Motorcycle wheelie control

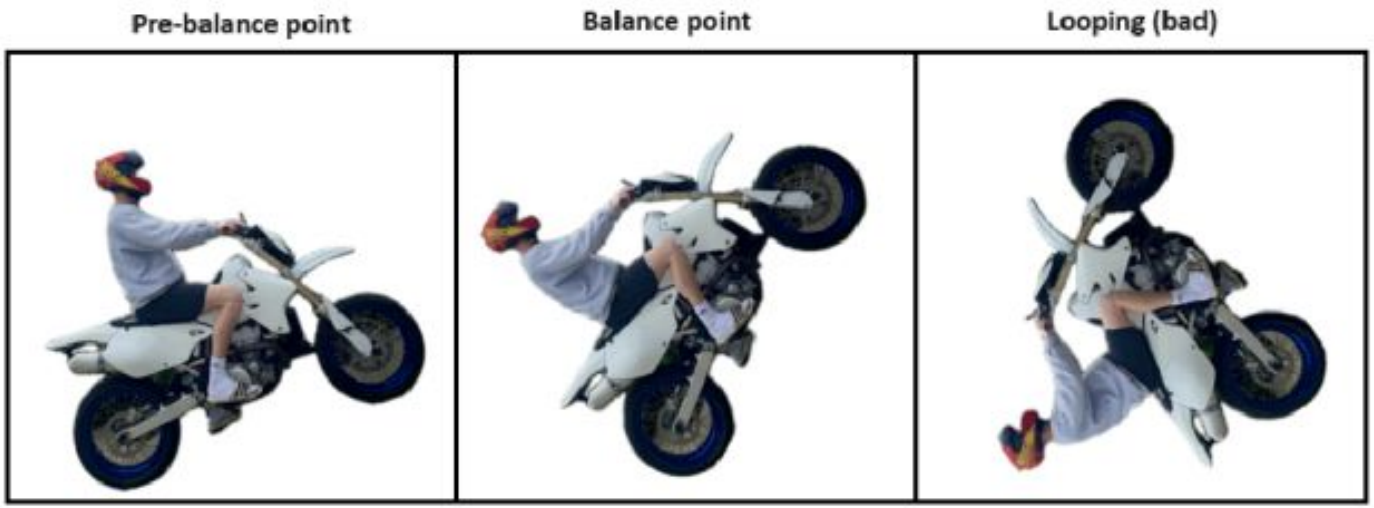


Figure 1. Wheelie Progression

Project goals

- Add wheelie control to my 90s technology bike
- Determine the angle with an IMU sensor, and limit the engine power when above the desired angle
- Cut the spark signal to limit engine power
- Hopefully switch this fast enough to remain at the same angle while at full throttle

Result


enjoy
enjoy


SSR-25 DA
Solid State Module
25A
24~380VAC
Input
3~32VDC

Component selection

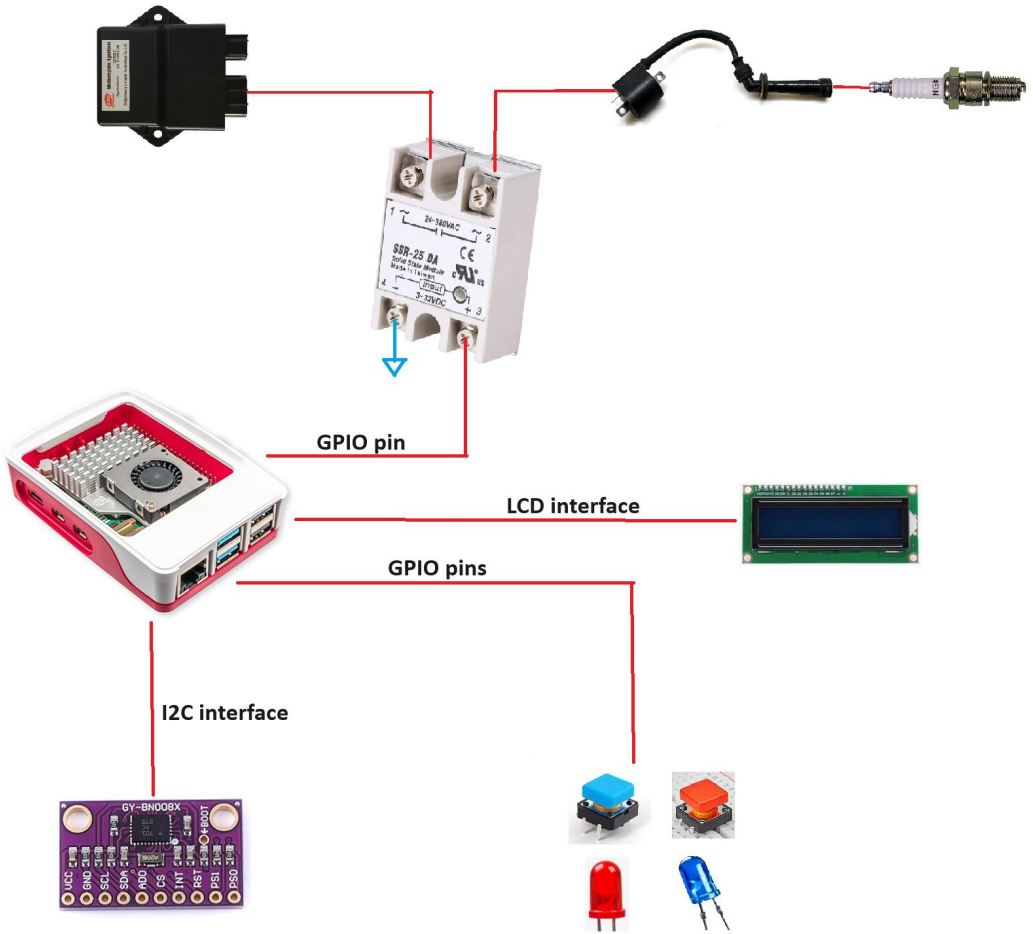
IMU sensor - BNO085

- Built in sensor fusion
- 400Hz angle refresh

Relay - SSR-25DA

- DC - AC
- Solid state
- Input voltage: 3-32V DC
- Output voltage: 24-380V AC

System architecture

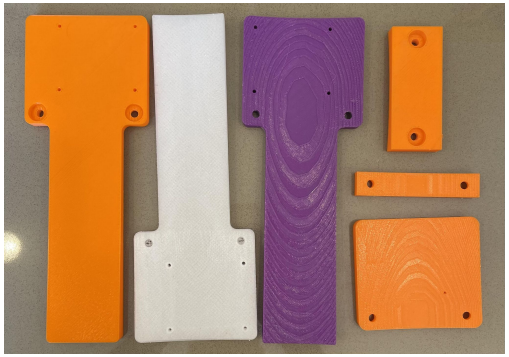


System architecture

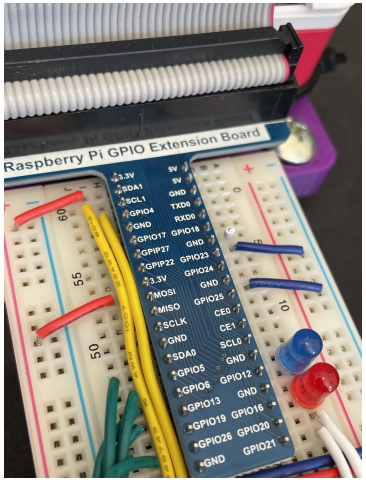
Raspberry Pi	BNO085
X (3V3)	VCC
3 (SDA)	SDA
5 (SCL)	SCL
X (GND)	GND
Raspberry Pi	Red LED
X (GND)	-
36 (GPIO16)	+
Raspberry Pi	Blue LED
X (GND)	-
32 (GPIO12)	+
Raspberry Pi	LCD Screen
X (GND)	1 (Vss)
X (3V3)	2 (Vdd)
NO CONNECT	3 (NC)
37 (GPIO26)	4 (RS)
X (GND)	5 (R/W)
35 (GPIO19)	6 (E)
33 (GPIO13)	11 (DB4)
31 (GPIO6)	12 (DB5)
29 (GPIO5)	13 (DB6)
27 (GPIO0)	14 (DB7)
X (3V3)	15 (LED+) plus 2k series resistance
X (GND)	16 (LED-)
Raspberry Pi	Red Button
38 (GPIO20)	-
X (3V3)	+ plus 5k series resistance
Raspberry Pi	Blue Button
40 (GPIO21)	-
X (3V3)	+ plus 5k series resistance
Raspberry Pi	Spark Cut Relay
12 (GPIO18)	+
X (GND)	-

Challenges

- 3d printing/designing mount
- Frying the Pi
- Sensor/relay not fast enough
- OS Errors with GPIO pins



Specification:
Input voltage:3-32V DC
Output voltage:24-380V AC
Output current:60A
Control Method: DC to AC
Mounting Method: Bolts fixed
On voltage:<1V
One-off time:<10ms → 100 Hz
Off leakage current:<2mA



Future improvements

- IMU calibration
- Using raw gyro data instead of corrected (reduce delay)
- Faster switching relay
- Glue everything to the breadboard (LCD fell off during testing)

Demo

https://youtu.be/qjaUx9cg5qc