Hi everyone! Welcome to our presentation on **Motion Metrics**. Today, we’re excited to share how we’re using smartphone sensors and machine learning to recognize everyday human activities.

When we walk, jog, sit, stand, climb stairs, or head back down, our bodies move in distinct ways. By placing an accelerometer and gyroscope, like the ones in your phone, we can accurately record and capture motion data. Those signals become the fingerprints our model learns to tell each activity apart.

Our goal is to build a six-class classifier—walking, jogging, sitting, standing, waking upstairs, and downstairs—with at least **90% accuracy**. We’re experimenting with LSTM or Transformer architectures, choosing between **3 and 9 sensor features** to balance detection power with model simplicity and energy efficiency. If our dataset turns out to be too small, we’ll apply normalization and data-augmentation techniques to enrich it and avoid underfitting.

We use an open-source dataset collected on smartphones from **24 participants of various weights and heights,** with a total of **15 trials** of six motions. That gives us 12 raw channels—three axes each for position, gravity, rotation rate, and user acceleration. For this project, we’ll streamline to our top features. If time allowed, we could expand to include more customized sensor setups or public HAR datasets to improve the performance of the model.

Looking ahead, Motion Metrics can power more sophisticated activities such as fitness tracking, output analytics, or personalized service. The possibility is vast and is a growing market. Thanks to modern hardware and proven models, it’s a very achievable two-week project. As we continue, we’ll collect richer data, refine our models, and push beyond these six activities to capture even more nuanced motion patterns.

Thank you for watching!