```
/**
 * @file ctc_bt.js
 * @author Joey Damico
 * @date September 25, 2019
 * @summary CTC Controller Class for the BT Interlocking
 */

// Color Constants For Drawing Routes
const Empty = '#999999';
const Lined = '#75fa4c';
const Occupied = '#eb3323';


/**
 * Class is the Backend for the BT Interlocking This class is what
controlls the BT Interlocking,
 * it is sort of like a backen, but is the controller, this is what
makes all the train movements possible,
 * and the ReactJS Component class gets information from this class to
display the correct status of the
 * interlocking on the screen
 *
 * @member sw_1 -> Bool if Switch #1 is Reveresed or Not
 * @member sw_3 -> Bool if Switch #3 is Reveresed or Not
 * @member sw_5 -> Bool if Switch #5 is Reveresed or Not
 *
 * @member sig_2w1 -> Bool if Signal #2w-1 is Lined or Not
 * @member sig_2w2 -> Bool if Signal #2w-2 is Lined or Not
 * @member sig_4w -> Bool if Signal #4w is Lined or Not
 * @member sig_2e -> Bool if Signal #2e is Lined or Not
 * @member sig_4e -> Bool if Signal #4e is Lined or Not
 *
 * @member route_w_trk_1 = The west bound route for track #1
 * @member route_w_trk_2 = The west bound route for track #2
 * @member route_w_trk_3 = The west bound route for track #3
 * @member route_e_trk_1 = The east bound route for track #1
 * @member route_e_trk_2 = The east bound route for track #2
 *
 * @member routed_trk_1 = Bool if track #1 is routed or not
 * @member routed_trk_2 = Bool if track #2 is routed or not
 * @member trk_1_time = The time track #1 was occupied, used to know
when to clear the route
 * @member trk_2_time = The time track #2 was occupied, used to know
when to clear the route
 * @member trk_1_occupied = Bool if track #1 is occupied or not
 * @member trk_2_occupied = Bool if track #2 is occupied or not
 */
class CTC_BT {
    /**
     * constructor()
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```
     * @summary The constructor for the CTC_BT class
     *
     * @description This will initialize all the member variables when
the program is started
     */
    constructor() {
        // Bools for the switches
        this.sw_1 = false;
        this.sw_3 = false;
        this.sw_5 = false;
        // Bools for the signals
        this.sig_2w1 = false;
        this.sig_2w2 = false;
        this.sig_4w = false;
        this.sig_2e = false;
        this.sig_4e = false;
        // Track routes
        this.route_w_trk_1 = null;
        this.route_w_trk_2 = null;
        this.route_w_trk_3 = null;
        this.route_e_trk_1 = null;
        this.route_e_trk_2 = null;
        // Used for routing and occupying the tracks
        this.routed_trk_1 = false;
        this.routed_trk_2 = false;
        this.trk_1_time = null;
        this.trk_2_time = null;
        this.trk_1_occupied = false;
        this.trk_2_occupied = false;
    }
    // ---- END constructor() ----

    /**
     * get_train_route()
     * @summary Returns the route for the train at a given track
     *
     * @param direction, The direction the train is moving
     * @param track, The Track number of the train
     */
    get_train_route(direction, track) {
        if (direction === "WEST") {
            if (track === "1") {
                return this.route_w_trk_1;
            }
            else if (track === "2") {
                return this.route_w_trk_2;
            }
            else {
                return this.route_w_trk_3;
            }
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        }
        else {
            if (track === "1") {
                return this.route_e_trk_1;
            }
            else {
                return this.route_e_trk_2;
            }
        }
    }
    // ---- END get_train_route() ----

    /**
     * click_sig_2w1()
     * @summary the function that is called when clicking the signal,
creates a route
     *
     * @description When the function is called it will determine if a
route can be created,
     * and if so what the route is and sets it based off of the switch
status
     *
     * @param next_block_1, The next block on Track #1
     * @param next_block_2, The next block on Track #2
     */
    click_sig_2w1(next_block_1, next_block_2) {
        // Checks if Any Switches are Against the signal
        if (this.sw_5 || this.sw_1) {
            return;
        }
        else if (!this.sw_3) {
            if (this.sig_2w1) {
                this.route_w_trk_1 = null;
                this.routed_trk_1 = false;
                this.sig_2w1 = false;
            }
            else {
                if (next_block_1 === Occupied || next_block_1 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
                }
                this.route_w_trk_1 = "W_1_1__|__3_ridgewood_bt";
                this.routed_trk_1 = true;
                this.sig_2w1 = true;
            }
        }
        else if (this.sw_3) {
            if (this.sig_2w1) {
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                this.route_w_trk_1 = null;
                this.routed_trk_1 = false;
                this.sig_2w1 = false;
            }
            else {
                if (next_block_2 === Occupied || next_block_2 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
                }
                this.route_w_trk_1 = "W_1_2__|__4_ridgewood_bt";
                this.routed_trk_1 = true;
                this.sig_2w1 = true;
            }
        }
    }
    // ---- END click_sig_2w1() ----

    /**
     * click_sig_2w2()
     * @summary the function that is called when clicking the signal,
creates a route
     *
     * @description When the function is called it will determine if a
route can be created,
     * and if so what the route is and sets it based off of the switch
status
     *
     * @param next_block_1, The next block on Track #1
     * @param next_block_2, The next block on Track #2
     */
    click_sig_2w2(next_block_1, next_block_2) {
        // Checks if Any Switches are Against the signal
        if (!this.sw_5 || this.sw_1) {
            return;
        }
        else if (!this.sw_3) {
            if (this.sig_2w2) {
                this.route_w_trk_3 = null;
                this.routed_trk_1 = false;
                this.sig_2w2 = false;
            }
            else {
                if (next_block_1 === Occupied || next_block_1 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
                }
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                this.route_w_trk_3 = "W_3_1__|__3_ridgewood_bt";
                this.routed_trk_1 = true;
                this.sig_2w2 = true;
            }
        }
        else if (this.sw_3) {
            if (this.sig_2w2) {
                this.route_w_trk_3 = null;
                this.routed_trk_1 = false;
                this.sig_2w2 = false;
            }
            else {
                if (next_block_2 === Occupied || next_block_2 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
                }
                this.route_w_trk_3 = "W_3_2__|__4_ridgewood_bt";
                this.routed_trk_1 = true;
                this.sig_2w2 = true;
            }
        }
    }
    // ---- END click_sig_2w2() ----

    /**
     * click_sig_4w()
     * @summary the function that is called when clicking the signal,
creates a route
     *
     * @description When the function is called it will determine if a
route can be created,
     * and if so what the route is and sets it based off of the switch
status
     *
     * @param next_block_1, The next block on Track #1
     * @param next_block_2, The next block on Track #2
     */
    click_sig_4w(next_block_1, next_block_2) {
        // Checks if Any Switches are Against the signal
        if (this.sw_3) {
            return;
        }
        else if (!this.sw_1) {
            if (this.sig_4w) {
                this.route_w_trk_2 = null;
                this.routed_trk_2 = false;
                this.sig_4w = false;
            }
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            else {
                if (next_block_2 === Occupied || next_block_2 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
                }
                this.route_w_trk_2 = "W_2_2__|__4_ridgewood_bt";
                this.routed_trk_2 = true;
                this.sig_4w = true;
            }
        }
        else if (this.sw_1) {
            if (this.sig_4w) {
                this.route_w_trk_2 = null;
                this.routed_trk_2 = false;
                this.sig_4w = false;
            }
            else {
                if (next_block_1 === Occupied || next_block_1 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
                }
                this.route_w_trk_2 = "W_2_1__|__3_ridgewood_bt";
                this.routed_trk_2 = true;
                this.sig_4w = true;
            }
        }
    }
    // ---- END click_sig_4w() ----

    /**
     * click_sig_2e()
     * @summary the function that is called when clicking the signal,
creates a route
     *
     * @description When the function is called it will determine if a
route can be created,
     * and if so what the route is and sets it based off of the switch
status
     *
     * @param next_block_1, The next block on Track #1
     * @param next_block_2, The next block on Track #2
     * @param next_block_3, The next block on Track #3
     */
    click_sig_2e(next_block_1, next_block_2, next_block_3) {
        // Checks if Any Switches are Against the signal
        if (this.sw_3) {
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            return;
        }
        else if (!this.sw_1 && !this.sw_5) {
            if (this.sig_2e) {
                this.route_e_trk_1 = null;
                this.routed_trk_1 = false;
                this.sig_2e = false;
            }
            else {
                if (next_block_1 === Occupied || next_block_1 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
                }
                this.route_e_trk_1 = "E_1_1__|__1_bt_pascack";
                this.routed_trk_1 = true;
                this.sig_2e = true;
            }
        }
        else if (!this.sw_1 && this.sw_5) {
            if (this.sig_2e) {
                this.route_e_trk_1 = null;
                this.routed_trk_1 = false;
                this.sig_2e = false;
            }
            else {
                if (next_block_3 === Occupied || next_block_3 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
                }
                this.route_e_trk_1 = "E_1_3__|__3_bt_nysw";
                this.routed_trk_1 = true;
                this.sig_2e = true;
            }
        }
        else if (this.sw_1) {
            if (this.sig_2e) {
                this.route_e_trk_1 = null;
                this.routed_trk_1 = false;
                this.sig_2e = false;
            }
            else {
                if (next_block_2 === Occupied || next_block_2 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
```

```
                }
                this.route_e_trk_1 = "E_1_2__|__2_bt_pascack";
                this.routed_trk_1 = true;
                this.sig_2e = true;
            }
        }
    }
    // ---- END click_sig_2e() ----

    /**
     * click_sig_4e()
     * @summary the function that is called when clicking the signal,
creates a route
     *
     * @description When the function is called it will determine if a
route can be created,
     * and if so what the route is and sets it based off of the switch
status
     *
     * @param next_block_1, The next block on Track #1
     * @param next_block_2, The next block on Track #2
     * @param next_block_3, The next block on Track #3
     */
    click_sig_4e(next_block_1, next_block_2, next_block_3) {
        // Checks if Any Switches are Against the signal
        if (this.sw_1) {
            return;
        }
        else if (!this.sw_3) {
            if (this.sig_4e) {
                this.route_e_trk_2 = null;
                this.routed_trk_2 = false;
                this.sig_4e = false;
            }
            else {
                if (next_block_2 === Occupied || next_block_2 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
                }
                this.route_e_trk_2 = "E_2_2__|__2_bt_pascack";
                this.routed_trk_2 = true;
                this.sig_4e = true;
            }
        }
        else if (this.sw_3 && !this.sw_5) {
            if (this.sig_4e) {
                this.route_e_trk_2 = null;
                this.routed_trk_2 = false;
```

```
                this.sig_4e = false;
            }
            else {
                if (next_block_1 === Occupied || next_block_1 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
                }
                this.route_e_trk_2 = "E_2_1__|__1_bt_pascack";
                this.routed_trk_2 = true;
                this.sig_4e = true;
            }
        }
        else if (this.sw_3 && this.sw_5) {
            if (this.sig_4e) {
                this.route_e_trk_2 = null;
                this.routed_trk_2 = false;
                this.sig_4e = false;
            }
            else {
                if (next_block_3 === Occupied || next_block_3 ===
Lined) {
                    alert("Cannot Line Route Because Conflict With
Next Block");
                    return;
                }
                this.route_e_trk_2 = "E_2_3__|__3_bt_nysw";
                this.routed_trk_2 = true;
                this.sig_4e = true;
            }
        }
    }
    // ---- END click_sig_4e() ----

    /**
     * set_trk_1_occupied()
     * @summary Sets track #1 as occupied
     *
     * @param n_state, The new state of the track
     * This was used to test, and never removed passing the state as a
paramemter, which is not needed anymore
     */
    set_trk_1_occupied(n_state) {
        if (n_state === true) {
            // Set the track #1 as Occupied
            this.trk_1_occupied = n_state;
            // Remove the route from track #1
            this.routed_trk_1 = false;
            // Set the time track #1 was occupied
```

```
            this.trk_1_time = new Date().getTime() / 1000;
        }
        else {
            console.log("ERROR");
        }
    }
    // ---- END set_trk_1_occupied() ----

    /**
     * set_trk_2_occupied()
     * @summary Sets track #1 as occupied
     *
     * @param n_state, The new state of the track
     * This was used to test, and never removed passing the state as a
paramemter, which is not needed anymore
     */
    set_trk_2_occupied(n_state) {
        if (n_state === true) {
            // Set the track #2 as Occupied
            this.trk_2_occupied = n_state;
            // Remove the route from track #2
            this.routed_trk_2 = false;
            // Set the time track #2 was occupied
            this.trk_2_time = new Date().getTime() / 1000;
        }
        else {
            console.log("ERROR");
        }
    }
    // ---- END set_trk_2_occupied() ----

    /**
     * can_clear()
     * @summary Checks if a track could be cleared, meaning a train is
no longer in the interlocking
     *
     * @description Check both track if a train has been in the
interlocking for more then 4 seconds, if so it
     * clears that track
     */
    can_clear() {
        // Get the current time
        let current_time = new Date().getTime() / 1000;

        // Checking Track 1
        if (current_time - this.trk_1_time > 4 && current_time -
this.trk_1_time< 100000) {
            // Clear Track 1
            this.sig_2w1 = false;
            this.sig_2w2 = false;
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            this.sig_2e = false;

            this.route_w_trk_1 = null;
            this.route_e_trk_1 = null;
            this.route_w_trk_3 = null;
            this.routed_trk_1 = false;

            this.trk_1_occupied = false;
            this.trk_1_time = null;
        }
        // Checking Track 2
        if (current_time - this.trk_2_time > 4 && current_time -
this.trk_2_time< 100000) {
            // Clear Track 2
            this.sig_4w = false;
            this.sig_4e = false;

            this.route_w_trk_2 = null;
            this.route_e_trk_2 = null;
            this.routed_trk_2 = false;

            this.trk_2_occupied = false;
            this.trk_2_time = null;
        }
    }
    // ---- END can_clear() ----

    /**
     * throw_sw_1()
     * @summary Changes the current state of switch #1, used when user
clicks the switch
     */
    throw_sw_1() {
        if (this.sw_1 === false) {
            this.sw_1 = true;
        }
        else {
            this.sw_1 = false;
        }
    }
    // ---- END throw_sw_1() ----

    /**
     * throw_sw_3()
     * @summary Changes the current state of switch #3, used when user
clicks the switch
     */
    throw_sw_3() {
        if (this.sw_3 === false) {
            this.sw_3 = true;
```

```
        }
        else {
            this.sw_3 = false;
        }
    }
    // ---- END throw_sw_3() ----

    /**
     * throw_sw_5()
     * @summary Changes the current state of switch #5, used when user
clicks the switch
     */
    throw_sw_5() {
        if (this.sw_5 === false) {
            this.sw_5 = true;
        }
        else {
            this.sw_5 = false;
        }
    }
    // ---- END throw_sw_5() ----

    /**
     * get_routes()
     * @summary Gets all the routes from the interlocking
     *
     * @returns An Array holding every route variable from the
interlocking
     */
    get_routes() {
        let routes = [
            this.route_w_trk_1, this.route_w_trk_2,
this.route_w_trk_3,
            this.route_e_trk_1, this.route_e_trk_2
        ];

        return routes;
    }
    // ---- END get_routes() ----

    /**
     * get_interlocking_status()
     * @summary returns the status of the interlocking that would be
needed by the ReactJS Components
     *
     * @description All the information that is returned here is what
is needed by the ReactJS Component
     * for the interlocking that is need to draw the interlocking to
the screen
     *
```

```
     * @returns Object with the status of the interlocking
     */
    get_interlocking_status() {
        var status = {
            sw_1: this.sw_1,
            sw_3: this.sw_3,
            sw_5: this.sw_5,

            occupied_trk_1: this.trk_1_occupied,
            occupied_trk_2: this.trk_2_occupied,
            routed_1: this.routed_trk_1,
            routed_2: this.routed_trk_2,
            routes: this.get_routes()
        };

        return status;
    }
    // ---- END get_interlocking_status() ----
}

// This is required when using ReactJS
export default CTC_BT;
```