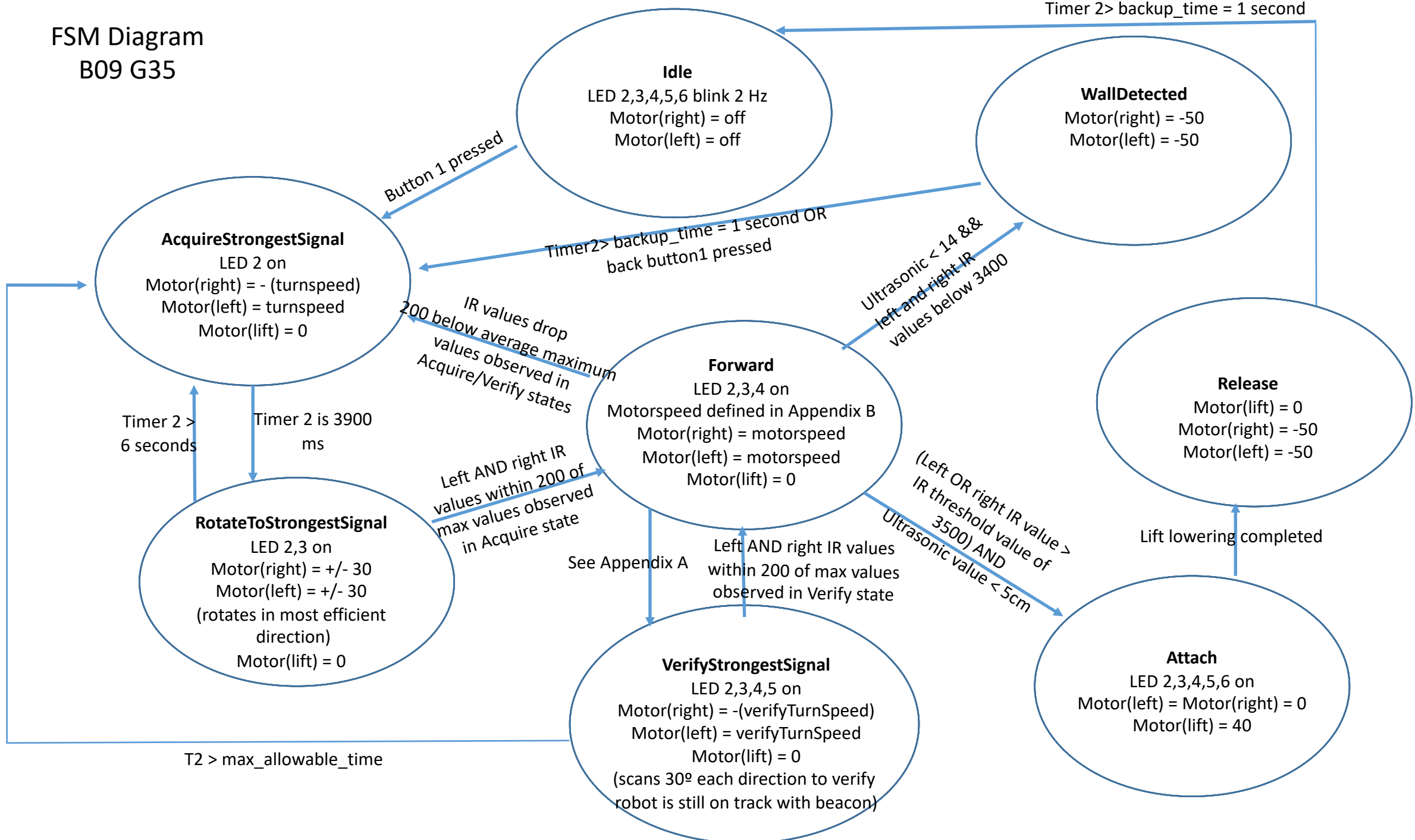


FSM Diagram B09 G35



Appendix A: State Transitions

Forward to VerifyStrongestSignal

IF: time has passed max_recheck time (2 seconds)

OR left and right IR values differ by more than IR_variance_threshold (300) AND time has passed min_recheck time (1.5 seconds)

OR left and right IR values are below the set threshold (set in AcquireStrongestSignal and VerifyStrongestSignal states, which is above background but lower than max values read), meaning beacon was moved

switch to VerifyStrongestSignal state, but ONLY IF the robot is farther than attachment_commitment_distance, which is the distance in which the robot is committed to its direction of approach and will not attempt to correct its orientation

Appendix B: State Details

Idle

Motor values are set to 0.

Initialize global variables:

```
Default light threshold = 1000;
```

```
maxDiffLevelIRRight = 0;
```

```
timeDiffLevelMeasured = 0;
```

```
maxDiffLevelIRLeft = 0;
```

```
checkLeftDirection = false;
```

```
max_recheck_time = 2000;
```

AcquireStrongestSignal

Robot takes 3.9 seconds to rotate 360 degrees at motor[right] = -60, motor[left] = 60

Record greatest IR values left and right IR sees:

```
if (diffLevelIRRight > maxDiffLevelIRRight):
```

```
maxDiffLevelIRRight = diffLevelIRRight
```

```
timeDiffLevelMeasured = time1[T2]
```

```
if (diffLevelIRLeft > maxDiffLevelIRLeft):
```

```
maxDiffLevelIRLeft = diffLevelIRLeft
```

Appendix B: State Details

Forward

Min motor speed on approach: 45

Absolute min motor speed to prevent stalling: 25

Absolute max motor speed to prevent uncontrolled speed: 95

IR variance between sensors for major direction adjustment: 300

IR variance between sensors for minor direction adjustment : 30

Distance at which robot will no longer perform direction adjustments: 8 cm

Robot will check direction of motion within $1.5 \leq t \leq 2$ seconds

Motor speed = base speed 30 + (target IR reading 3750 - (greater of left or right IR reading)) / 100 * k

Ensure motor speed is $\text{absolute_min_speed} \leq \text{motorspeed} \leq \text{absolute_max_speed}$

Robot is faster when it is farther away than when it is close

If (LeftIRvalue > rightIRvalue) slow down left to 0.8 of motor_speed

If (RightIRvalue > leftIRvalue) slow down right to 0.8 of motor_speed

If nearing beacon, slow down to 35 or 25 motor power

Right motor needs 0.91% power of left motor to go straight, so correction is applied to all motor_speed values before writing them to motor

Appendix B: State Details

Attach

Lower lift mechanism

Motor[[lift]] at 40 power for 2.6 seconds

Release

Once the release state is called from the attach state the robot backs up

Verify Strongest Signal

Robot scans 30 degrees to either direction. Initial direction determined by which IR signal was strongest.

Max allowable time for this state is 5 seconds (otherwise it may have lost track of beacon signal)

Rotates 0.5 sec then 0.9 sec in other direction at 45 motor power

Tracks highest left and right IR values

After 1.4 sec, attempts to locate these max values (within variance of 200) by spinning in that direction at 35 motor power

Appendix B: State Details

WallDetected

Constants:

Backup time= 1000

Acceleration time= backup time/ 2

Base speed= -25

Max speed= -100

k = -75

```
if (time1[T2] < acceleration_time):  
    motorSpeed = base speed+ k * 1.0 * time1[T2] / acceleration time
```

```
if (SensorValue(button1)) :  
    drive_forward(50) for 750 seconds
```

```
if (time1[T2] > backup time) :  
    motor[left] = motor[right] = 0;
```

Appendix C: LED Strip Values

- Idle: Signal 2,3,4,5,6 blinking
- Acquire: Signal 2 on
- Rotate: Signal 3 on
- Forward: Signal 4 on
- Verify: Signal 5 on
- Attach: Signal 6 on
- Completion: Signal 2,3,4,5,6 blinking