SDSU | HealthLINK Center

Wellness Monitoring Devices in Health Research

Presented by the Health Sensor Methods Group (HSMG)
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SDSU HealthLINK Center for Transdisciplinary Health Disparities Research
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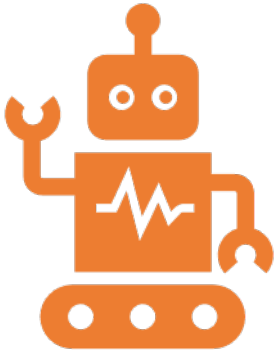
What we will cover today

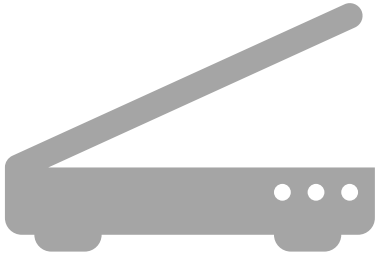
- A brief introduction to the Health Sensor Methods Group (HSMG)
- Learn about a cutting-edge wearable: the Garmin VivoSmart 5
- Introduction to LabFront: A platform designed for Health Researchers.
- Understand how the LabFront platform manages wearable projects, wearable data, participants, and participant adherence
- Learn about LabFront To-Dos, Questionnaires, and Timer Tasks for participants to complete
- Learn basic data analytics workflow and options to gain insights from collected data

What is an Intelligent Sensor System (ISS)?

- An ISS is any device that can record and/or transmit data which can be used to improve health outcomes.
- This definition covers a lot of devices including wearables and non-wearables.
- Today we will focus on the Gamin VivoSmart 5, which is a wearable ISS.

Introduction to the HSMG





The SDSU Health Sensor Methods Group (HSMG) is a knowledge center for Intelligent Sensor System (ISS) technologies.

The HSMG has expertise with Intelligent Sensor Systems (ISS) and the data they produce.

HSMG Services Offered

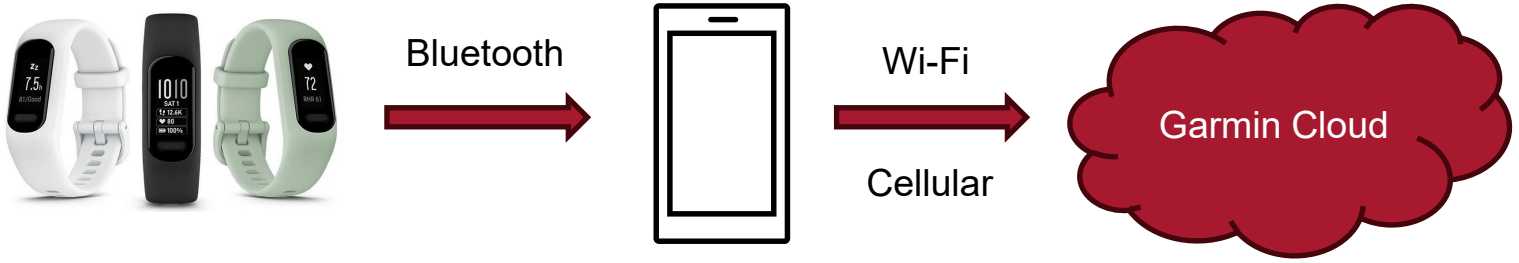
- ISS Usage Bootcamp Service
  - Learn how to use the Garmin VivoSmart 5 and other supported devices
- ISS Data Software Selection Advisory Service
  - Software tools and techniques we recommend for managing the ISS data given the project goals
- ISS Data Management Advisory Service
  - Software tools and techniques we recommend for ISS data aggregation, querying, visualization, statistical analysis and machine learning
- ISS Data Transformation Advisory Service
  - Software tools we recommend for transforming ISS data into a standard open format

Our Focus for Today : The Garmin Vivosmart 5

Introducing the Garmin VivoSmart 5

- Tiny wrist worn wearable weighs less than 1 ounce
- Nearly medical grade
- Discounts are readily available, bringing the price to about $100 when purchased in quantity
- Can collect a wide variety of data including heart rate, O_2 saturation, sleep actigraphy steps, stress, HRV aka (heart rate variability) aka BBI aka (beat to beat interval)
- Charging time from 0% to 100% battery: about 2 hours via USB
- Available for 2 wrist sizes: regular and large

VivoSmart 5 Data Flow



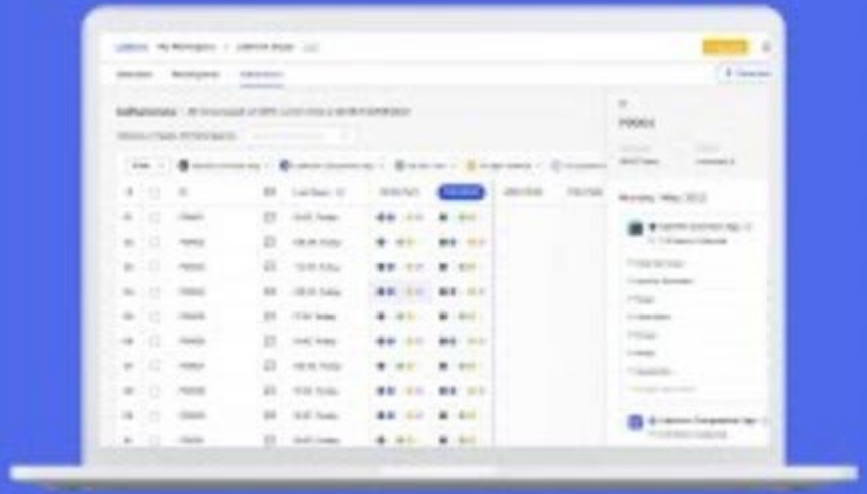
- The VivoSmart 5 streams data over Bluetooth to the mobile phone. The mobile phone saves and sends the collected data to the Garmin Cloud
- The mobile phone works with either Wi-Fi or Cellular
- Both the mobile phone and the VivoSmart 5 have off-line internal data storage in case of a loss of data connectivity
- Eventually, off-line internal storage will fill up. Additional data will be lost
- Best practice is to sync the mobile phone to the cloud at least once per day.
- I will talk more about sync in a few slides

Unlock Garmin VivoSmart 5 Advanced Capabilities

- The VivoSmart 5 has high resolution data capture capabilities that are not exposed out of the box. Garmin sells access to this data via a Software Development Kit (SDK).
- 3rd party companies buy SDK access and add other features, like Surveys and Participant Adherence Management. These companies call the combination of enhanced data and added features a Platform.
- Accessing a Platform requires a paid subscription
- Today we will focus on a Platform called LabFront

Participant

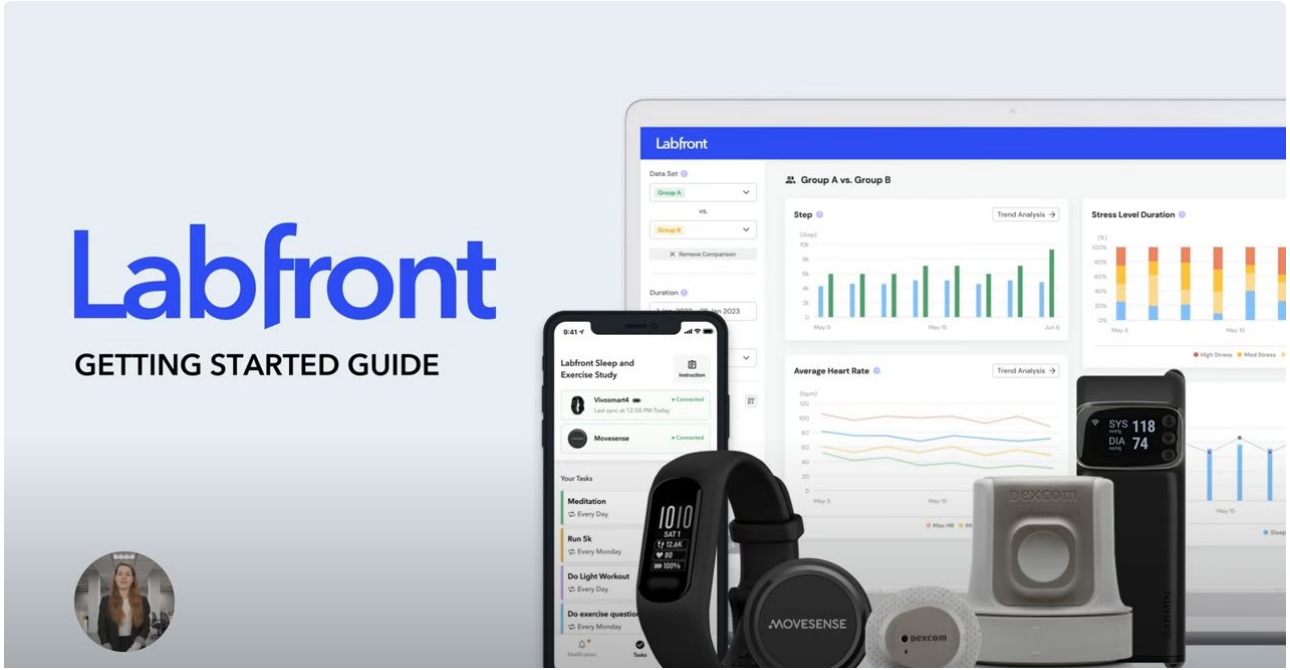
Researcher



LabFront Licensing

- HSMG recommends a LabFront Advanced license
- A LabFront Advanced license includes
  - High resolution physiological data from the VivoSmart 5
  - Garmin Connect data and metrics
  - Questionnaires, To-Dos and Timer tasks
  - Participant management dashboard
  - Data Visualization

Getting Started with LabFront for Researchers



Link HERE

LabFront Participant Onboarding

- When you are ready to get started with LabFront, this video gives an overview of onboarding participants to LabFront
- Participant onboarding will be covered in detail in the HSMG Bootcamp course we will be offering
- Scan the QR Code
- or link HERE

Data Management

- LabFront makes it easy to capture a lot of data
  - Both survey and sensor data are integrated with timestamps
- Processing and visualizing this data can present some challenges
- Depending on your needs, different options will be appropriate
- We'll present a few options for your consideration
- Data Management will be covered in more detail in the Bootcamp course we will be offering

LabFront Data Visualization

- LabFront data visualization (currently beta) is a graphical dashboard and is included with the Advanced License at no extra cost
- Plots for Heart Rate, Stress, Steps, Sleep Staging, Calories, Device Wearing Time, BBI, Actigraphy
- Includes Participant Adherence Dashboard
- Fixed format, no ad-hoc analysis available
- Graphs are per participant only

Ad-hoc Data Visualization using Microsoft Excel

- Microsoft Excel is a powerful data visualization tool, installed on your computer now
- Excel can be used to do ad-hoc visualization of downloaded LabFront data
- Excel can also be used to summarize and do basic statistical analysis of downloaded LabFront data

Example Ad-hoc Data Visualization using Microsoft Excel

Using Microsoft Excel, you can calculate heart rate distribution and plot it on a histogram.

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6					
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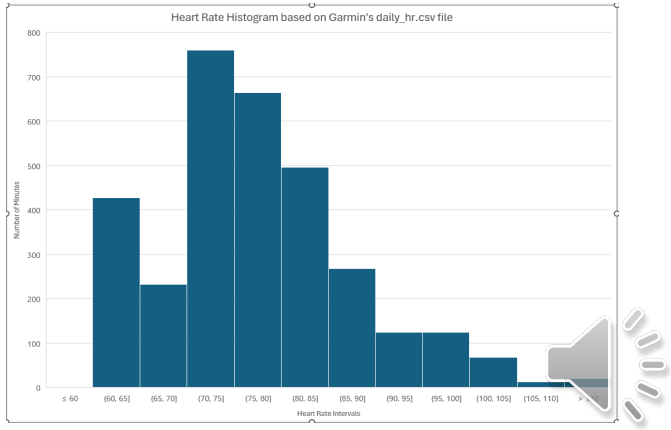

Example Ad-hoc Data Visualization using Microsoft Excel

Using Microsoft Excel, you can calculate Activity Duration and plot it on a Pie Chart

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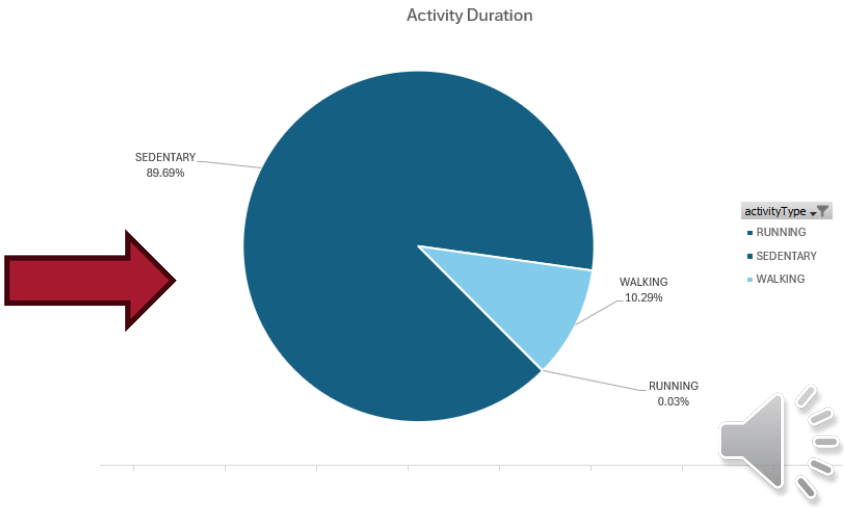
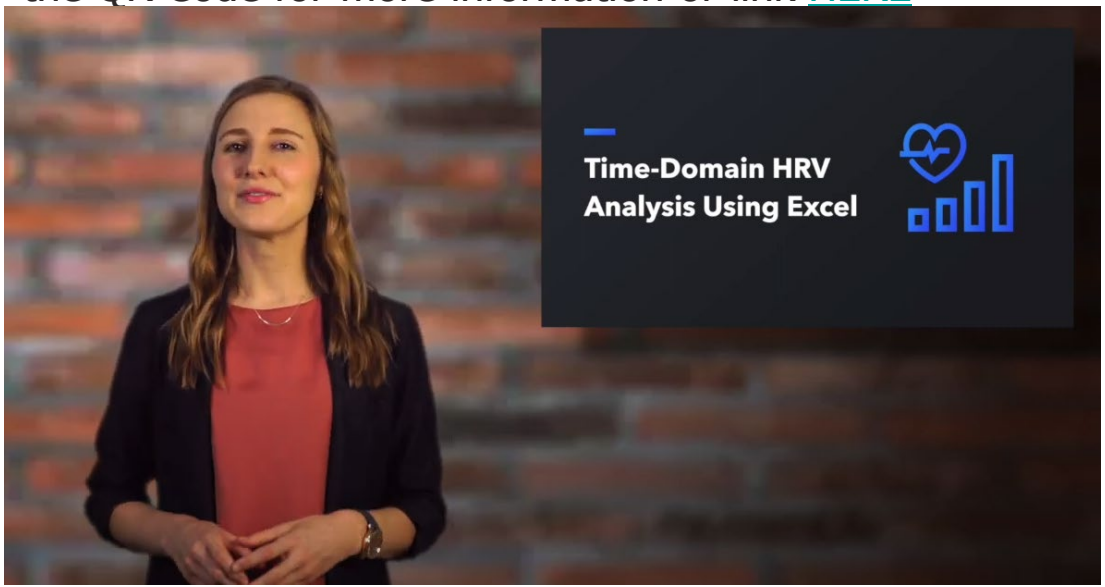


Advanced Example: Time Domain Heart Rate Variability (HRV) analysis using Microsoft Excel

Using Microsoft Excel, you can do Time Domain Heart Rate Variability (HRV) analysis. Scan the QR Code for more information or link HERE



Data Analytics

- For research projects with specific research questions or hypotheses, LabFront data visualization and ad-hoc Excel will not be enough.
- HealthLINK can help take the researcher to the next level
- The Health Data Analytics Group (HDAG) provides high-quality data management and analytic services to researchers.
- HSMG and HDAG work together to assist the researcher

Health Data Analytics Group (HDAG)

- The Health Data Analytics Group (HDAG) provides high-quality data management and analytic services to researchers.
  - SDSU researchers and SDSU HealthLINK Center partners receive competitive pricing at all stages of research.
- HDAG Services Offered include:
  - Study Design Consultation
  - Power and Sample Size Calculation
  - Data Management
  - Data Analysis Support

HealthLINK Data Analytics Synergy: HSMG & HDAG

HSMG and HDAG work together like links in a chain, helping the researcher

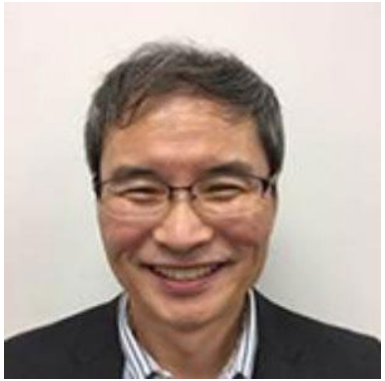
Data Transformation Support including formatting, filtering, cleaning, validating and labelling.

Data Management and Data Analysis Support

HSMG Courses

- We have only skimmed the surface of how to utilize the VivoSmart 5 and LabFront in your research
- Our Bootcamp course has a lot more detail, including the following topics and more
  - Advanced Researcher and Participant setup for LabFront
  - VivoSmart 5 optimization
  - Mobile Phone App optimization
  - Data Management
- Additional courses are in the works on Advanced Data Science topics, including Machine Learning
- Contact us regarding our course schedule

The HSMG Team



Dr. Kee Moon is a co-leader of the SDSU HealthLINK Center's Research Infrastructure Core.

Dr. Yusuf Ozturk is a co-leader of the SDSU HealthLINK Center's Research Infrastructure Core.

Doug Neary is the Wireless Sensor Technology Coordinator for the SDSU HealthLINK Center

In Summary

- The Garmin VivoSmart 5 is a tiny, powerful, and cheap wearable
- LabFront is a reasonably priced, powerful Health Researcher focused platform.
- HSMG and HDAG can help with data transformation and data analytics
- HSMG offers a VivoSmart 5 bootcamp class where we will go into more detail than we can here.
- Contact us if you would like to be notified when the next VivoSmart 5 Bootcamp class is available.