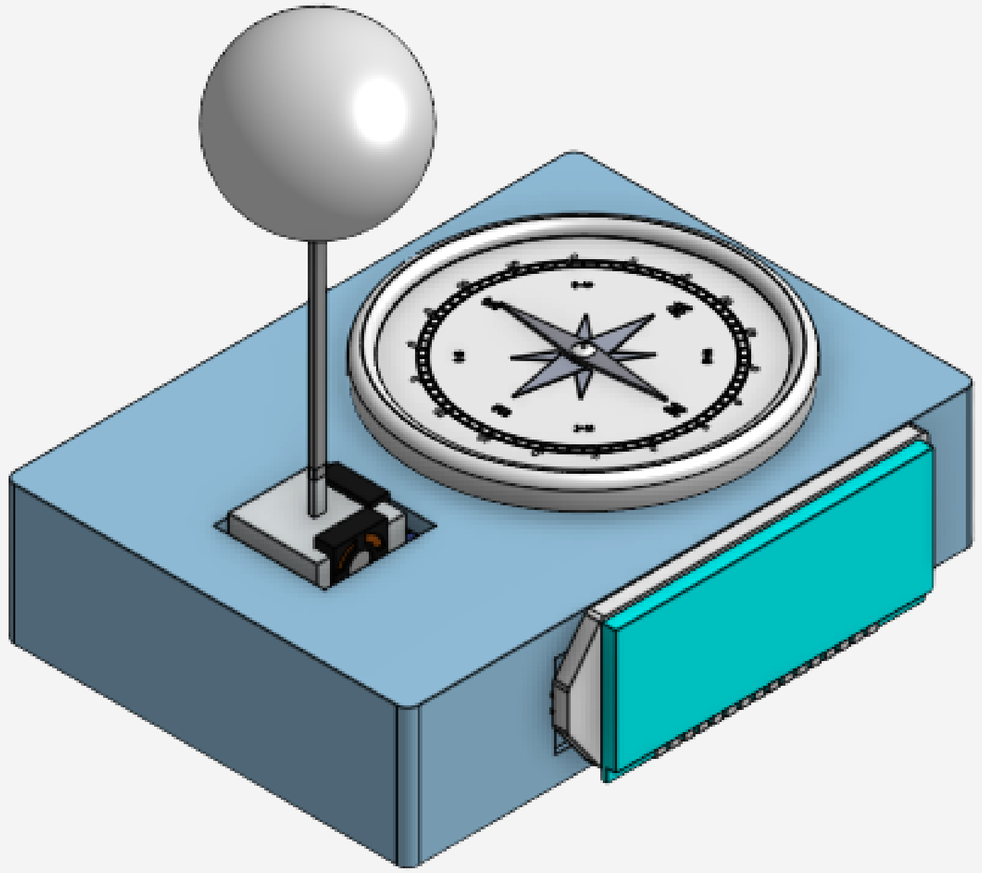
DIP004U3M

PRODUCT DEVELOPMENT

Velocity Meter



GROUP 8

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Introduction

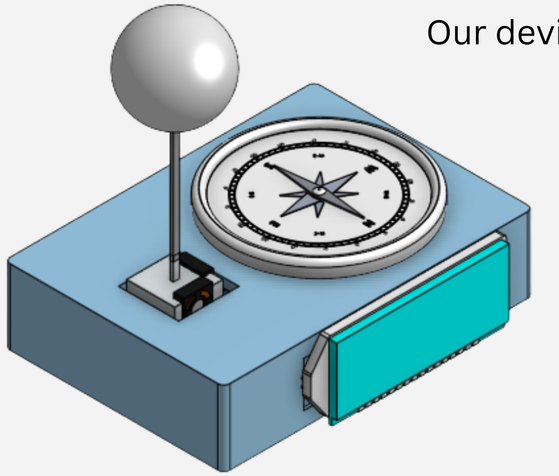
Rotary cup anemometer

propeller anemometer

Pitot Tube

Pre-Existing tech.

Our device

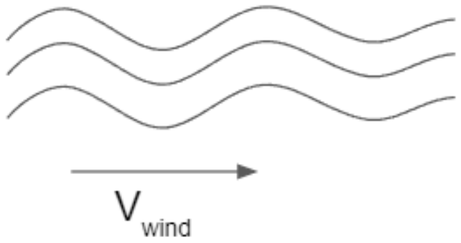


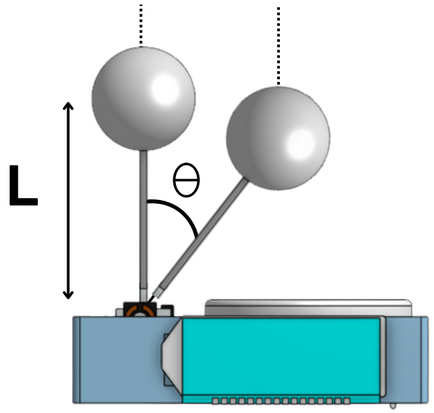
NEW tech.

Our wind sensor is **based on the new approach** where we detect the **speed of the wind** by using the force exerted by the wind on the obstructing surface, causing it to deflect, and **by measuring the deflection** through sensors and calibrating it according to measured wind speed.

The wind sensors available in today's market are not **very affordable**, unlike this device, as it does not require any sophisticated design for wind flow measurement, and this device is **easy to carry.**

Working and Basic formulation





$$w = f(Re)$$

$$Re = \frac{\rho u L}{\mu}$$

$$w = f(V_{wind})$$

w = Deflection due to wind
Re = Reynolds no.
ρ = Density of Air
Vwind = Flow Velocity
L = Linear dimention

The design consists of a light **shaft mounted on a joystick** sensor with a lightweight, high surface area object (such as a thermocol ball).

When the wind blows on **the ball, the device indicates the direction** of the flow of wind the joystick sensor attached to the shaft, the **orientation** of the digital **joystick** sensor **changes** depending on the wind direction.

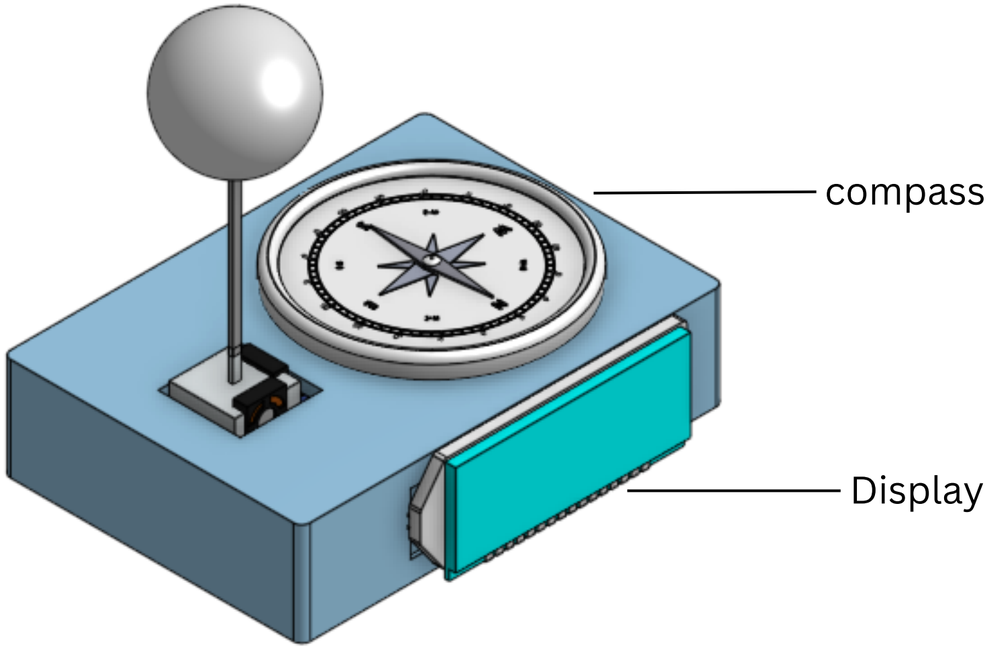
The digital output of elevation and Azimuth is then transduced to read wind direction. **The speed of wind is calculated by measuring the angle of deflection.**

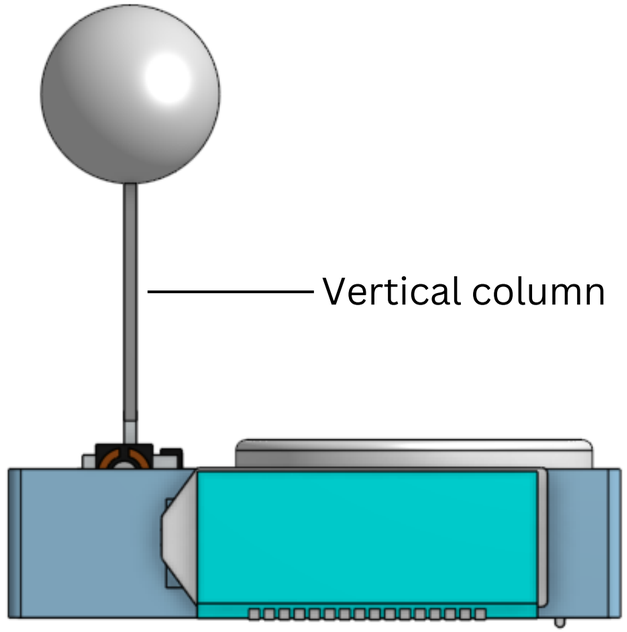
The output provided by joystick/gyro sensor is input to the **Arduino UNO** micro controller board and the **calibrated output** is then **displayed** on the display module.

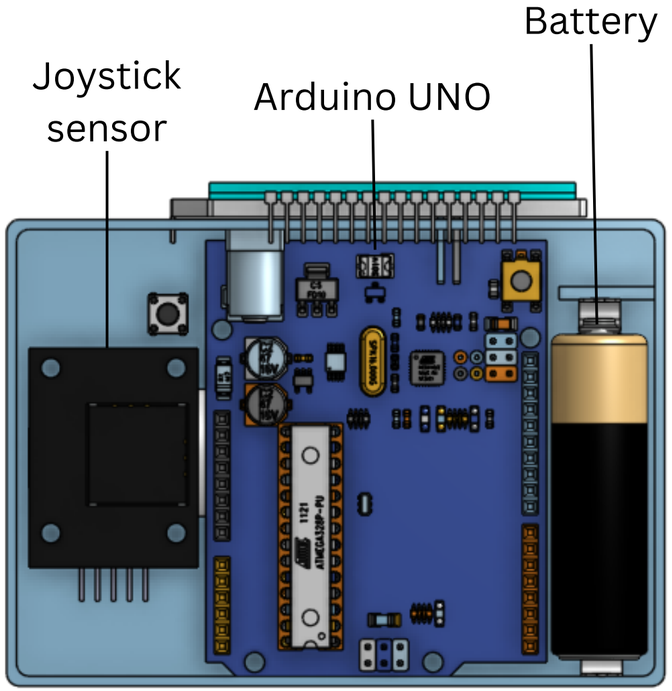
BASIC COMPONENTS INVOLVED:

Joystick Sensor	
Arduino NANO	Mini-display module
Vertical column	Battery (5-9V)

Initial CAD Design

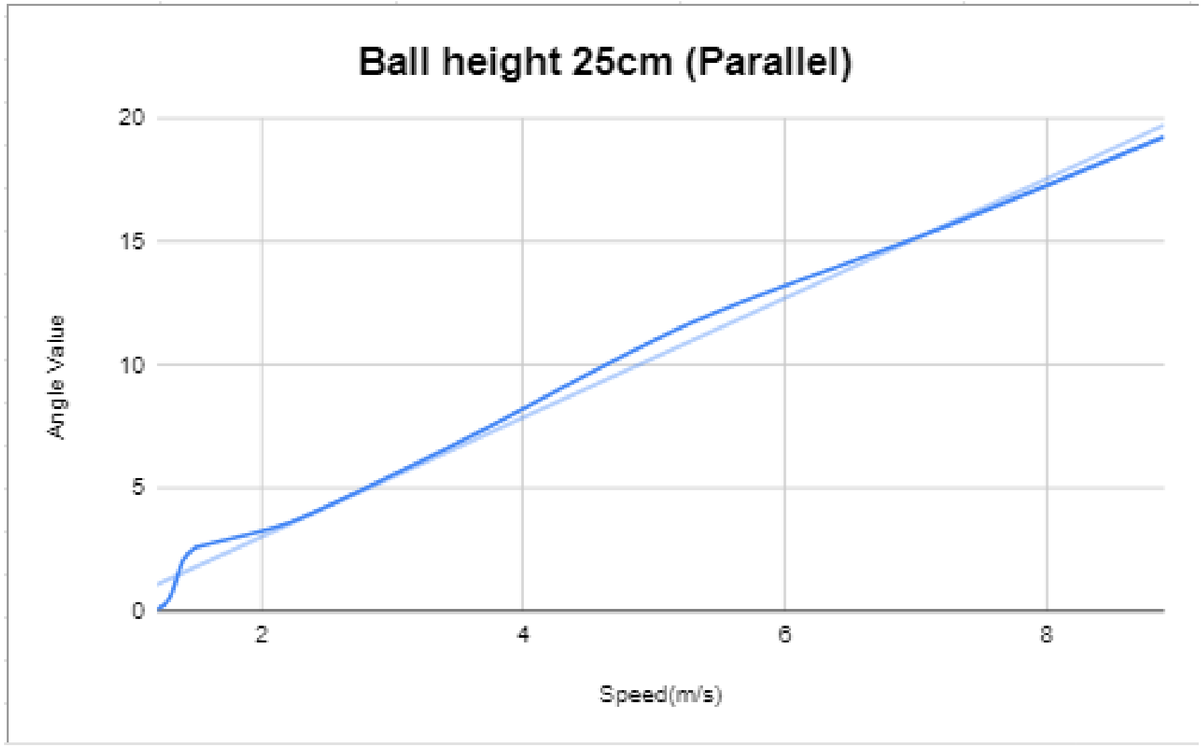




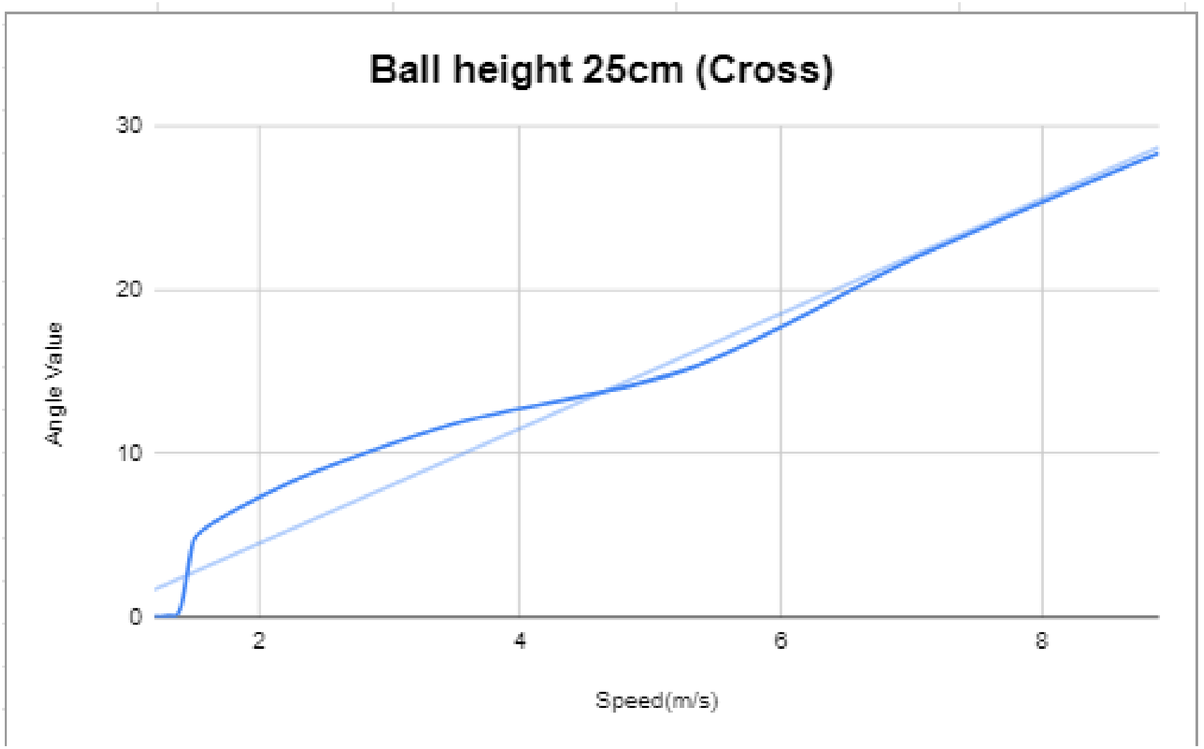


Calibration data with 25cm length

	ball height 25 cm	
distance	sensor	Dgital anemometer
(in cm)	Angle value	speed (m/s)
5	19.28	8.9
20	15.36	7.1
30	11.75	5.3
40	6.83	3.5
45	3.56	2.2
50	2.59	1.5
65	2.07	1.4
70	0.55	1.3
75	0.05	1.2



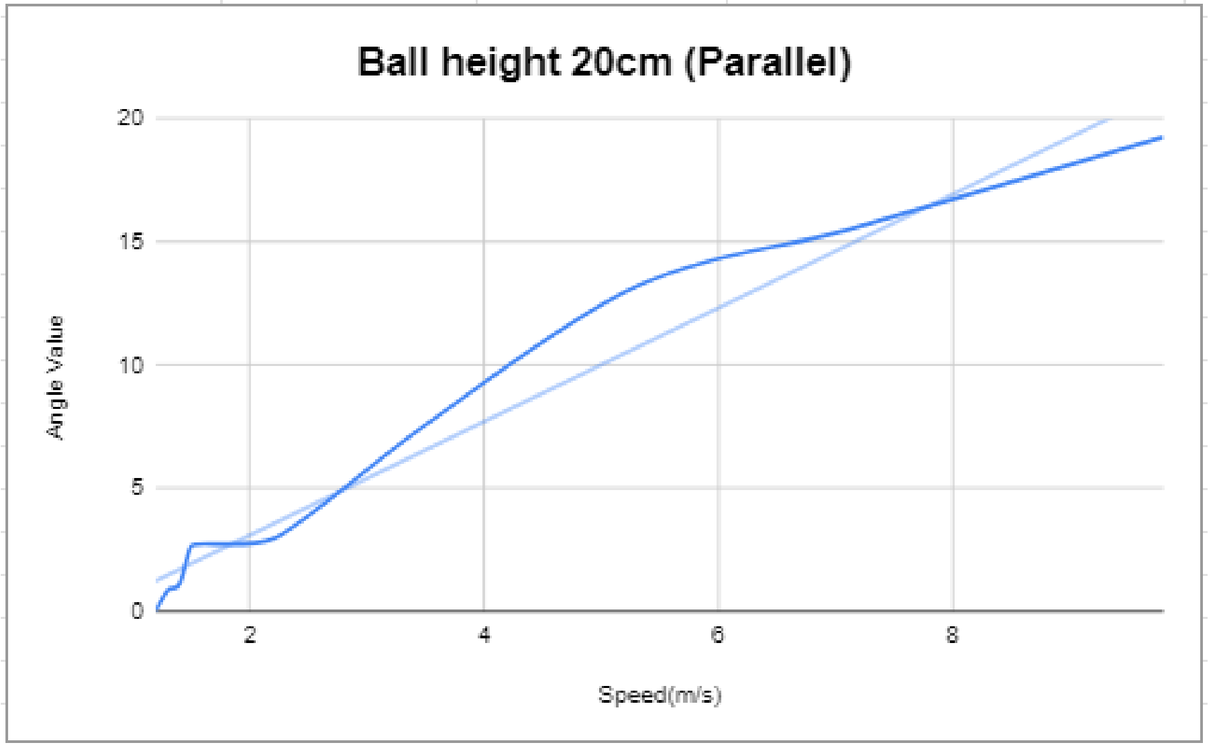
Calibration data with 25cm length



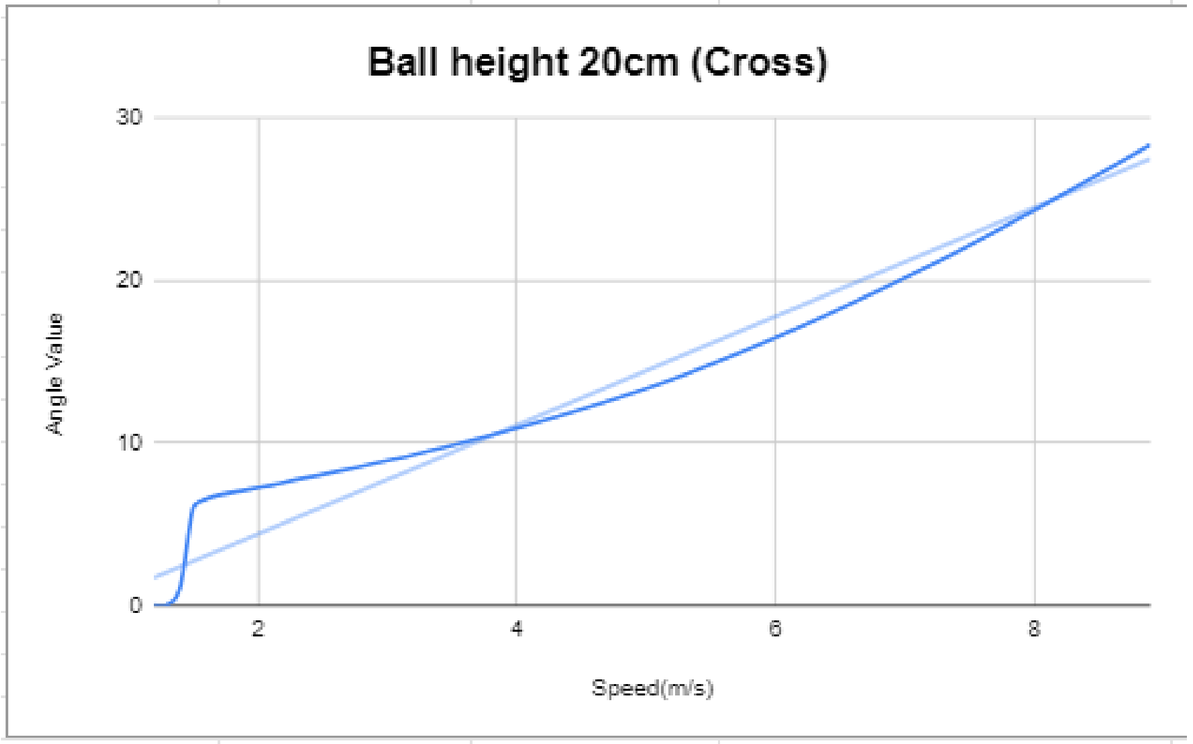
	ball height 25 cm	
distance	sensor	Dgital anemometer
(in cm)	Angle value	speed (m/s)
5	28.4	8.9
20	22.23	7.1
30	15.21	5.3
40	11.84	3.5
45	8.11	2.2
50	4.73	1.5
65	0.55	1.4
70	0.09	1.3
75	0.05	1.2

Calibration data with 20cm length

	ball height 20 cm	
distance	sensor	Dgital anemometer
(in cm)	Angle value	speed (m/s)
5	19.28	9.8
20	15.5	7.1
30	13.2	5.3
40	7.57	3.5
45	2.94	2.2
50	2.65	1.5
65	1.11	1.4
70	0.85	1.3
75	0.04	1.2



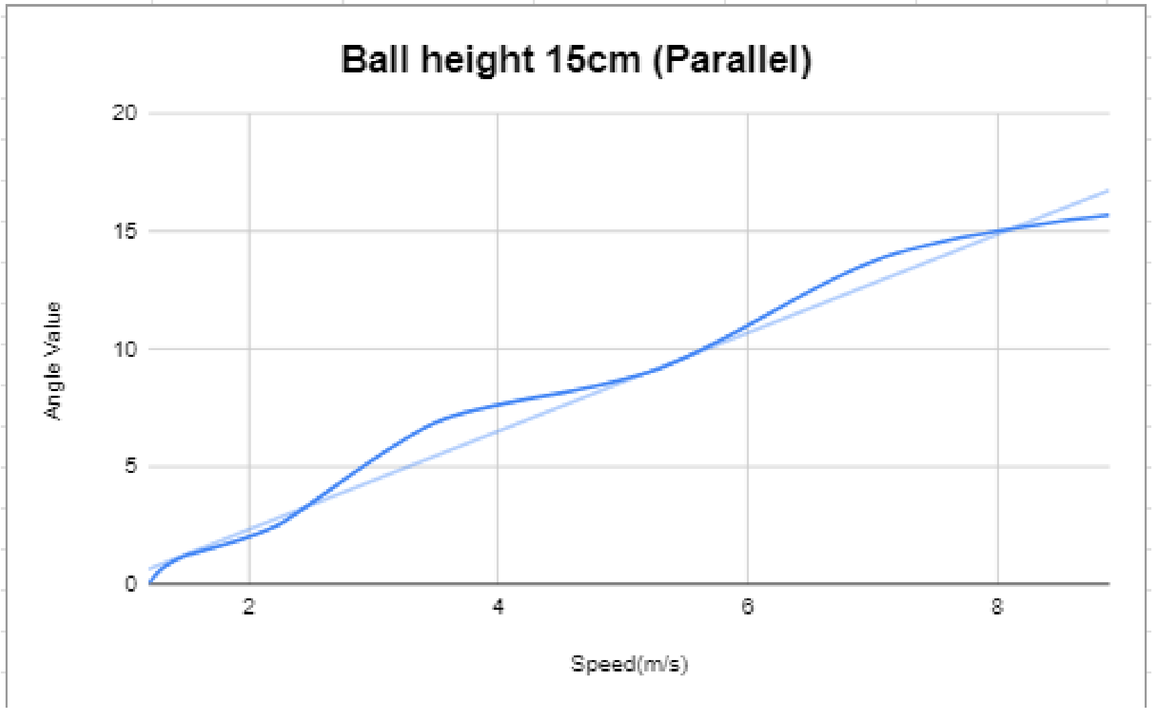
Calibration data with 20cm length



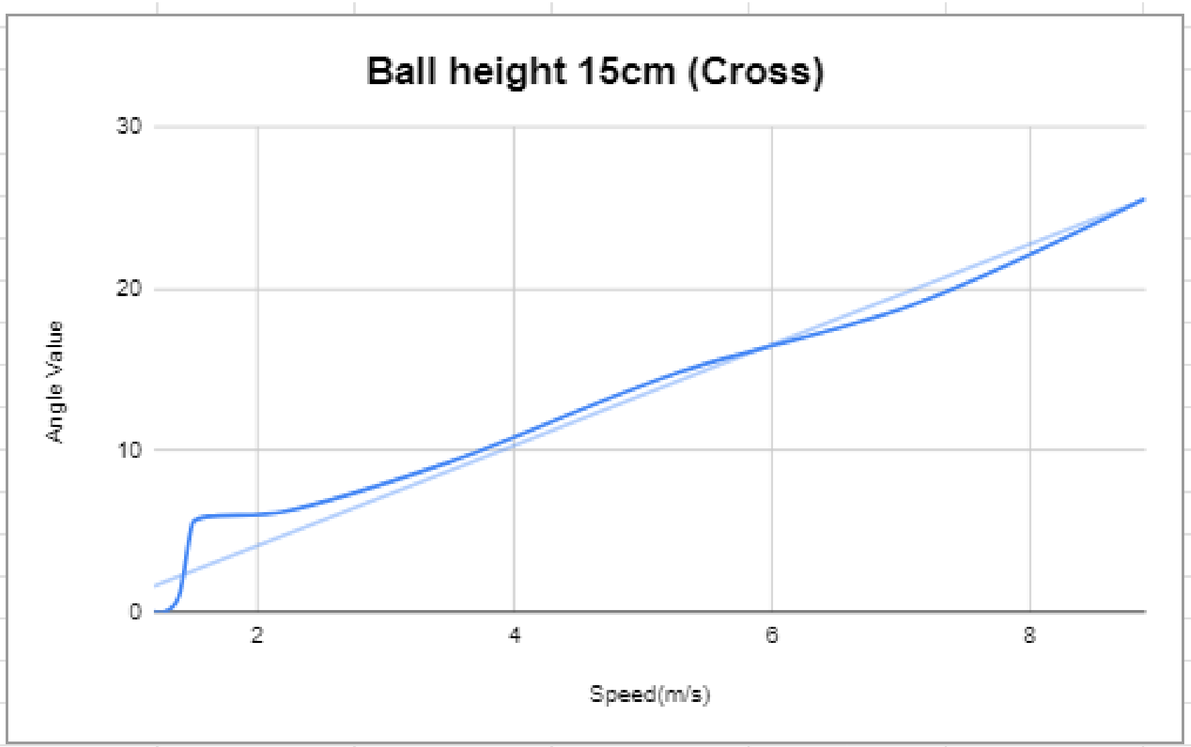
	ball height 20 cm	
distance	sensor	Dgital anemometer
(in cm)	Angle value	speed (m/s)
5	28.4	8.9
20	20.56	7.1
30	14.22	5.3
40	9.84	3.5
45	7.55	2.2
50	6.02	1.5
65	1.17	1.4
70	0.05	1.3
75	0.04	1.2

Calibration data with 15cm length

	ball height 15 cm	
distance	sensor	Dgital anemometer
(in cm)	Angle value	speed (m/s)
5	15.7	8.9
20	13.93	7.1
30	9.19	5.3
40	6.88	3.5
45	2.41	2.2
50	1.23	1.5
65	0.98	1.4
70	0.65	1.3
75	0.04	1.2



Calibration data with 15cm length



	ball height 15 cm	
distance	sensor	Dgital anemometer
(in cm)	Angle value	speed (m/s)
5	25.63	8.9
20	19.05	7.1
30	14.89	5.3
40	9.32	3.5
45	6.21	2.2
50	5.54	1.5
65	1.16	1.4
70	0.06	1.3
75	0.04	1.2

Average of the Calibration data