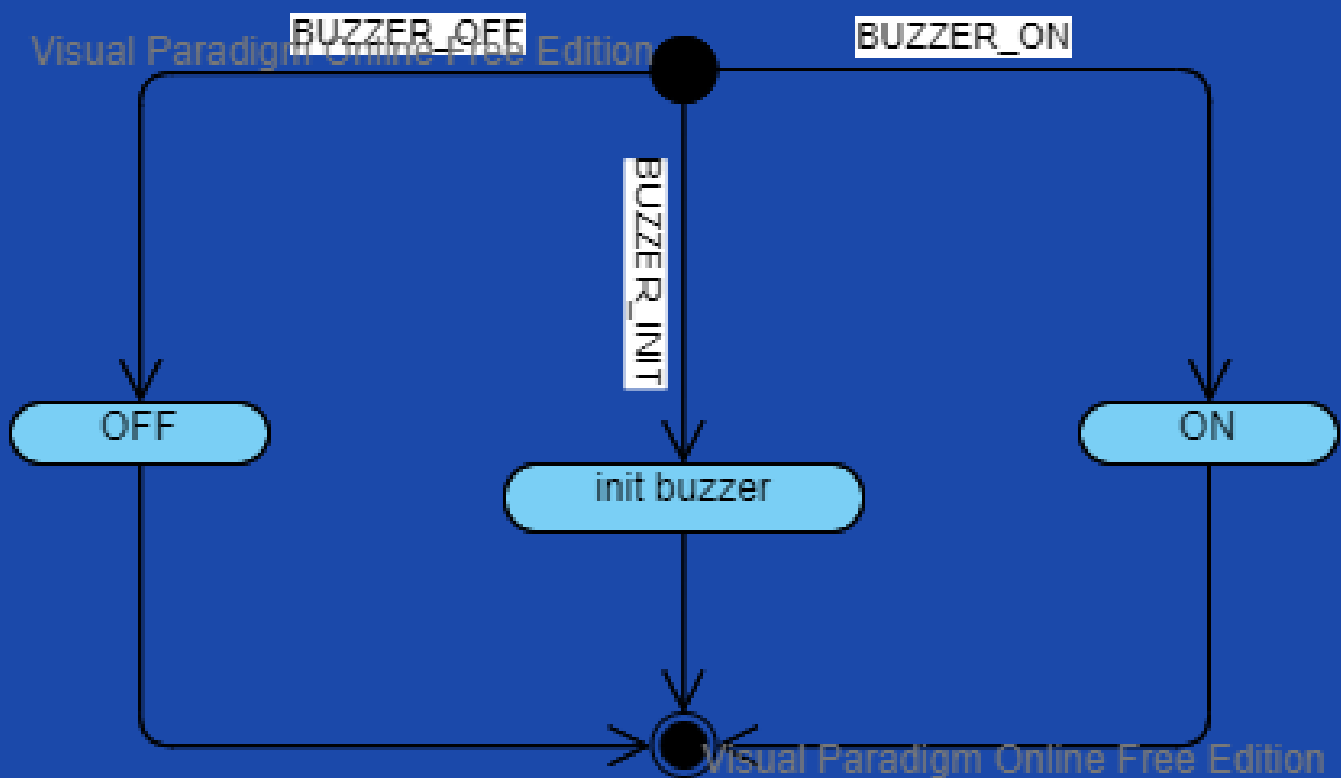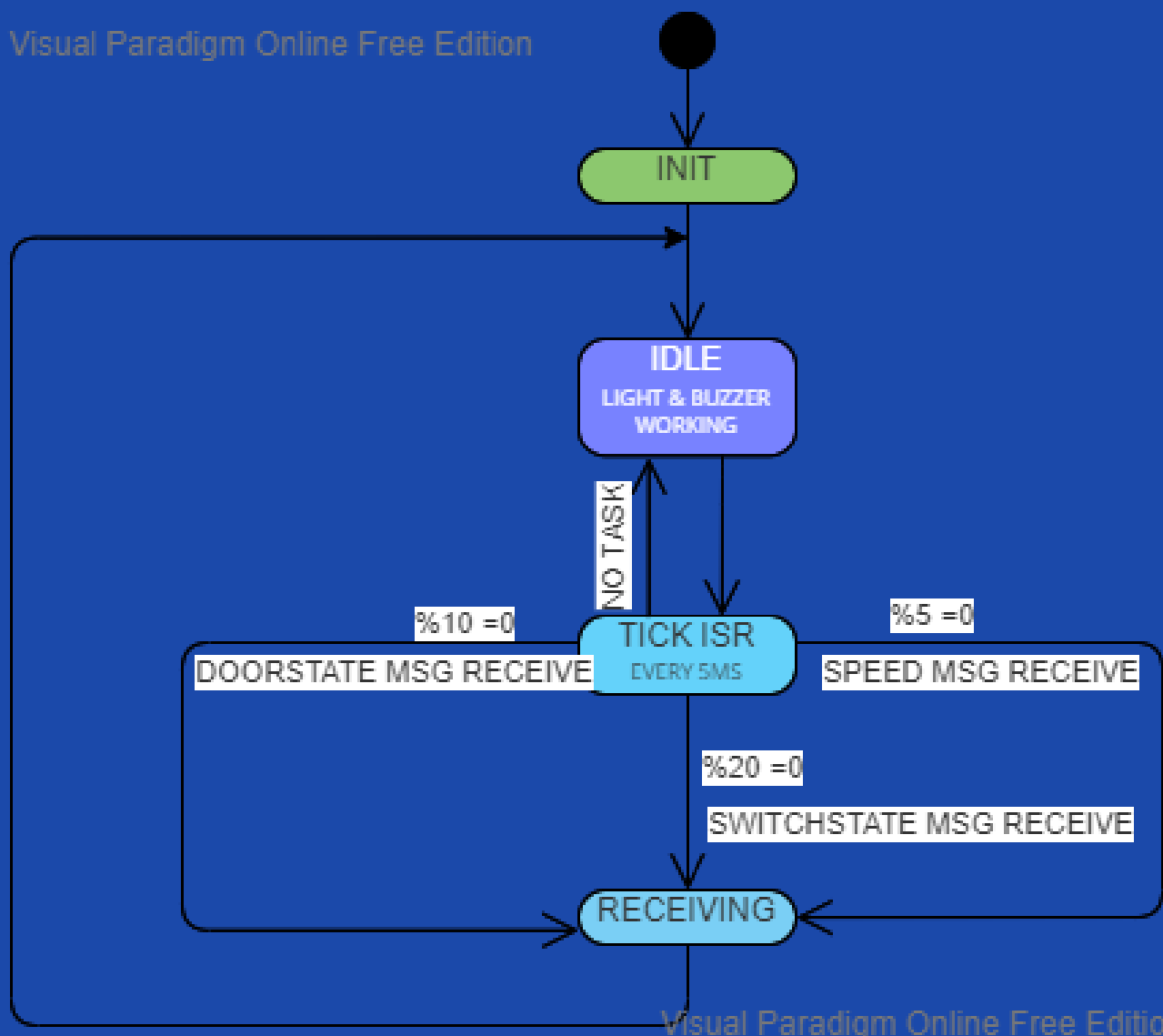
ECU2
SEQUENCE DIAGRAM

CPU LOAD

both of two CPUs are mainly loaded while tasks are processing

- speed sensor --> every 5   ms
- door sensor   --> every 10 ms
- switch   --> every 20 ms

hyperperiod = 20 ms

assuming all tasks have equal execution time which equals 1ms

then CPU load = (4*1)+(2*1)+(1*1)/20 = 35%