



California State University, Channel Islands (CSUCI)
Department of Computer Science

COMP-462: Embedded Systems
Fall 2019

Assignment Number: 4

Student Name: Brian “Keith” Skinner

Student Major: Computer Science

State Machine



{

W001, W002, W004, W008, W016,
W101, W102, W104, W108, W116,
W216, W208, W204, W202, W201,
W316, W308, W304, W302, W301,

C001, C002, C004, C008, C016,
C101, C102, C104, C108, C116,
C216, C208, C204, C202, C201,
C316, C308, C304, C302, C301,

```
NUM_STATES
};
```

State Structure

```
typedef struct state_tag {
    uint32_t wipe;
    uint32_t clean;
    uint32_t next[4];
} State;
```

List of I/O Transitions

```
State STATES[NUM_STATES] =
{
    // NOTHING
    { 0, 0, { NOTHING, C001, W001, C001 } },

    // W0XX
    { 1, 0, { W002, C002, W002, C002 } },
    { 2, 0, { W004, C004, W004, C004 } },
    { 4, 0, { W008, C008, W008, C008 } },
    { 8, 0, { W016, C016, W016, C016 } },
    { 16, 0, { W101, C101, W101, C101 } },

    // W1XX
    { 1, 0, { W102, C102, W102, C102 } },
    { 2, 0, { W104, C104, W104, C104 } },
    { 4, 0, { W108, C108, W108, C108 } },
    { 8, 0, { W116, C116, W116, C116 } },
    { 16, 0, { W216, C216, W216, C216 } },

    // W2XX
    { 16, 0, { W208, C208, W208, C208 } },
    { 8, 0, { W204, C204, W204, C204 } },
    { 4, 0, { W202, C202, W202, C202 } },
    { 2, 0, { W201, C201, W201, C201 } },
    { 1, 0, { W316, C316, W316, C316 } },

    // W3XX
    { 16, 0, { W308, C308, W308, C308 } },
    { 8, 0, { W304, C304, W304, C304 } },
    { 4, 0, { W302, C302, W302, C302 } },
    { 2, 0, { W301, C301, W301, C301 } },
    { 1, 0, { NOTHING, C001, W001, C001 } },

    // C0XX
    { 1, 1, { W002, C002, W002, C002 } },
    { 2, 1, { W004, C004, W004, C004 } },
```

```

{ 4, 1, { W008, C008, W008, C008 } },
{ 8, 1, { W016, C016, W016, C016 } },
{ 16, 1, { W101, C101, W101, C101 } },

// C1XX
{ 1, 1, { W102, C102, W102, C102 } },
{ 2, 1, { W104, C104, W104, C104 } },
{ 4, 1, { W108, C108, W108, C108 } },
{ 8, 1, { W116, C116, W116, C116 } },
{ 16, 1, { W216, C216, W216, C216 } },

// C2XX
{ 16, 1, { W208, C208, W208, C208 } },
{ 8, 1, { W204, C204, W204, C204 } },
{ 4, 1, { W202, C202, W202, C202 } },
{ 2, 1, { W201, C201, W201, C201 } },
{ 1, 1, { W316, C316, W316, C316 } },

// C3XX
{ 16, 1, { W308, C308, W308, C308 } },
{ 8, 1, { W304, C304, W304, C304 } },
{ 4, 1, { W302, C302, W302, C302 } },
{ 2, 1, { W301, C301, W301, C301 } },
{ 1, 1, { NOTHING, C001, W001, C001 } }
};

```

State Loop

```

while(1) {
    // output
    GPIO_PORTA_DATA_R = state.wipe + (state.clean << 5);
    // wait
    SysTick_Wait10ms(5);
    // input
    uint32_t input = GPIO_PORTA_DATA_R;
    // next
    input >>= 4;
    input &= 3;
    state = STATES[state.next[input]];
}

```