

SBES466

Biomedical Data Analytics

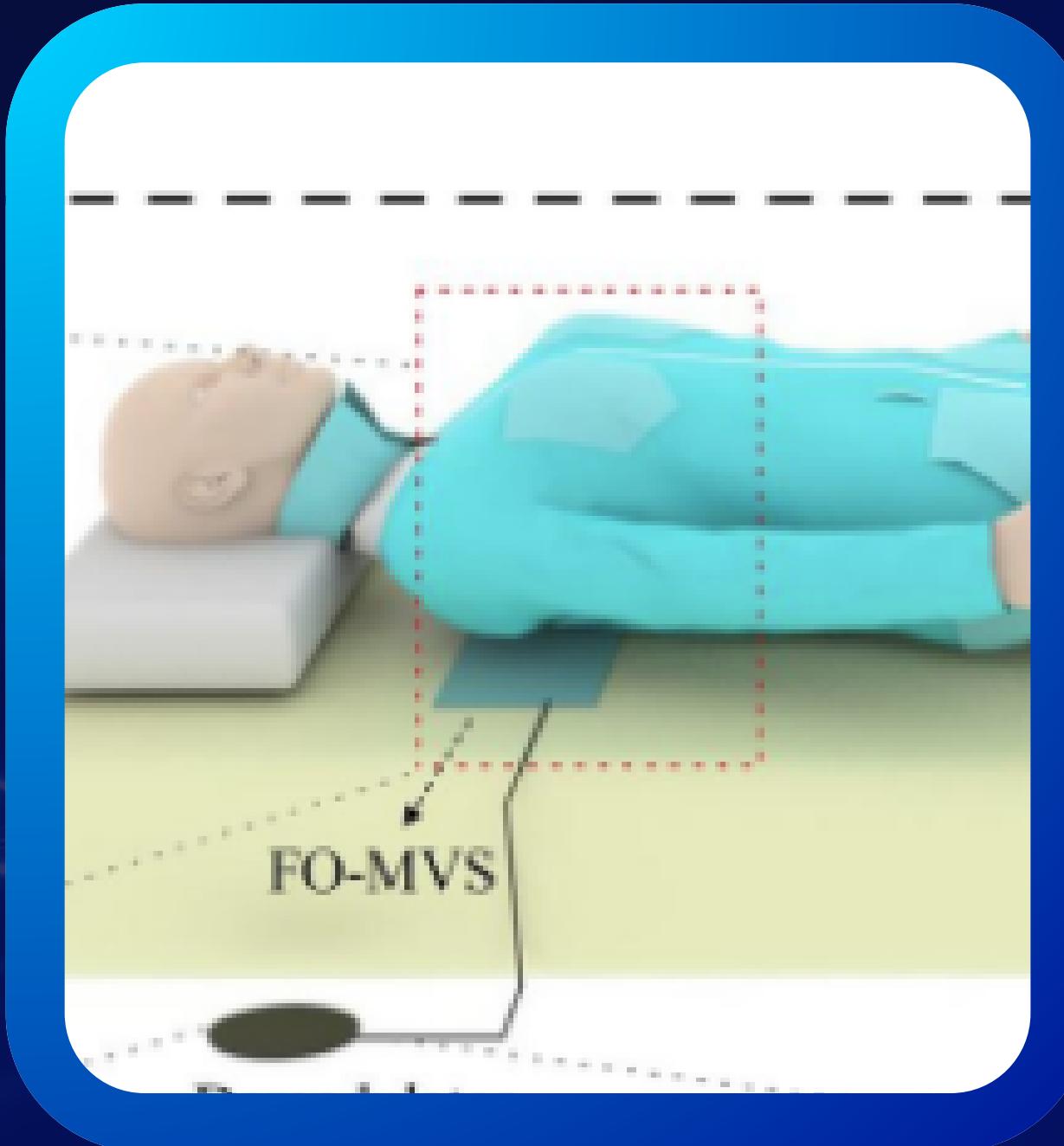
Final Project Presentation

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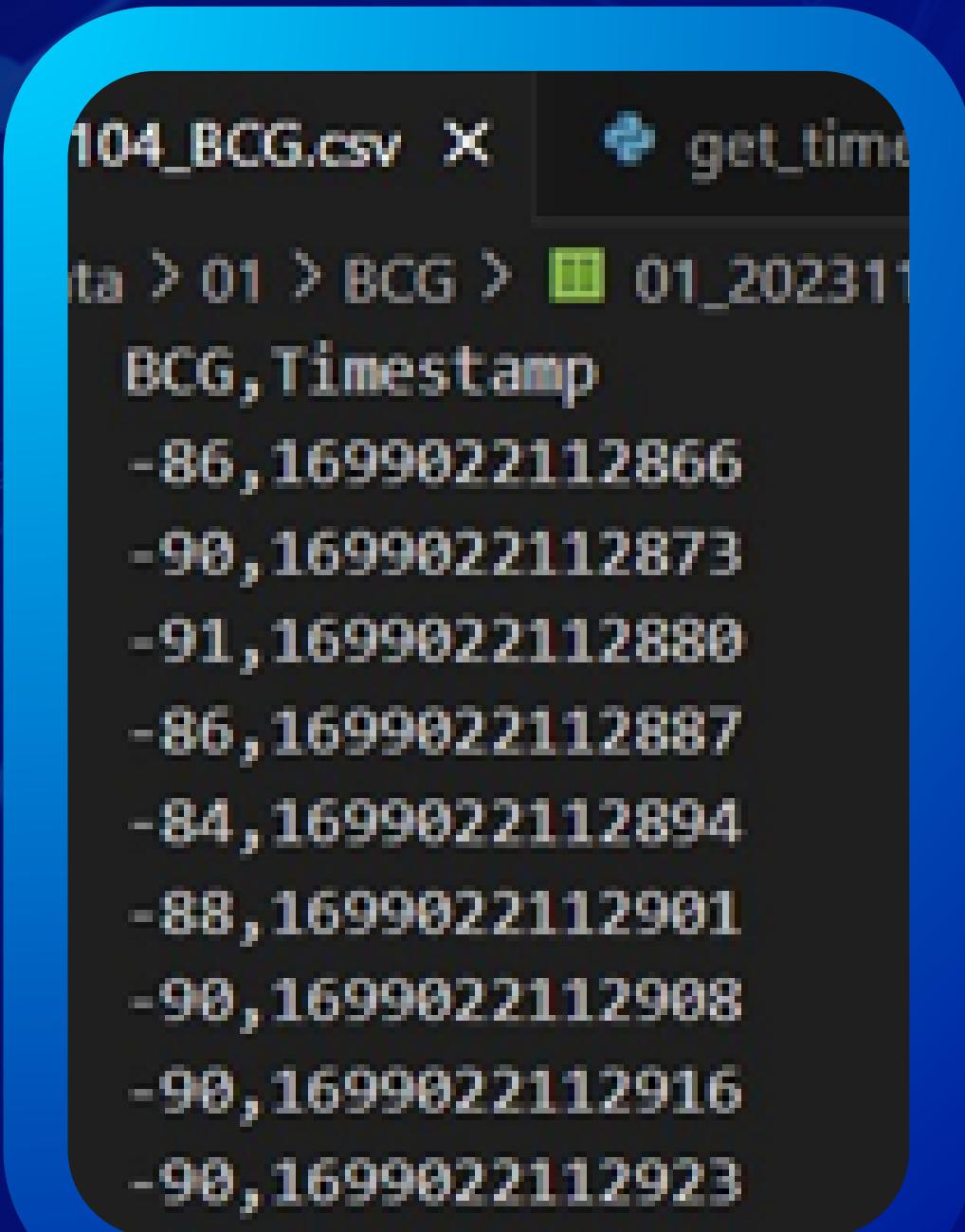
Objective

- Extract heart rate from BCG signal
- Synchronize BCG with RR intervals
- Evaluate accuracy using error calculation



Step1 - Get Timestamp for BCG

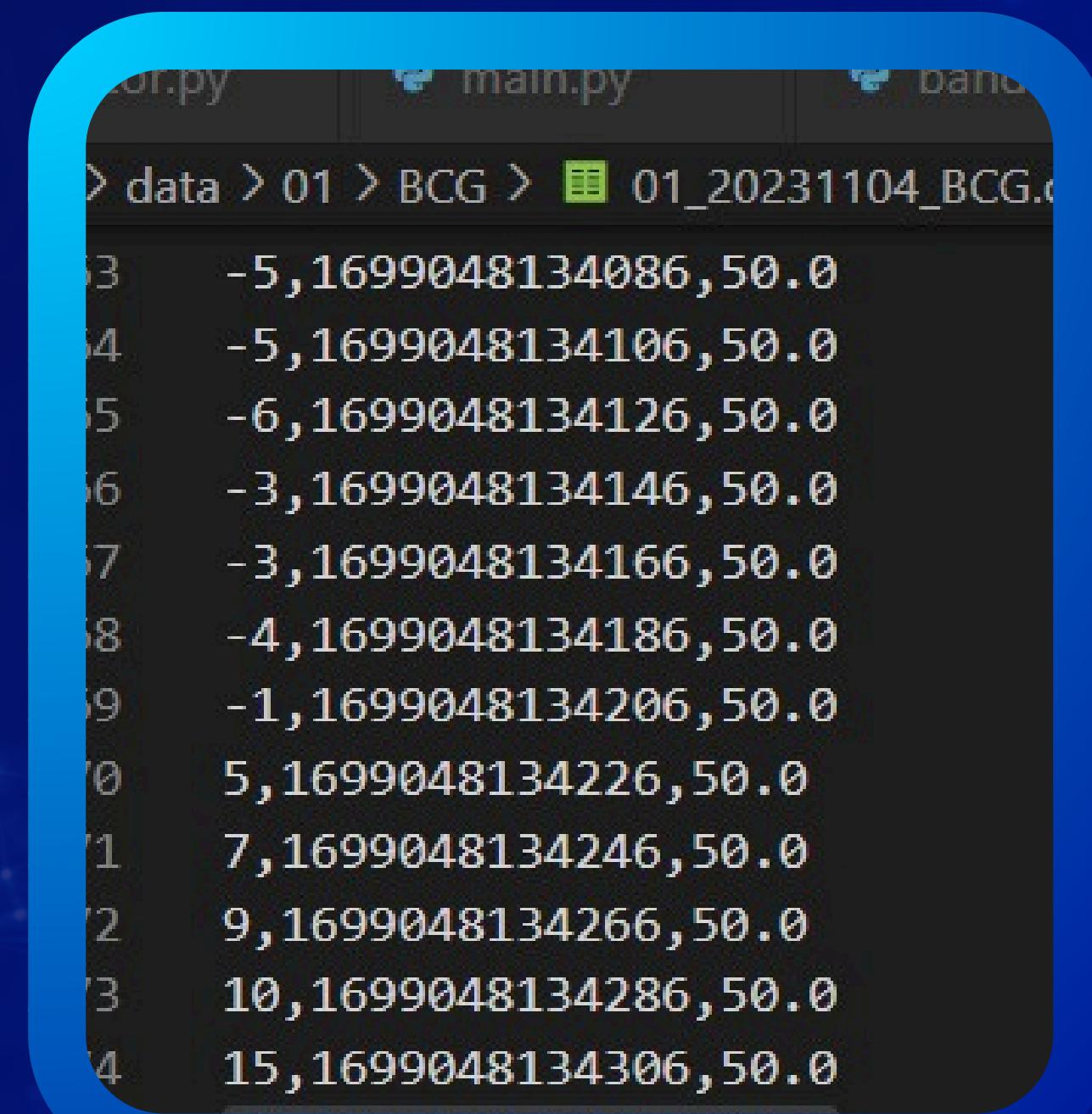
- Timestamps extracted from raw BCG data
 - Serves as time reference for synchronization
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- We began by extracting timestamps from the BCG signal, which were essential for aligning it later with the RR intervals.



```
104_BCG.csv  X  get_time
data > 01 > BCG > 01_20231128165940
BCG,Timestamp
-86,1699022112866
-98,1699022112873
-91,1699022112880
-86,1699022112887
-84,1699022112894
-88,1699022112901
-98,1699022112908
-98,1699022112916
-98,1699022112923
```

Step 2 – Resample BCG to 50 Hz

- Original frequency: 140 Hz
- Resampled to 50 Hz
- Standardized sampling for easier processing

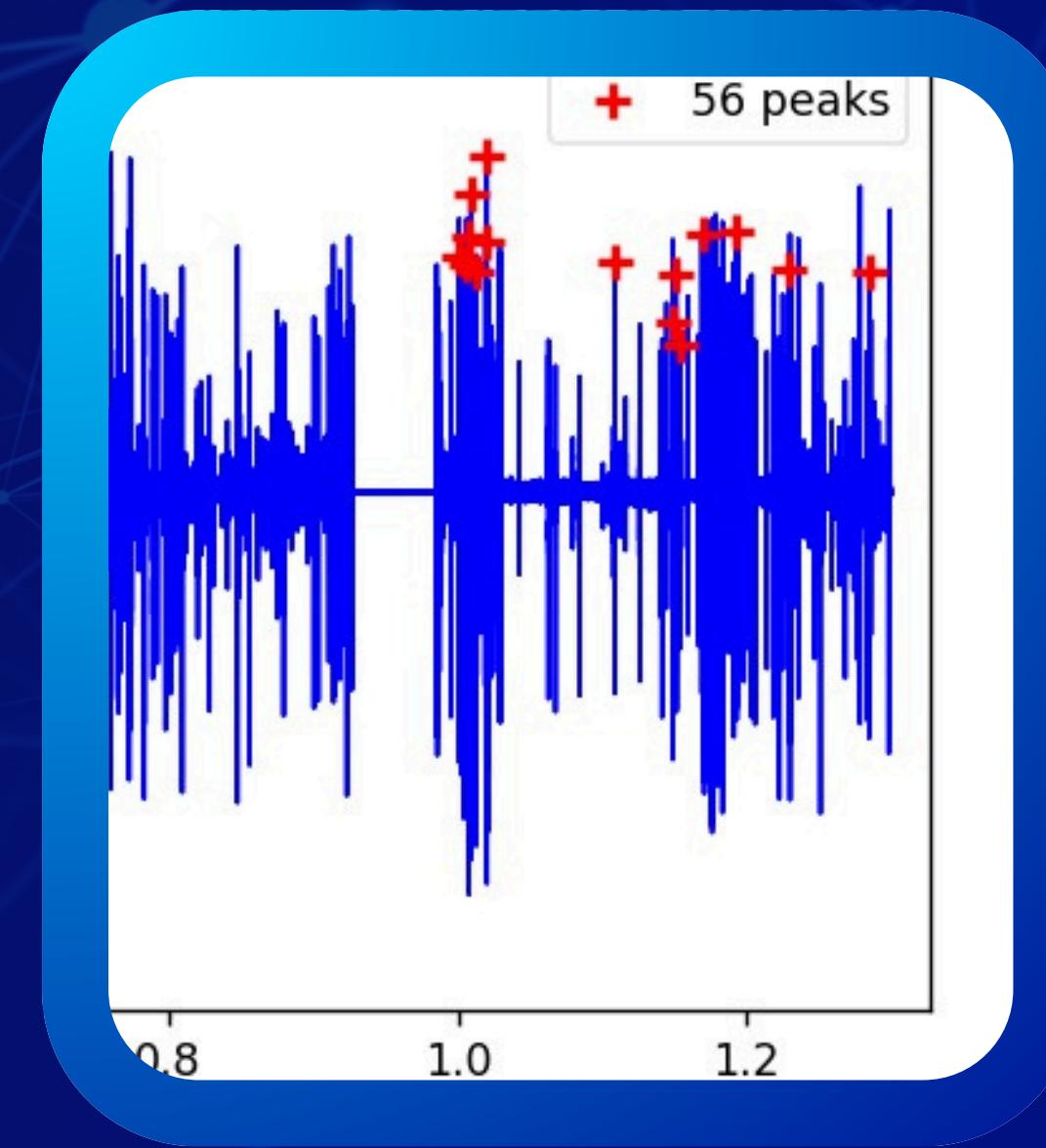


```
main.py  band.py
> data > 01 > BCG > 01_20231104_BCG.csv
1,1699048134086,50.0
2,1699048134106,50.0
3,1699048134126,50.0
4,1699048134146,50.0
5,1699048134166,50.0
6,1699048134186,50.0
7,1699048134206,50.0
8,1699048134226,50.0
9,1699048134246,50.0
10,1699048134266,50.0
11,1699048134286,50.0
12,1699048134306,50.0
```

- The BCG signal was originally sampled at 140 Hz. We resampled it to 50 Hz to make computations faster and match our desired window size of 10 seconds.

Step 3 – Run JPeak Detection Code

- Used prewritten script to detect J-peaks
- Calculated HR from RR intervals between peaks



- To extract heart rate from the BCG, we ran a provided script that identifies J-peaks. The heart rate was calculated based on the time between these peaks.

Step 4 – Synchronize BCG and RR

- Converted one signal's timeline to match the other
 - Ensured both signals align over the same period
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- Since the BCG and RR signals operate on different timelines, we synchronized them to ensure that both datasets could be compared accurately.

Step 5 – Identify Start and End

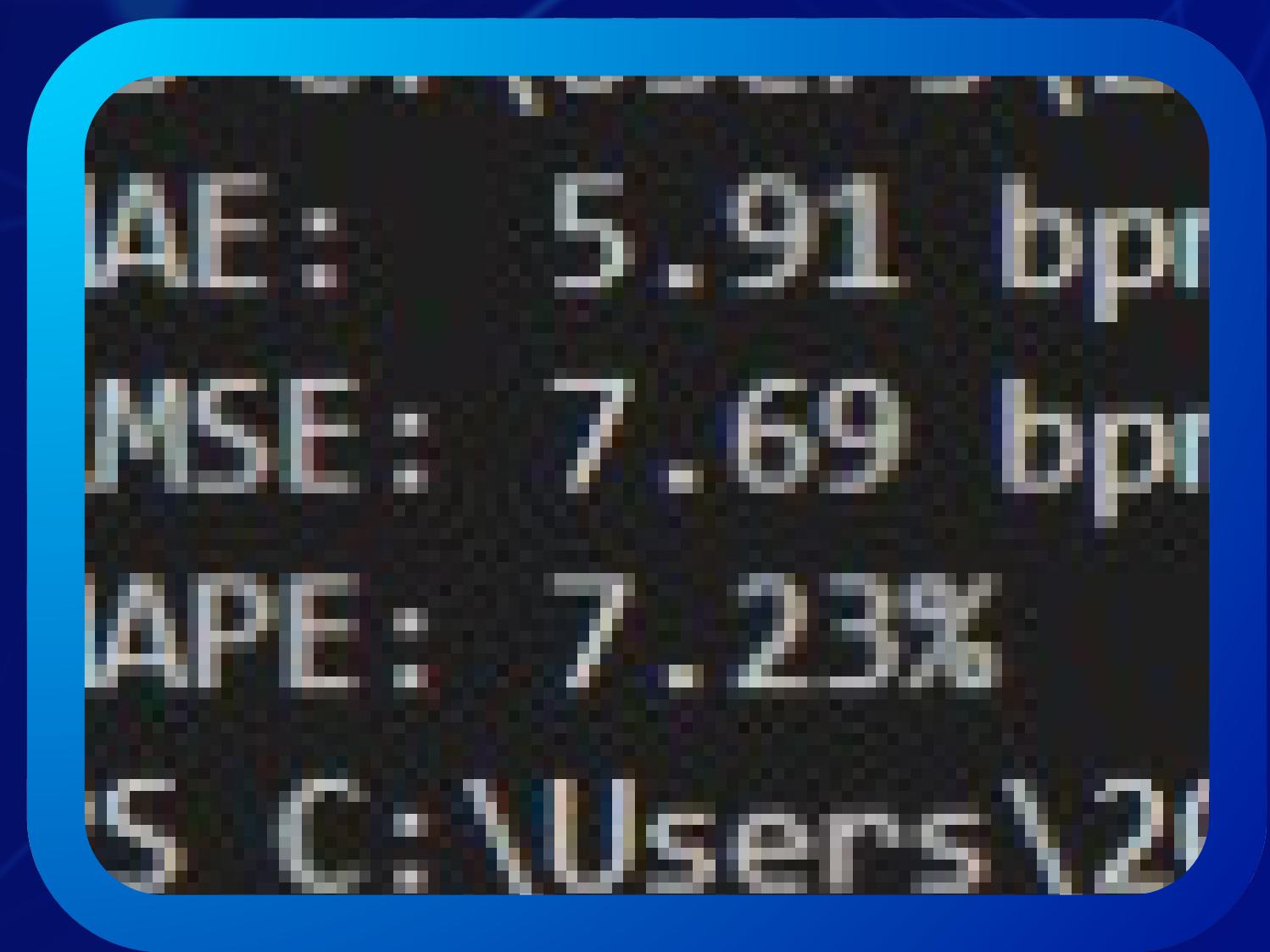
- Located overlapping time segments in both signals
- Selected common start and end points

```
PS C:\Users\20111\Downloads\capsule> & C:/Users/20111/A  
Synchronized from 2023-11-09 23:26:00 to 2023-11-10 01:  
PS C:\Users\20111\Downloads\capsule>
```

- After synchronization, we identified where both signals overlapped in time, allowing us to extract corresponding segments for analysis.

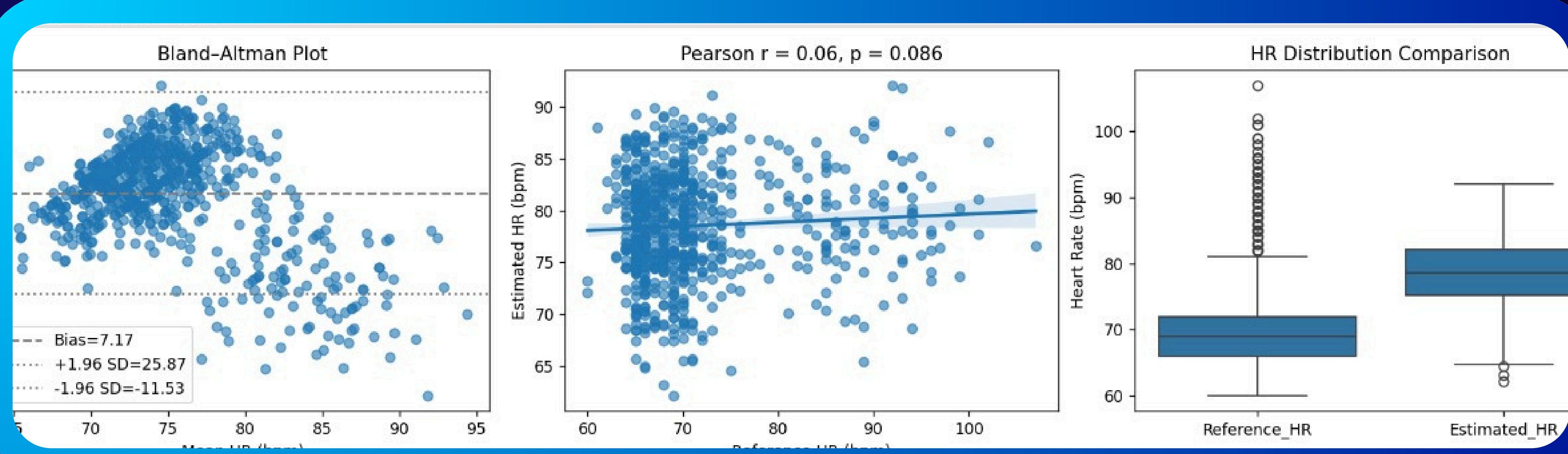
Step 6 – Calculate Error

- Compared BCG-derived HR with RR-based HR
 - Computed the difference (error) in each window
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- Finally, we compared the heart rate from BCG to the reference from RR intervals and calculated the error to evaluate performance.



Final Output

- Successfully processed and synchronized signals
- Extracted HR and quantified error
- Useful for validating non-invasive HR monitoring





THANK YOU