



SLAM VIP Team

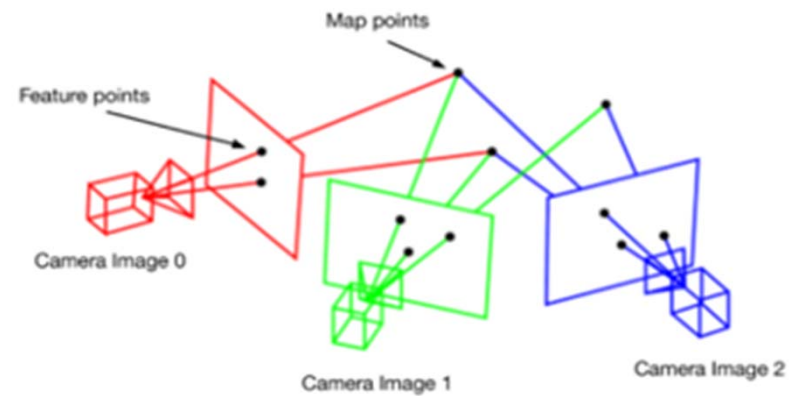
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Team Members: Myracle Jarmon, Oluwatamilore Ogunbanjo,
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Problem Statement

Due to human error and the amount of accidents that occur annually, there is a need for vehicles that can drive themselves and react in real time to the surrounding environment in order to create a more convenient driving experience by reducing driver error from impaired driving, drugged driving, reducing traffic, etc.



Camera moving through space tracking feature points

Design Requirement



- **Specifications**

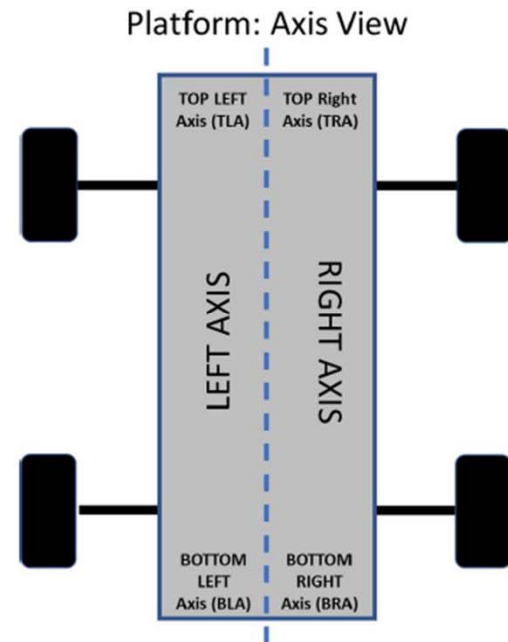
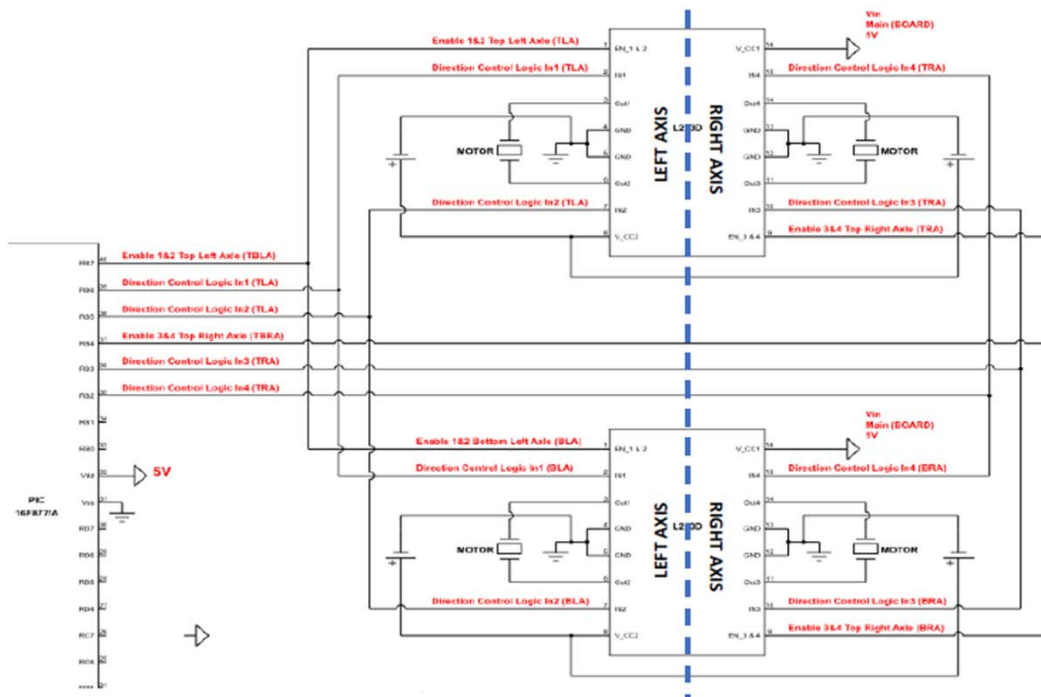
- Power Supply : 9V
- Max Speed: 25mph

- **Standards**

- SAE J3016 Level 3 Standards
- Must not violate Waymo's localization and mapping patent #10386480

- **Constraints**

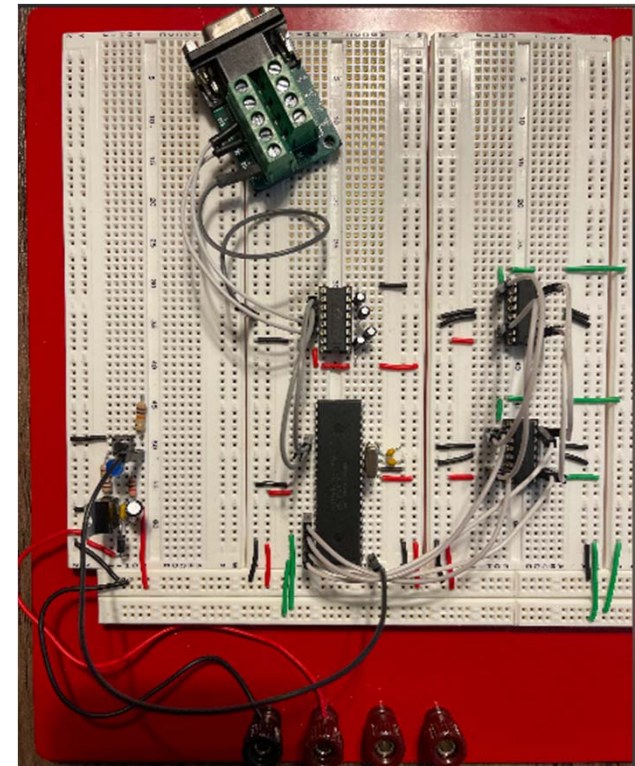
- Cost: less than \$500
- Time: 04/20/2021
- Environmental Responsibility: reduce harmful emissions



FINAL SOLUTION DESIGN

IMPLEMENTATION

- **Sprint 1:**
 - Basic Minimum circuit completed
- **Sprint 2:**
 - Bang Bang (Motor Control) completed
- **Sprint 3:**
 - Completed Assembly language code



Basic Minimum Circuit and Bang Bang

```

85 ;-----
86 ;Subroutines for Wheels
87 ; PORTB Pinout
88 ; RB7 = Enable 1 and 2 Top Left Axis (TBLA)
89 ; RB6 = Direction Control Logic In1 (TLA)
90 ; RB5 = Direction Control Logic In2 (TLA)
91 ; RB4 = Enable 3 and 4 Top Right Axis (TBRa)
92 ; RB3 = Direction Control Logic In3 (TRA)
93 ; RB2 = Direction Control Logic In4 (TRA)
94 ;-----
95 ;Forward_Vroom = All Wheels Forward
96 Forward_Vroom
97         bsf     PORTB, 0x07
98         bsf     PORTB, 0x04
99         bcf     PORTB, 0x06
100        bsf     PORTB, 0x05
101        bsf     PORTB, 0x02
102        bcf     PORTB, 0x03
103        return
104
105 ;Reverse_Vroom = All Wheels Reverse
106 Reverse_Vroom
107        bsf     PORTB, 0x07
108        bsf     PORTB, 0x04
109        bsf     PORTB, 0x06
110        bcf     PORTB, 0x05
111        bcf     PORTB, 0x02
112        bsf     PORTB, 0x03
113        return
114

```

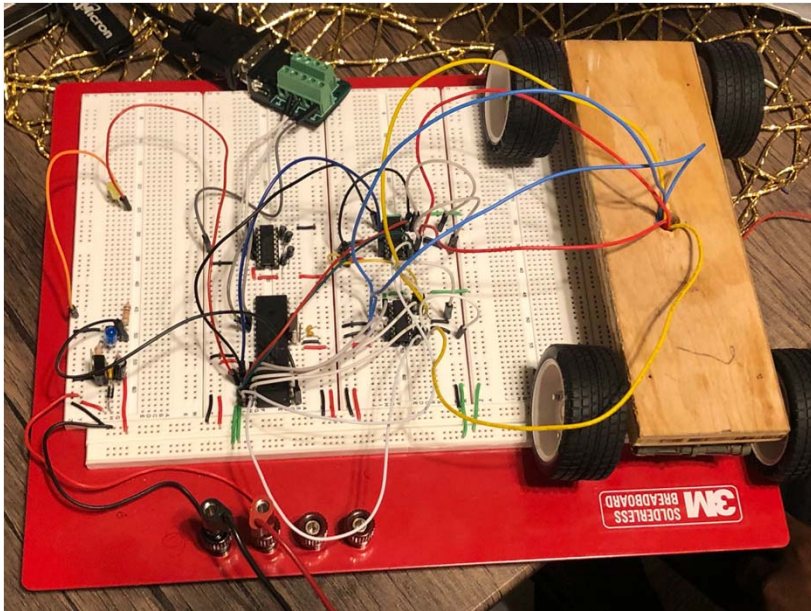
Bidirectional Control Logic: En (1&2)

En (1&2)	In1	In2	FUNCTION
H	L	H	FORWARD
H	H	L	REVERSE
H	H	H	STOP
H	L	L	STOP
L	X	X	STOP

Bidirectional Control Logic: En (3&4)

En(3&4)	In3	In4	FUNCTION
H	L	H	FORWARD
H	H	L	REVERSE
H	H	H	STOP
H	L	L	STOP
L	X	X	STOP

Assembly Language Code



Final Implementation

```
36 Start
37
38 bcf STATUS, P1
39 bsf STATUS, P0 ;move to bank 1
40 movlw 0x00 ;move 00000000 to Write Reg
41 movwf TRISB ;move working reg to TRISB making PORTB ports outputs
42 bcf STATUS, P0 ;move to bank 0
43 movlw 0x00 ;move 00000000 to Write Reg
44 movwf PORTB ;move working reg to TRISB making PORTB ports outputs
45
46 Main
47
48 call Forward_Vroom
49 call delays
50 call Right_Forward_Vroom
51 call delays
52 call Left_Forward_Vroom
53 call delays
54 call Stop_Stop
55 call delays
56 call Reverse_Vroom
57 call delays
58 call Right_Forward_Vroom
59 call delays
60 call Left_Reverse_Vroom
61 call delays
62 call delays
63 call delays
64 call delays
65 call delays
66 call delays
67 call delays
68 goto Main ;Infinite Loop
69
```

Conclusion

- **Highlights**

- Working code for motor control
- Fully incorporated motors into the Bang Bang

- **Lowlights**

- Time constraints
- Illnesses

- **Future Direction:**

- Incorporate Lidar sensors
 - Hardware and software
- Perf-board training
 - Soldering
 - Wire wrapping
 - Board cutting
- Replace broken motor (BRA)



DEMO