

1 Research Questions

- What is the benefit of using full 9-Degrees Of Freedom IMU data in predicting speaking status, as opposed to using only accelerometer signals?
- Where do the Gyroscope and Magnetometer complement the accelerometer?
- How does one predict the speaking status and what is the benefit of knowing this?

2 Background

- Determine speaking status through wearable sensors.
- Pre-existing data from an experiment where 49 participants were all wearing an IMU around their neck.
- The wearable device has three sensors on board that are important for calculating the speaking estimation:
 - Accelerometer
 - Gyroscope
 - Magnetometer

3 Methodology

- Evaluating data from the experiment in Python Using ConFlab for preprocessing data and the MS-G3D framework for training and evaluating.
- Literature study on Accelerometer, Gyroscope and Magnetometer.
- Research in what areas the Gyroscope and Magnetometer are significantly better then the Accelerometer.

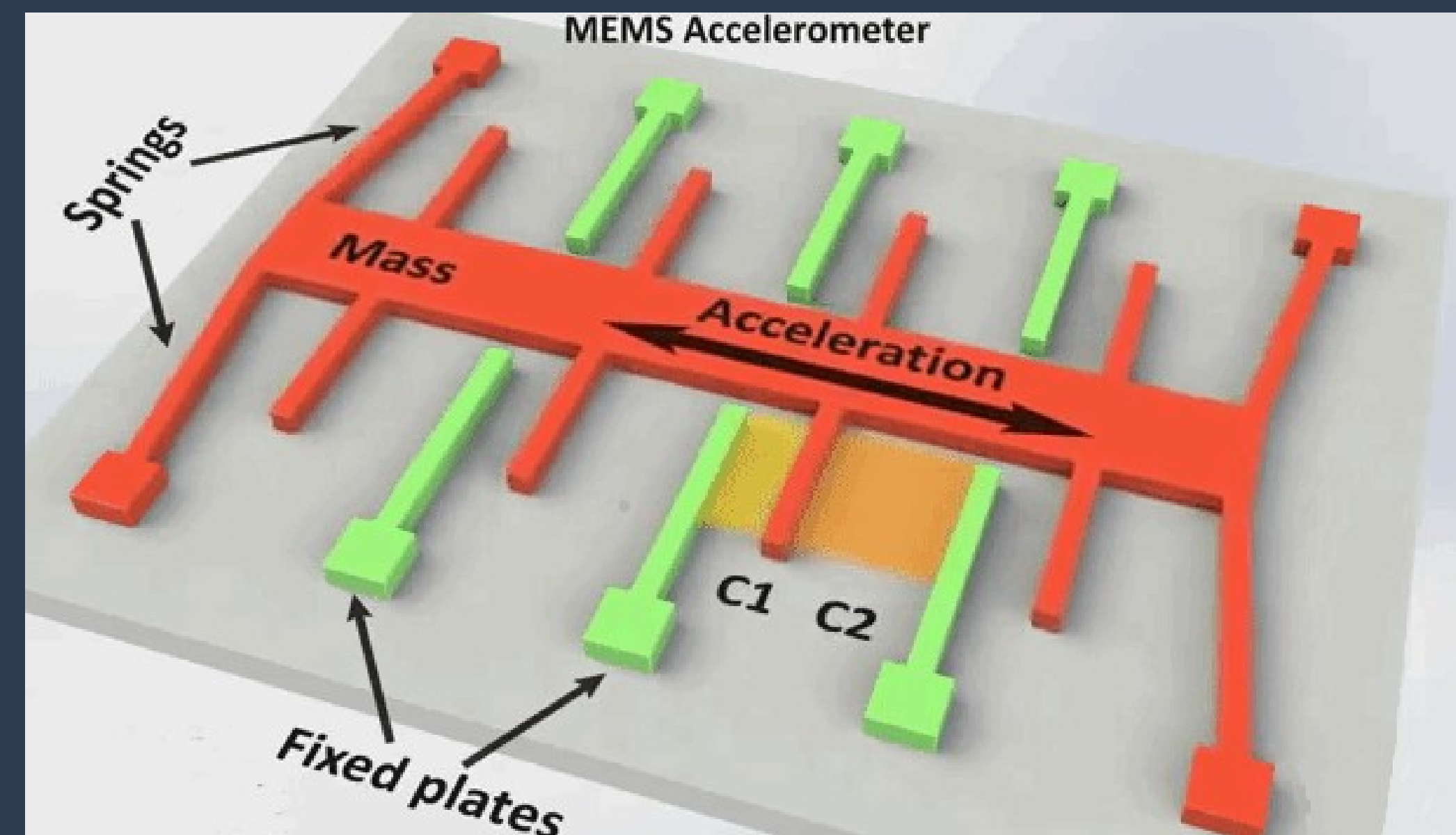


Figure 1: Model of Accelerometer [1]

4 Results

	AUC	accuracy
Accelerometer	0.7968	0.737
Combination of sensors	0.730	0.729

- Accelerometer does not sense rotation, only acceleration in linear direction.
- Gyroscope detects 3 types of rotations: Pitch, Roll and Yaw.
- Magnetometer acts as a miniaturized compass.

5 Conclusions

- Results indicate that accelerometer outperforms the combination.
 - More noise
 - In need for a more complex script.
- The Gyroscope and Magnetometer are helpful in retrieving information about the rotation.
- The rotation contributes in determining whether or not subjects are standing towards the speaking person.

6 References

- [1] <https://thefilibusterblog.com/how-does-the-accelerometer-of-a-smartphone-work/>
 [2] <https://howtomechatronics.com/how-it-w...%E2%96%BA>

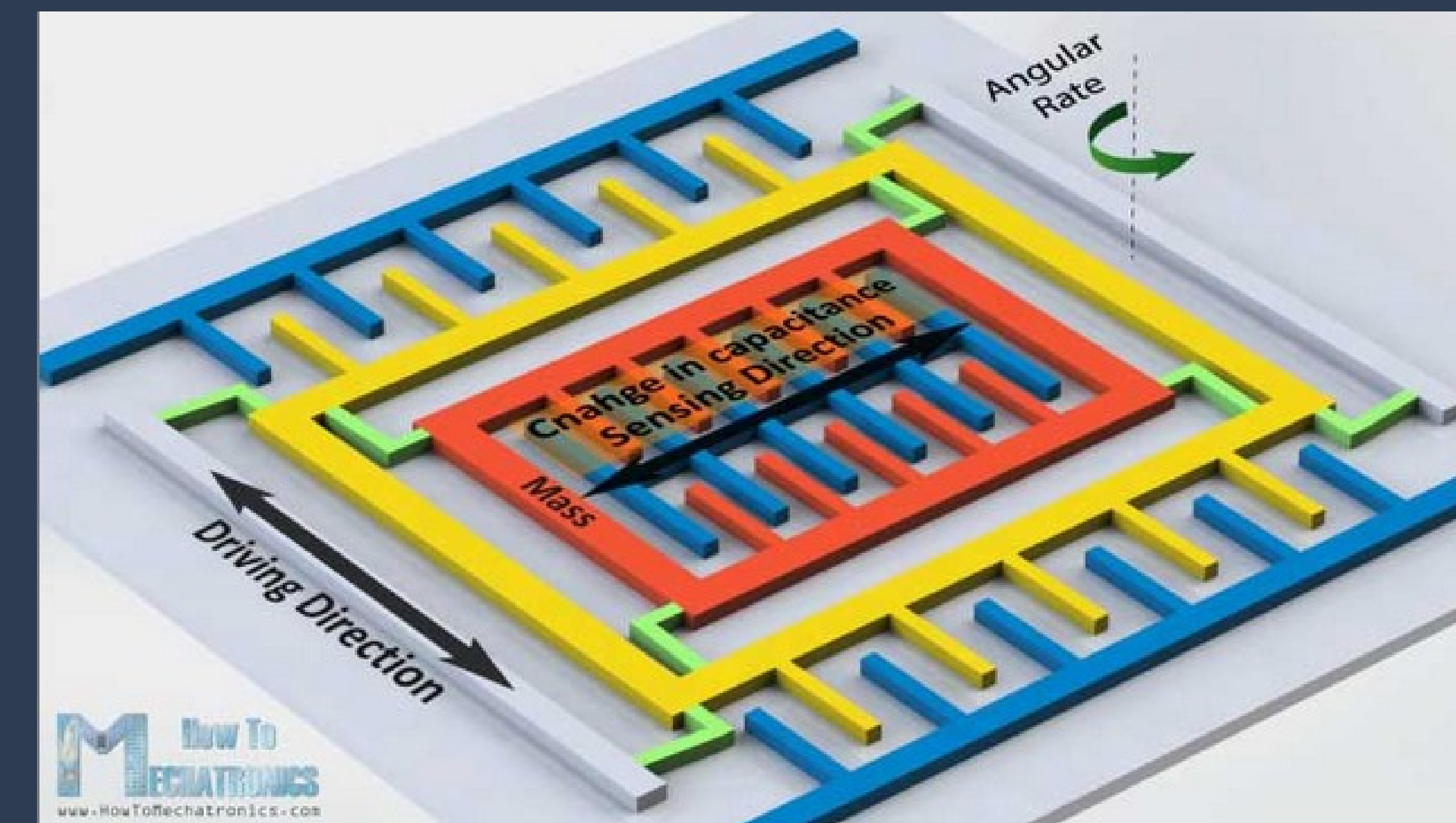


Figure 2: Model of a Gyroscope[2]