

Team 192 – Software Design Documentation for the iRobot Create

The architecture of our program for our iRobot Create, the robot which obtains Botguy, is essentially a simple series of commands which direct the robot to do one task at a time. Each task is begun when the previous task is assumed to have been completed. Tasks are sensor-driven, loop-based, or time-based, depending on what needs to be completed.

Tasks Include:

- Open claw: Uses the function “set_servo_position” to manipulate the servo motor and open the claw a certain degree. Also uses an if/else function to take into account the current position of the claw and which direction it needs to move in.
- Close claw: Uses the function “set_servo_position” to manipulate the servo motor and close the claw. Also uses an if/else function to take into account the current position of the claw and which direction it needs to move in.
- Raise arm: Uses the function “set_servo_position” to raise the arm attachment to a specified level. Also uses an if/else function to take into account the current position of the claw and which direction it needs to move in.
- Lower arm: Uses the function “set_servo_position” to raise the arm attachment to a specified level. Also uses an if/else function to take into account the current position of the claw and which direction it needs to move in.
- “create_mrp”: A drive function which effectively replicates the mrp function for the CBC, which is quite useful as it allows for programming the CBC and the iRobot Create in the same manner.
- Various light sensor tasks: A while loop is used to instruct the robot to continue its current task until the left light sensor, the right light sensor, either sensor, or both sensors hit a line.
- Align robot: A while loop is used to read input from the light sensors and keep the robot driving on a certain line of black tape.

Tasks are ordered in such a way that the robot is able to find and obtain Botguy easily, as well as obtain the wind turbines. Many of the functions which utilize servos control the attachment which grabs the turbines. In the program which will be discussed in more detail, the one which allows the robot to obtain Botguy, servo motors will not be mentioned because the claw attachment which retrieves Botguy is controlled by a single IFI motor.

Sensor Functions Used in Botguy Program

// Waits until either light sensor hits a line.

```
void until_line_either() {  
    while (analog10(10) < THRS && analog10(9) < THRS) msleep(10L);  
}
```

// Waits until both line sensors hit a line.

```
void until_line_both() {  
    int had_left = 0, left = 0, had_right = 0, right = 0;  
    while (!had_left || !had_right) {  
        left = analog10(10) >= THRS;  
        right = analog10(9) >= THRS;  
        if (left) had_left = 1;  
        if (right) had_right = 1;  
        msleep(10L);  
    }  
}
```

Note: Analog 10(10) is the left light sensor, and analog10(9) is the right one.

Flowchart with Code: Obtaining Botguy

