IMOTIONS®

Remote Data Collection

Pocket Guide

iMotions - Powering Human Insight

What's inside?

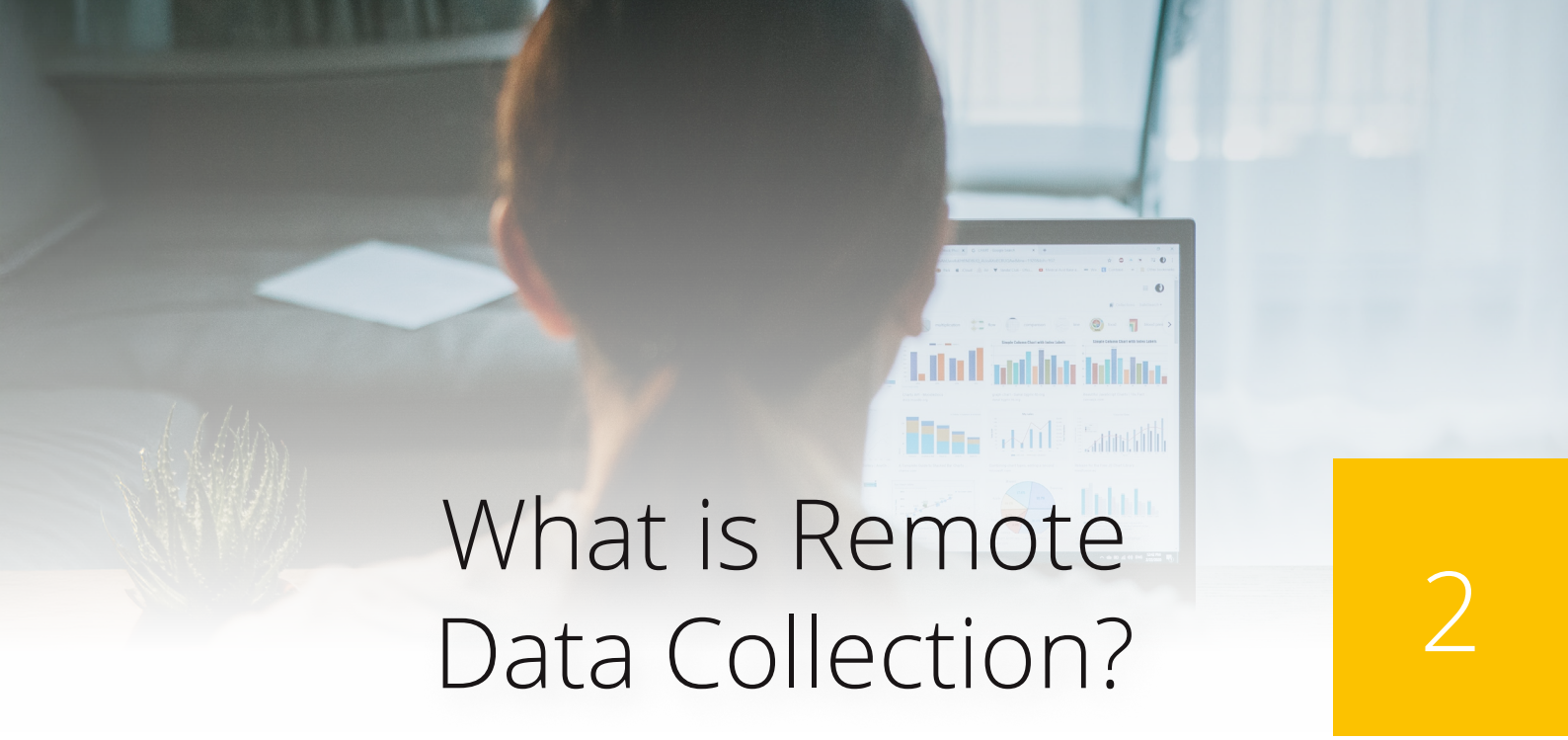
1 Introduction

Conducting online behavioral research through the iMotions Lab allows researchers to gather data from diverse populations worldwide and at scale. While not a new concept, iMotions online research capabilities have evolved rapidly and is now widely used in both academic and commercial research through the Remote Data Collection (RDC) Platform to expand the physical lab with a remote lab extension.

Despite its accessibility, successful online behavioural research requires a solid understanding of the technology and best practices for study design, execution, and analysis. This pocket guide provides a practical overview of how remote data collection with iMotions is applied across various research fields, along with key steps for designing, monitoring, and analyzing online data.

By the end of this guide, you'll be equipped to make informed decisions about integrating online research and remote data collection into your own lab research practices.

If you'd like to explore how Remote Data Collection (RDC) can enhance your research, feel free to connect with the iMotions team through our website.



What is Remote Data Collection?

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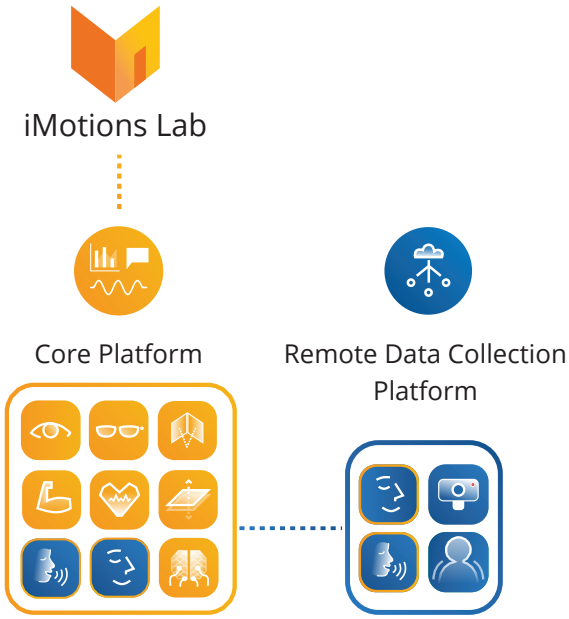
Remote data collection refers to the process of gathering information from individuals or environments without requiring their physical presence at a research facility or lab. While remote data collection can be conducted using various technologies, such as wearables and digital sensors, this pocket guide focuses specifically on internet-based remote data collection.

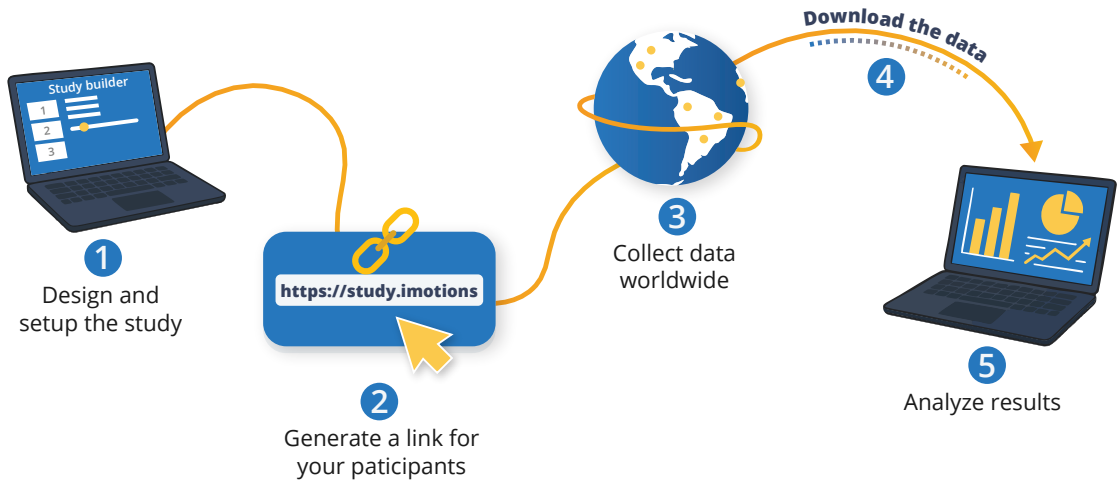
Remote data collection for online research enables researchers to gather human data through the internet to study human behavior using tools like surveys, questionnaires, eye tracking, and facial expression analysis.

By leveraging browser-based studies, researchers can reach participants worldwide, allowing them to contribute data using their own webcams and web browsers. This data is then aggregated through cloud-based platforms, such as iMotions, for comprehensive analysis.

As an extension to the iMotions Lab Core Platform, the iMotions Remote Data Collection Platform (RDC) provides access to this process by bringing advanced biometric research online. With add-on modules such as webcam-based eye tracking, webcam respiration monitoring, and AI-powered voice analysis and emotion detection, researchers can gather nuanced behavioral data remotely. Studies can be designed and managed within iMotions Lab, distributed globally—including via online surveys—and analyzed using the platform's sophisticated analysis software.



How it works



The Benefits of Remote Data Collection:

1. **Increased Convenience for Participants**
   Recruiting participants for in-person studies can be challenging, but remote data collection opens up vast possibilities. Whether you need 35-45-year-olds in full-time employment, individuals from rural areas, or participants with specific lifestyle traits—like owning three pets and raising two children—remote data collection simplifies recruitment. Through integration with panel providers, iMotions ensures fast, easy access to diverse demographics tailored to your research needs.

2. **Real Insights, Free from Bias**
   Self-reported data often suffers from biases, as people struggle to accurately articulate their preferences, emotional states, or decision-making processes. By measuring nonconscious emotional signals and visual attention simultaneously, iMotions delivers unbiased, high-quality insights into the drivers behind behavior.

3. **Cost-Effective and Flexible**
   Remote data collection eliminates the need for expensive hardware. Using computer vision algorithms, biometrics are captured through participants' webcams, offering a fast and economical solution. Additionally, iMotions' cloud portal enables research teams to collaborate on study design and data analysis from anywhere in the world.

4. **Scalability for Large-Scale Studies**
   Remote tools allow researchers to scale their studies efficiently, engaging large numbers of participants simultaneously. This scalability accelerates data collection timelines while maintaining high data quality.

Remote data collection, through the iMotions platform, transforms how behavioral research is conducted—making it more accessible, scalable, and insightful than ever before.

3 Sensors for Remote Data Collection

Remote data collection harnesses a webcam and a microphone to gather biometric and behavioral data from participants without requiring physical hardware installations. Below is an overview of the key data modalities available via the iMotions Remote Data Collection Platform.

1. Webcam-Based Eye Tracking

Webcam-based eye tracking captures participants' gaze patterns, providing valuable insights into visual attention, focus, and cognitive engagement. While traditional eye tracking—using specialized hardware like screen-based trackers and eye-tracking glasses—has been extensively studied for over a century, webcam-based eye tracking is a relatively new field. As a result, there is no industry-wide consensus on standardized reporting metrics, leading to inconsistencies in how accuracy is communicated across different software solutions. This variability can make it challenging for researchers to determine the best fit for their needs.

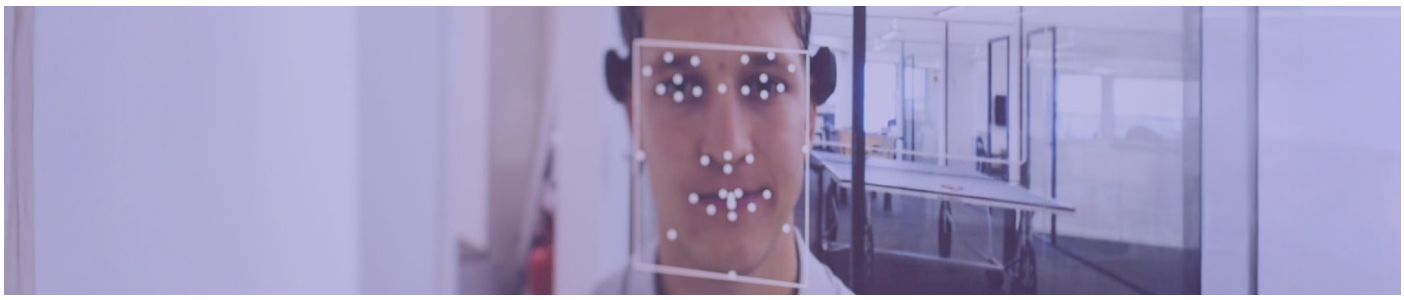
At iMotions, we apply the same rigorous standards used in traditional eye tracking to our webcam-based solution. Specifically, we adhere to "degrees of visual angle" (DVA) as the standard accuracy metric. In our recent validation study of our webcam-eye tracking technology, called WebET 3.0 (iMotions WebET 3.0 Validation Study Report, 2023), we set an upper threshold of 5.5 DVA for acceptable accuracy. Of the 255 participants tested, 92% (235 participants) achieved accuracy below this threshold, and 70% (179 participants) had accuracy below 3.0 DVA—demonstrating state-of-the-art performance in webcam-based eye tracking.

Several factors can influence eye tracking accuracy, but in our validation study, the only significant negative factor was whether the participant wore glasses. More details on optimizing data quality are provided in the *Best Practices* section.

Webcam eye tracking provides many of the same key metrics as hardware-based systems, including dwell time, time to first fixation, and revisits. Data visualization through heatmaps offers intuitive, color-coded representations of where participants looked most and least. However, webcam-based tracking is not recommended for research involving pupil dilation metrics or saccadic eye movement analysis.

2. Webcam Facial Expression and Head Movement Analysis

Facial expression analysis leverages webcam technology to detect subtle muscle movements in the face, enabling real-time emotion recognition. Built on decades of research from leading academic institutions, automatic facial expression recognition has become widely accessible, allowing researchers to instantly detect faces, classify expressions, and infer emotional states. These technologies operate using built-in laptop, tablet, and smartphone cameras, as well as external webcams, capturing participants' facial responses as they engage with different types of content.



The automation of facial expression analysis has transformed the fields of affective neuroscience and biosensor engineering, making emotion analytics scalable for scientific research, commercial applications, and consumer insights. Traditionally, facial expression analysis required manual coding by trained analysts or the use of facial electromyography (fEMG) to measure muscle activity. However, advances in AI-driven facial coding have enabled comparable accuracy to fEMG while significantly increasing efficiency and accessibility (*Kulke et al., 2020*).

Webcam-based facial expression analysis by Affectiva detects the face in a video feed and applies AI-driven models to track and interpret facial movements. By analyzing key facial landmarks—such as the eyes, lip corners, and nose tip—the system classifies expressions and provides a range of quantifiable metrics. These include:

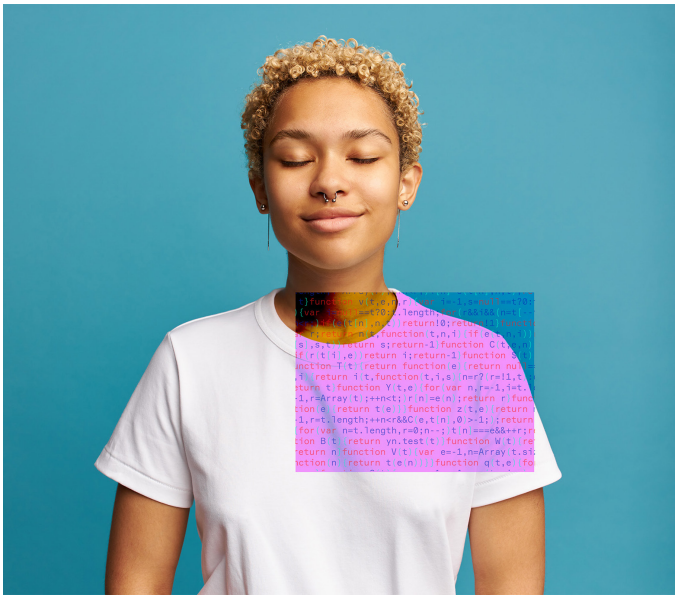
- Head orientation (yaw, pitch, roll)
- Interocular distance and 33 facial landmarks
- 7 basic emotions, as well as valence, engagement, and attention
- 20 facial expression metrics

By automating facial expression analysis, researchers can efficiently capture and interpret emotional responses, making large-scale, remote studies more feasible and impactful.

3. Webcam Respiration Monitoring

Using advanced computer vision algorithms, webcams can estimate respiration rates by tracking subtle movements in the chest and/or facial region. iMotions' Webcam Respiration module leverages sophisticated image processing techniques to monitor these micro-movements, accurately detecting respiration cycles while filtering out noise to ensure clean, reliable data. By automatically designating a region of interest (ROI) around the participant's chest, the software enables precise tracking without the need for physical sensors.

The development of the Webcam Respiration module was guided by a rigorous validation process, comparing its performance to the gold-standard BIOPAC respiration belt (*iMotions Web-Respiration Validation, 2024*). In a controlled lab study, the technology demonstrated a strong intraclass correlation coefficient (ICC) of 0.815 for respiration rate, indicating a high degree of agreement with traditional methods.



Bland-Altman plots further confirmed that:

- The average measurement error between webcam respiration and lab-based respiration was minimal—less than 1 respiration cycle per minute for respiration rate and under 1 second for cycle duration.
- Both respiration rate and cycle count showed homoscedasticity, meaning measurement accuracy remained consistent across different breathing rates.

These findings suggest that webcam-based respiration tracking is comparable to lab-based methods across a wide range of conditions and participant movements.

This validation not only establishes the accuracy of webcam respiration monitoring but also highlights its potential for large-scale remote research, where traditional hardware like respiration belts would be impractical. Webcam-based respiration analysis provides key physiological metrics, including:

- Breathing rate (cycles per minute)
- Cycle duration (length of each breath)

By eliminating the need for specialized equipment, Webcam Respiration enables seamless, scalable physiological data collection, making it a powerful tool for remote behavioral and biometric research.

4. Voice Analysis

Voice analysis leverages microphone input to extract emotional and cognitive data from speech. Using audEERING's devAIce technology, this process identifies key vocal characteristics, including prosody (e.g., pitch and intonation), emotional dimensions (e.g., arousal and valence), and emotional categories (e.g., happiness and anger). In addition to emotion detection, the technology provides predictions on the speaker's perceived gender and age, further enriching the analysis.

audEERING's devAIce technology is widely recognized as a gold standard in voice analysis and has been validated through numerous academic publications. For a deeper understanding of its accuracy and methodology, refer to *audEERING's recent White Paper*.

5. Speech-to-Text Analysis

Speech-to-text analysis in iMotions is powered by AssemblyAI's cloud-based technology, enabling seamless transcription and sentiment analysis of audio data. Processing speech is straightforward—simply select the study you want to analyze and enable the speech-to-text option in the post-processing menu. The transcription runs in the background like other post-processing features, and once complete, results are stored as annotations linked to your data.

The processed audio is structured into:

- Speaker-separated transcripts, with each segment attributed to an individual speaker.
- Sentiment analysis, categorizing speech as positive, negative, or neutral based on language tone and sentiment-laden words.

Beyond transcription, this data provides valuable discursive insights, allowing researchers to analyze word frequency, thematic patterns, and sentiment shifts. This makes it particularly useful for focus groups, open-ended interviews, and multi-speaker conversations.

AssemblyAI's technology ranks among the top-performing speech AI models, demonstrating industry-leading accuracy in benchmark evaluations (*Ramirez et al., 2024; AssemblyAI Benchmarks*).

Why These Modalities Matter

These webcam and microphone-based tools allow researchers to capture diverse data types remotely, enabling holistic insights into human behavior. By utilizing widely accessible technology, this approach reduces logistical barriers, enhances participant convenience, and ensures scalability for global studies.

Use cases

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The use of iMotions Remote Data Collection (RDC) surged across disciplines during the COVID-19 pandemic, as restrictions on face-to-face interactions accelerated the adoption of video calls, online surveys, and questionnaires to measure attitudes, emotions, thoughts, and behaviors.

This shift enabled researchers to study complex human behavior in a decentralized manner, reaching diverse populations while capturing data in naturalistic settings. The rapid expansion of RDC highlights its transformative potential, demonstrating how remote methodologies can enhance accessibility, scalability, and ecological validity in behavioral research.

iMotions Remote Data Collection is widely used in both academia and industry across diverse research areas, from detecting deception to assessing packaging preferences through A/B testing.

Below, we provide an overview of key publications that have successfully implemented iMotions RDC methodologies.

Social Psychology

The study of human behavior and interaction is central to social psychology, and remote data collection methods are enabling researchers to investigate these processes on a broader scale with greater efficiency. By leveraging technological advancements, these approaches enhance both the scope and ecological validity of psychological research.

For example, a study employing webcam-based eye-tracking confirmed the happiness-superiority effect, demonstrating faster attentional responses to happy faces compared to sad ones (*Wisiecka et al., 2022*). Similarly, facial expression analysis through webcam recordings allowed researchers to detect subtle markers of deceitful behavior, replicating and extending findings from controlled laboratory settings (*Hammond et al., 2022*).

RDC can also be conducted through virtual assistants. One innovative study was able to reliably assess personality scales and five famous social psychology experiments, including Kahneman and Tvyrsky's famous Anchoring and Framing experiments (*Sprengholz and Betsch, 2021*). This data further underscores the many ways in which data can be collected remotely with meeting scientific standards.

Infant and Caregiver-Child Dyad Research

Remote data collection has proven valuable for studying child behaviors and caregiver-child interactions, offering an alternative to traditional laboratory-based observation.

For instance, one study utilized the Multisensory Attention Assessment Protocol (MAAP) to remotely assess multisensory attention skills (MASks), such as the duration of looking, speed of shifting attention, and accuracy of audiovisual matching (*Eschman et al., 2022*). Postprocessing software further enabled the estimation of visual gaze behaviors by detecting facial movements.

Similarly, another study analyzed mother-infant attachments by recording mothers and their infants engaging in structured tasks, including standardized toy play and book-reading activities (*Shin et al., 2021*). These studies leverage behavioral coding, which, depending on the software, can be conducted manually or automatically.

These approaches not only expand access to diverse populations but also enhance ecological validity by allowing research to occur in participants' natural environments. Remote methods thus provide an efficient, scalable means of advancing our understanding of early developmental processes and caregiver-child dynamics.

User experience & Design

Remote data collection is increasingly utilized in user experience (UX) research, offering an efficient and scalable alternative to traditional in-person methods. By capturing user interactions with websites, interfaces, and products remotely, researchers can gain valuable insights while conserving resources.

For instance, one study demonstrated that remote eye-tracking recordings during website interactions produced results comparable to resource-intensive in-person assessments (*Hammond and Wang, 2023*). This finding underscores the efficiency of RDC in achieving reliable outcomes with reduced logistical demands. Similarly, RDC is being employed as a viable substitute for in-person interviews and focus groups. Through video recordings, researchers can conduct user experience studies, capturing participant feedback in a flexible and accessible manner (*Archibald et al., 2019*).

Architecture and design are leveraging biometric research to explore how people experience spaces, indoor and outdoor. Early findings using remote data collection Webcam-Eye Tracking reveals that specific types of building structures can uniquely capture visual attention, potentially shaping our interactions with them (*Rosas et al., 2023*).

By enabling the study of diverse user populations in naturalistic settings, RDC enhances the ecological validity of UX and design research. Its versatility makes it a critical tool for understanding how users engage with digital platforms and products in real-world contexts.

Neuromarketing and decision making

RDC is a powerful tool in neuromarketing and decision-making research, enabling deeper insights into human behavior and predictive models of choice. By combining traditional methods with remote biometric data, researchers can better understand attention, emotion, and decision-making processes.

For example, one study used webcam-based facial expression analysis to track attention patterns and emotional responses to anti-tobacco public service announcements (PSAs) (*Parvanta et al., 2022*). Incorporating biometric data alongside self-reports significantly improved the ability to predict which PSAs were most effective. Similarly, webcam eye-tracking has revealed a strong relationship between dwell time—the duration of gaze on an item—and decision outcomes (*Yang and Krajbich, 2023*).

This phenomenon has broad applications, from predicting consumer product preferences to understanding voter behavior.

Education Research

The shift to RDC during COVID-19 had a profound impact on education research, forcing a move away from in-person methods. Even after restrictions eased, in-person research faced ongoing challenges. One team successfully transitioned a classroom observation study to RDC using home security cameras, yielding meaningful data while significantly reducing costs (*McLean et al., 2024*).

RDC has also proven effective for evaluating student performance. In one study, webcam-based eye tracking was used to compare reading performance across age groups (*Lin et al., 2022*). Results showed no significant difference when compared to commercial in-person eye tracking hardware, demonstrating the reliability of remote methods.

From social psychology to education, iMotions Remote Data Collection enables researchers to study behaviors, interactions, and decision-making in diverse populations and real-world contexts. Its seamless integration into various fields offers innovative ways to gather data in naturalistic settings.

However, designing and executing these studies with scientific rigor is essential. In the next section, we outline best practices to ensure the success and reliability of iMotions RDC methodologies.

5 Best Practices for Remote Data Collection Studies

This section offers guidance on key considerations for designing and conducting successful remote data collection (RDC) studies. While some recommendations are tailored to the iMotions platform, much of the information is broadly applicable to any remote data collection study, regardless of the platform used. We encourage the interested reader to explore further recommendations presented in recent scientific literature (see for example Rodd, 2024)

1. Evaluate your stimuli, study duration, and experimental design

To ensure the success of your remote data collection study, start by assessing whether your stimuli, study duration, and experimental design are compatible with remote methods. This will help you balance participant engagement with data quality.

Stimuli

- Choose stimuli compatible with remote platforms (e.g., videos, images, screen recordings).
- In the iMotions RDC platform, when using videos as a stimuli, ensure a resolution of 1920x1080 pixels at 30 fps for smooth performance.

Study Duration

- Limit sessions to 10 minutes for the highest participant engagement and data reliability.
- For longer studies, conduct rigorous testing to confirm data stability and transferability.

Experimental Design

- Select an experimental design aligned with your research goals.

Common RDC designs

Experimental Design	Design Description	Suitability for RDC
Slideshow	*Participants view a sequence of pictures, text, or videos, which may be presented in a specific or randomized order to assess attention, perception, or comprehension.*	*This design is highly suitable and easy to implement remotely using online platforms.*
Block Design	*Pictures, text, or videos are grouped into distinct blocks, with participants engaging with one block at a time. This format allows for the comparison of responses across blocks, such as A/B testing designs.*	*This design is well-suited for remote data collection, allowing participants to focus on one block at a time.*
Think Aloud	*Participants verbalize their thoughts while completing a task or interacting with stimuli, providing insight into their decision-making processes and cognitive strategies.*	*This remote experimental design is feasible but requires proper setup to ensure the microphone works, audio quality is good, and background noise is minimal. Clear instructions, careful study design, and thorough testing are crucial to mitigate webcam eye-tracking issues from excessive head or speech movements.*
Interviews	*Structured or semi-structured conversations where participants share detailed responses to open-ended questions, enabling in-depth exploration of their experiences and perspectives.*	*Interviews are also well-suited for remote data collection when the camera and microphone are enabled. To reduce manual coding and analysis, especially to capture nonverbal behaviors, it is highly recommended to have automated software analysis available.*
Focus Group	*Guided discussions with a small group of participants to gather diverse opinions, insights, and feedback on a specific topic, often emphasizing group dynamics and interaction.*	*While Focus Groups can be conducted remotely using video conferencing tools, managing group dynamics, ensuring equal participation, and moderating effectively can be more challenging than in-person settings.*

Tip: Always pilot your study to resolve all issues, optimize data quality, and ensure a smooth participant experience.

2. Sensor Selection and Environmental Factors

The effectiveness of remote data collection heavily relies on the proper use of sensors and an understanding of environmental conditions. This section outlines how to optimize sensor setup and account for external factors that may affect data quality.

Webcam Eye Tracking

Proper webcam positioning is crucial to accurate eye tracking, as the participant should maintain the same position throughout the study. Software like iMotions can automatically detect facial positioning, and calibration points should be added for individualized reference. If the study is longer, adding calibration between stimuli will help maintain data quality. Be mindful of lighting conditions—extreme brightness or darkness can interfere with the accuracy of eye tracking. And lastly, based on our validation report (*iMotions WebET 3.0 Validation Study Report, 2023*), participants should wear contacts and avoid wearing glasses during the study.

Key action items:

- Implement automatic facial positioning for unobstructed visibility of the participant's face.
- Implement calibration points at the beginning and end of the study. If the study is longer, add calibration points throughout the study as well.
- Avoid environmental interference (e.g. extreme lighting condition and eye wear)
- Provide clear participant instructions.

Webcam Facial Expression Analysis and Head Movement Analysis

As with eye tracking, correct webcam positioning is key for facial expression and head movement analysis.

Participants should maintain a consistent position, and software like iMotions can ensure proper alignment throughout the study. Be mindful of lighting conditions—extreme brightness or darkness can obstruct visualization of facial features, reducing data quality.

Key action items:

- Implement automatic facial positioning for unobstructed visibility of the participant's face.
- Provide clear participant instructions.
- Avoid extreme lighting conditions (extreme brightness and darkness).

Webcam Respiration

Ensure the webcam is correctly positioned for respiration tracking, with the participant remaining still during the study. iMotions technology can help with face positioning, similar to the requirements for eye tracking and facial expression analysis.

Key action items:

- Implement automatic facial positioning for unobstructed visibility of the participant's face and chest.
- Provide clear participant instructions.

Voice Analysis and Speech to Text Analysis

For voice data, ensure the microphone is enabled and that the environment is quiet enough for clear audio. Test the audio quality before the study starts, and ensure participants avoid noisy surroundings. High background noise can obscure speech, affecting the analysis of subtle voice changes.

Key action items:

- Use a quiet environment to capture high-quality audio.
- Implement audio quality testing before the participant starts the data collection.
- Provide clear participant instructions.

Final note

Because the data will be collected without synchronous support from researchers, it is critical that the data collection is done with software that can independently execute data quality control. Troubleshooting and instructions must also be clear for participants to complete data collection on their own. Software like iMotions provides a seamless setup experience, helping participants achieve the highest data quality for researchers.

3. Provide clear and simple instructions throughout

Clear communication with participants is essential to ensure the success of your remote data collection study. This section provides a roadmap for preparing participants and guiding them throughout the process.

How to Conduct a Successful Study

Pre-Session Briefing

1. **Informed Consent**:
   Clearly explain data collection, usage, and storage. Offer an opt-out option.
2. **Device Requirements**:
   Ensure participants use a laptop or desktop; mobile devices are unsupported.
3. **Environment Setup:**
   Recommend a quiet, well-lit space with a reliable internet connection.

4. Webcam & Microphone Access:
   Provide step-by-step guidance to enable and test these tools.

During the Study

5. Provide reminders for participants to maintain a stable position and minimize movement.
6. For longer sessions, consider periodic check-ins for recalibration.

Post-Session Confirmations

7. Confirm data upload.

4. Plan for Attrition and Adjust Sample Size Accordingly

Remote data collection often encounters higher attrition rates and variability in data quality compared to in-person studies. Factors such as participants' misunderstanding of instructions, technical issues, or lack of attention can lead to incomplete or unusable data.

Attrition rates and data quality depend heavily on the complexity and duration of the study. For instance, shorter, simpler studies are more likely to yield high-quality data than longer, more complex ones.

In the largest remote webcam eye-tracking study conducted to date, 92% of the 255 participants produced data of sufficient quality for analysis, meaning 8% of the collected data was excluded due to quality issues (iMotions WebET 3.0 Validation Study Report, 2023). However, this figure does not account for participants who began but abandoned the study mid-session.

In some cases, the rate of study abandonment has been observed to reach a ratio of 2:1. Offering monetary incentives for participation has been shown to improve both completion rates and data quality (*Rodd, 2024*).

To anticipate and mitigate attrition in your study, conducting a pilot test is essential. Pilots provide an opportunity to evaluate dropout rates, troubleshoot potential participant challenges, and adjust sample size to ensure that sufficient usable data is collected.

Key Takeaways

Because remote data collection studies are conducted without synchronous support from researchers, it is critical to use software capable of independently managing data quality controls. Clear, accessible instructions and troubleshooting resources are vital for enabling participants to complete the study on their own.

Platforms like iMotions streamline setup and execution, helping researchers collect high-quality data with minimal participant confusion.

By integrating these best practices into your remote data collection workflow, you can enhance data quality, ensure a smooth participant experience, and maintain ethical research standards.

How Online Studies Can Interface with Panel Services

6

One of the key advantages of online studies is their ability to scale research across diverse demographics and regions that might otherwise be difficult to access.

Panel providers, such as Prolific, Amazon Mechanical Turk (mTurk), and Sona Systems, specialize in recruiting and managing participants for various research studies, including surveys, focus groups, and biometric online studies. These platforms offer access to pre-screened, diverse participant pools, making it easier for researchers to reach a wide range of participants.

By integrating your online study with a panel provider, you can seamlessly link participant demographic data with experimental results. iMotions' RDC platform enables this integration through the HTTP GET method, a widely-used protocol that allows you to retrieve specific data from web servers. This method is especially useful for requesting participant-related information, such as participant IDs, survey responses, and email addresses.

Prolific

amazon mechanical turk

SONA SYSTEMS

There are two main ways in which iMotions can communicate with external websites, like panel providers, using the HTTP GET method:

- **Passing Data via the iMotions Study Link:**
  iMotions can capture data passed through the study link. Any parameters included in the link (e.g., participant ID, demographic info) are stored and forwarded to websites the participant visits during or after the study, including any redirects.
- **Sending Study Data to External Websites:**
  iMotions can send study-specific data, such as the participant's ID, study name, and the specific stimuli being presented, to any websites visited during or after the study. These details are appended to the website URL. For example, if a participant is redirected after the study, the data from the RDC study can be sent to a third-party site, but the URL setup must follow specific guidelines to ensure proper data transfer.

Example Use Case

Consider a scenario where a researcher recruits participants for an online study via Prolific using iMotions RDC. The researcher first uses a screening questionnaire within Prolific, and if a participant qualifies, they are redirected to the iMotions RDC platform to complete the study. This redirection includes the participant's Prolific ID as a URL parameter using the HTTP GET method.

Once the RDC session is completed, the participant is redirected back to Prolific, again via an HTTP GET request, which includes both the iMotions session ID and the original Prolific participant ID. This ensures that both platforms log and retain the necessary identifiers, allowing for seamless data merging between Prolific and iMotions. By structuring the URLs correctly, the researcher can automate the transfer of participant information across platforms without requiring manual intervention.

Other Alternatives

While the HTTP GET method is powerful, it requires proper configuration, particularly when setting up redirects. As an easier alternative, researchers can set up a redirect URL to guide participants to another webpage after the study ends, or even if they decline to participate. However, in this case, the data from the iMotions RDC study will not be merged with third party data sets.

We are here to support

iMotions' Help Center and Customer Support team are available to offer personalized assistance as you navigate the process of integrating panel providers with your iMotions RDC study. They can help guide you through any technical setup and ensure seamless communication between platforms.

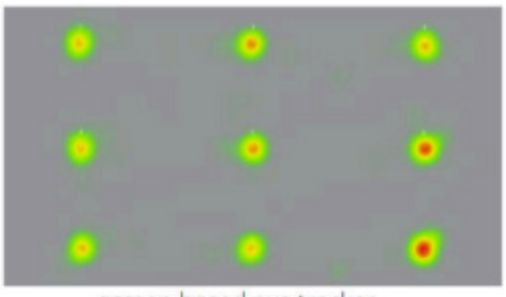
7 Monitoring Data Collection & Data Quality

While researchers are not physically present during remote data collection, iMotions' RDC platform provides robust tools to monitor participant progress and ensure data quality. Through the browser-based interface, researchers can access near real-time overviews of participant activity and the quality of data being collected.

Participant Overview Dashboard

The iMotions RDC platform offers detailed information about each participant who has interacted with the study link. Key metrics displayed include:

1. **ID**: A unique respondent ID assigned by iMotions.
2. **Started**: The date and time when the participant accessed the study link.
3. **Ended**: The date and time when the participant completed the study, including data upload.
4. **Eye Tracking Quality**: Precision (measured in degrees of visual angle) and the percentage of the session where eye-tracking data was successfully recorded.



screen based eye tracker during parallel recording

5. Facial Data Quality: The percentage of the session with usable face data.
6. Block: The name of the study flow block in progress or completed.
7. Status: The participant's data collection progress, with possible statuses including:
    - **In Progress:** Participant has accessed the study link but not completed the session.
    - **Processing:** Participant has completed the study, and their data is being uploaded.
    - **Processed:** Data upload is complete, and files are ready for download.
    - **Abandoned:** Data upload was interrupted, often due to the participant closing the browser or losing internet connectivity.
    - **Errors:** Data files are invalid or contain errors, making them unprocessable.

Key Metrics for Researchers

Among the available metrics, two are particularly critical:

1. **Data Quality Metrics**:
   Eye Tracking and **Facial Expression Analysis** percentages help researchers assess the quality of collected data.

   High percentages indicate robust and usable data, while lower percentages might suggest technical issues or environmental challenges (e.g., poor lighting or participant movement).

2. **Participant Status**:
   Tracking the status of participants allows researchers to gauge study progress.

   For example, a high rate of "Abandoned" sessions may indicate issues such as overly long study duration, poor internet connectivity, or unclear instructions.

Maximizing Data Collection Success

By continuously monitoring participant activity and data quality, researchers can make informed decisions to optimize their studies. If a significant number of sessions are abandoned or yield poor-quality data, extending recruitment efforts may be necessary to achieve the desired sample size.

Additionally, patterns in data quality issues can reveal opportunities to refine the study design, such as improving participant instructions, adjusting stimuli, or addressing environmental factors like lighting and internet connectivity.

The iMotions platform provides researchers with real-time insights to evaluate progress, troubleshoot challenges, and ensure the collection of high-quality data, enabling a seamless and efficient remote data collection process.

Analyzing Data Collected Remotely

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Analyzing data collected with the iMotions RDC is straightforward and mirrors the process for in-person data collection using the iMotions Lab. The primary difference is that with RDC, you must first download your data from the cloud to your computer before beginning analysis.

With iMotions, you can export all raw datasets, which can be analyzed in dedicated software such as MATLAB and Python. However, iMotions also empowers users with built-in tools to organize data and obtain key metrics and visualizations directly within the platform. Below, we explore four key features for effective data analysis. You can read more about each technology on our website.

1. iMotions Notebooks: Obtaining Key Metrics and Visualization

A central feature of the iMotions suite is its ability to visualize data from a wide range of hardware components used in research.

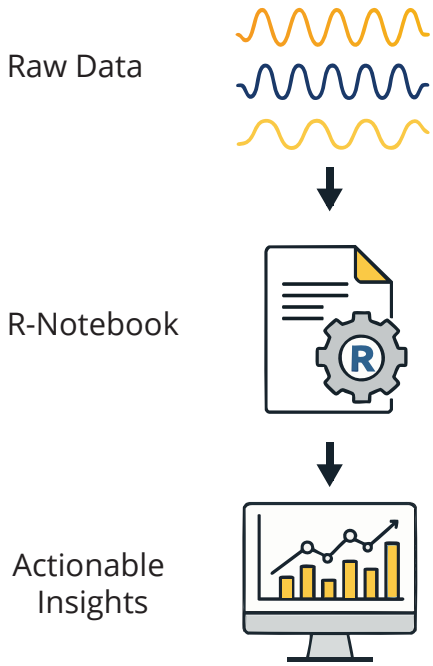
Without tools like R Notebooks, signals from these devices would be difficult and time-consuming to process and interpret.

Here, we delve into the significance of R Notebooks and their role within the iMotions platform.

What are "R Notebooks"?

R Notebooks are custom-programmed scripts designed specifically for the iMotions platform. They process signals from hardware and software used in biometric and AI-driven research and translate them into interpretable data representations.

These visualizations and metrics are ready for publication or presentation, saving researchers significant time and effort compared to working with raw datasets.



Supported Sensor Data

R Notebooks cover all available iMotions modules and include visualizations for popular metrics used by researchers daily. These include metrics that typically require advanced analysis and are not directly inferable from simple data exports. The platform is continually updated with new R Notebooks to address evolving research needs. Examples of current metrics accessible through R Notebooks include:

- **Facial Expression Analysis (FEA):** Blink detection, and raw data statistics.
- **Eye Tracking:** Blink detection and dwell time analysis.
- **Respiration**: Inhalation and exhalation processing.
- **Speech-toText and Voice Analysis**: Speech-to-text conversion and emotional tone analysis.

Additionally, R Notebooks can be customized for unique research needs, although we recommend only experienced R programmers attempt such modifications.

2. Behavioral Coding: Logging Behaviors and Events

Behavioral coding involves systematic, quantifiable observations of participant behavior, often conducted by reviewing recorded sessions. While behavioral coding is essential in fields such as psychology, usability research, and human factors, it requires meticulous planning and precise execution.

iMotions simplifies this process with robust behavioral coding tools that allow researchers to structure and analyze data collected remotely. Key technologies include:

Event Markers

Event markers label specific time points in recordings. These markers can be:

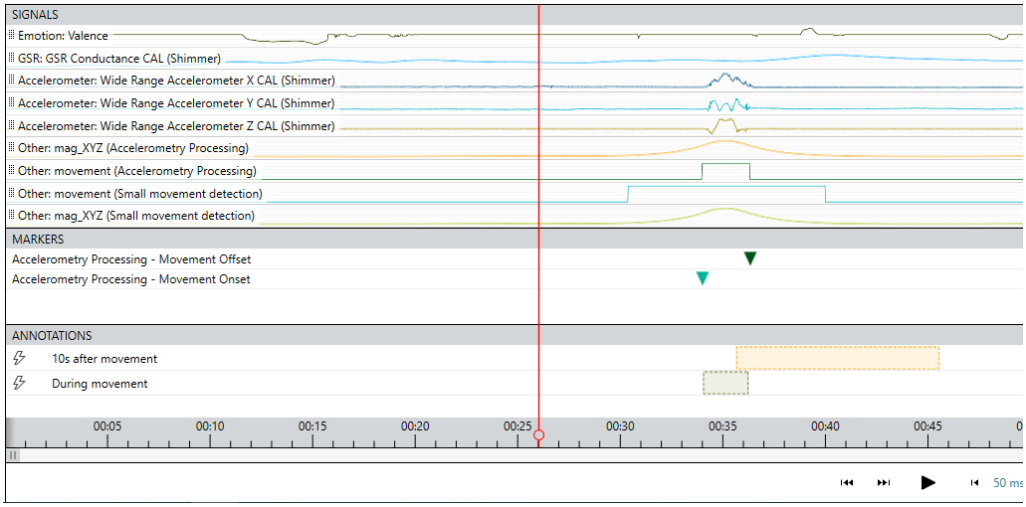
- **Built-In Markers:** Automatically created for events such as recording starts, stimulus presentations, and keyboard/mouse interactions.
- **Analysis Markers:** Generated automatically during data analysis, such as fixation events on Areas of Interest (AOIs).
- **User-Defined Markers**: Manually inserted at desired time points, offering complete control over event placement.

Annotations

Annotations mark time periods relevant for analysis. These can be:

- **Stimulus Annotations:** Applied to static stimuli for consistent duration/content across respondents.
- **Respondent Annotations:** Specific to individual recordings and created manually or automatically.
- **Automated Annotations**: Generated from existing event markers, enabling seamless analysis of key time periods.

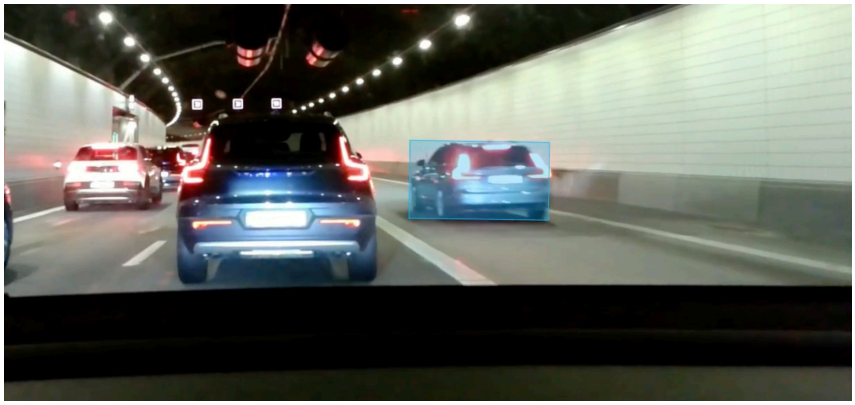
Event markers and annotations work in tandem to provide a detailed and organized dataset for analysis.



3. Automated Areas of Interest

If your RDC study includes webcam-based eye tracking, conducting an Area of Interest (AOI) analysis will likely be essential. iMotions' AOI Developer allows researchers to easily define specific areas within a stimulus to extract key eye-tracking metrics, such as fixation duration or the number of revisits.

However, analyzing dynamic content—such as websites or video advertisements—has traditionally been labor-intensive. iMotions' new Automated AOI tool transforms this process by enabling the automatic creation of AOIs for moving content.



This technology leverages an advanced tracking algorithm with a simple point-and-click interface. Researchers can define objects in a single video frame, and the system will intelligently track them across subsequent frames, adjusting AOIs in response to changes in movement, contrast, and boundaries. This cutting-edge innovation not only streamlines analysis but also ensures precision.

By integrating Auto AOI technology with RDC data, researchers can scale data collection efficiently while accelerating analysis, making the process faster and more accessible than ever before.

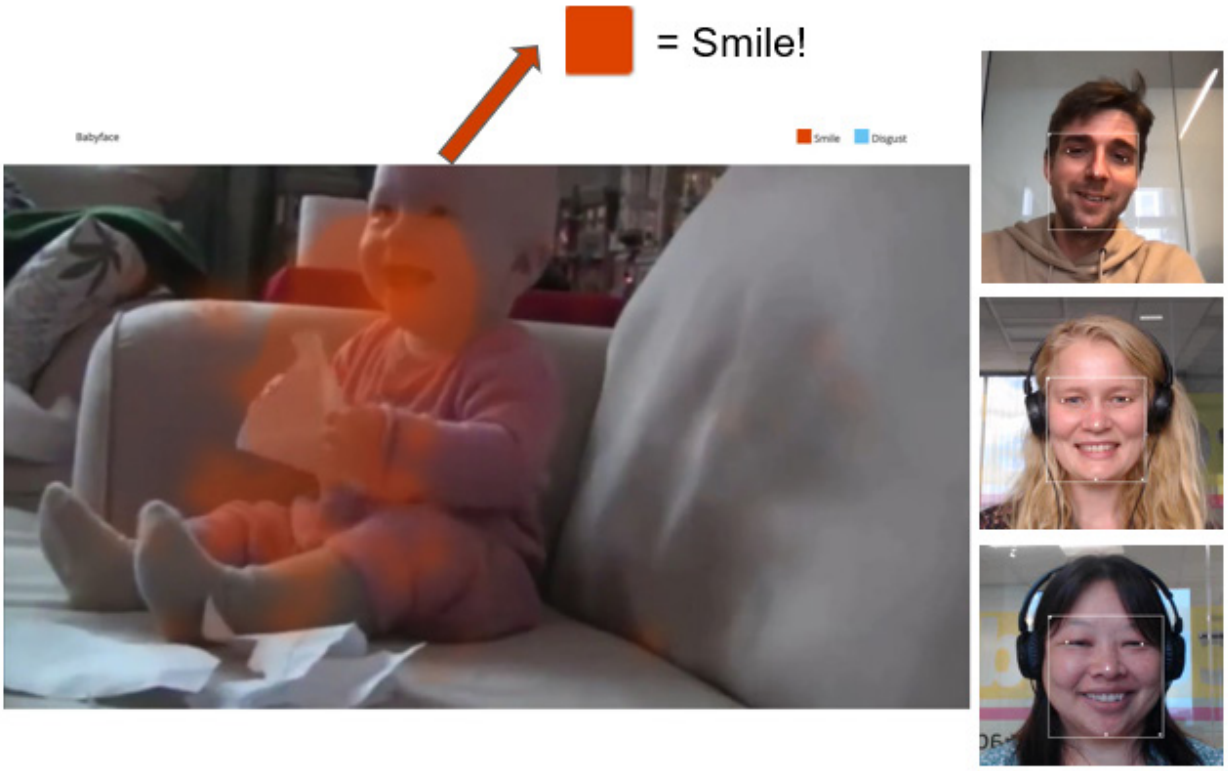
4. Emotional Heatmaps

For RDC studies involving facial expression analysis and eye tracking, emotional heatmaps combine visual attention data with emotional responses. By overlaying emotional metrics onto heatmaps, researchers gain insight into how participants feel about what they are viewing.

Emotional heatmaps are particularly useful for:

- Advertising and branding research.
- User experience testing.
- Communication analysis.

Studies have shown that emotional intensity positively correlates with consumer engagement and willingness to pay for advertised products, making this tool invaluable for evaluating content impact.



Final notes

In summary, analyzing data collected remotely using iMotions offers a powerful, flexible, and efficient process that mirrors in-person workflows while leveraging advanced tools like R Notebooks, behavioral coding, and automated AOIs. By turning raw data into meaningful insights through customizable visualizations and metrics, iMotions enables researchers to unlock the full potential of their biometric data. Whether you're decoding emotional responses, tracking eye movements, or annotating behavior, the platform provides a seamless transition from data collection to actionable insights. With iMotions, the complexities of remote data analysis become manageable, empowering you to focus on uncovering meaningful patterns and driving impactful research outcomes.

9 Wearables, Integration, and the Future

In this pocket guide, we have focused on leveraging personal computers for remote data collection using biosensors and AI technology. However, remote data collection extends beyond desktops and laptops. In this section, we briefly explore the role of wearable technology and consider what the future of remote data collection might hold.

Wearables: Real-World Remote Data Collection

Remote data collection isn't limited to online interactions—it can also happen in real-time, on the go, through commercial wearable devices like Apple Watches, Whoop bands, and biometric patches. These devices contain embedded systems capable of continuous health monitoring, tracking metrics such as heart rate, blood oxygen levels, and ECG readings. By processing data on-device, wearables provide immediate feedback, enabling timely health interventions.

Research has demonstrated the value of wearable technology in data collection, but current studies typically rely on a single device rather than integrating multiple wearables. Additionally, wearable data often provides summary metrics (e.g., daily averages) rather than detailed, continuous time-stamped recordings. However, when combined with ecological momentary assessments (EMA)—self-reports collected in real-time—wearables offer a powerful way to link physiological responses with conscious experiences. The ability to synchronize data across multiple wearables and EMA remains an area of ongoing development, holding promise for deeper insights into human behavior.

The Future of Remote Data Collection - What's next?

Today, webcams and microphones serve as the primary tools for remote data collection, with machine learning algorithms interpreting facial expressions, vocal cues, and behavioral patterns. However, the next generation of remote data collection will go beyond these sensors. Future laptops, smartphones, and wearables are likely to feature increasingly sophisticated, built-in biosensors capable of real-time eye tracking, facial expression analysis, respiration monitoring, and even subtle micro-movements—all processed locally for improved privacy and efficiency.

Another key development will be the integration of multiple data sources. Instead of relying on a single device, remote data collection will aggregate information from PCs, smartwatches, VR headsets, and even smart environments, creating a richer, more comprehensive view of human behavior. This multimodal approach will reduce bias from any one data source and allow researchers to gain deeper insights into physiological and psychological states.

As remote data collection continues to evolve, its potential applications will expand across fields such as health monitoring, psychology, human-computer interaction, and beyond. By embracing new technologies and refining methodologies, we move closer to a future where remote data collection is more accurate, holistic, and seamlessly integrated into everyday life.

Final Comments

10

iMotions Remote Data Collection for online research has evolved into a scalable and powerful research method, offering high-quality insights across a wide range of disciplines. With advancements in AI and biosensor technology, researchers now have more opportunities than ever to conduct innovative studies remotely. However, while online research can be a cost-effective way to expand research capabilities, careful planning and adherence to best practices remain essential for success.

Using online research platforms such as iMotions simplifies data collection and analysis, making it more accessible to researchers of all experience levels.

Key Takeaways

- iMotions RDC enables scalable, high-quality research across diverse fields.
- Advances in AI and biosensor technology continue to expand the potential of online research.
- Careful planning is crucial to minimizing attrition rates and ensuring reliable results.
- User-friendly platforms like iMotions streamline data monitoring and analysis for efficient remote data collection studies.

By embracing new technologies and best practices, researchers can unlock the full potential of remote data collection and online research, driving meaningful discoveries and innovations in the years to come.

References

01. Archibald, M. M., Ambagtsheer, R. C., Casey, M. G., & Lawless, M. (2019). **Using Zoom Videoconferencing for Qualitative Data Collection: Perceptions and Experiences of Researchers and Participants. International Journal of Qualitative Methods, 18.** https://doi.org/10.1177/1609406919874596

02. AssemblyAI. (2024). **Industry's Most Accurate Speech AI Models.** https://www.assemblyai.com/benchmarks

03. Eschman, B., Todd, J. T., Sarafraz, A., Edgar, E. V., Petrulla, V., McNew, M., Gomez, W., & Bahrick, L. E. (2022). Remote Data Collection During a Pandemic: A New Approach for Assessing and Coding Multisensory Attention Skills in Infants and Young Children. Frontiers in psychology, 12, 731618. https://doi.org/10.3389/fpsyg.2021.731618

04. Gregoret, L.,Seernani, D.,Wilson, J. (2024). In-Lab and Remote webcam-based Respiration : A promising candidate for neuromarketing? DOI: 10.13140/RG.2.2.21108.77442

05. Hammond, R., Wang, Y. (2023). Crowdsourced Online Biometric Studies: Is the juice worth the squeeze? Muma Business Review, 7. DOI: 10.28945/5224

06. Hammond, R, Parvanta, C., Zemen, R. (2022). Caught in the Act: Detecting Respondent Deceit and Disinterest in On-Line Surveys. A Case Study Using Facial Expression Analysis. Social Marketing Quarterly, 28. DOI: 10.1177/15245004221074403

07. Hensen, B., Mackworth-Young, C. R. S., Simwinga, M., Abdelmagid, N., Banda, J., Mavodza, C., Doyle, A. M., Bonell, C., & Weiss, H. A. (2021). Remote data collection for public health research in a COVID-19 era: ethical implications, challenges and opportunities. Health policy and planning, 36(3), 360–368. https://doi.org/10.1093/heapol/czaa158

08. Kulke, L., Feyerabend, D., & Schacht, A. (2020). A Comparison of the Affectiva iMotions Facial Expression Analysis Software With EMG for Identifying Facial Expressions of Emotion. Frontiers in psychology, 11, 329. https://doi.org/10.3389/fpsyg.2020.00329

09. Lin, Z., Liu Y., Wang,H., Liu, Z., Cai,S., Zheng, Z., Zhou,Y., Zhang, X. (2022). An eye tracker based on webcam and its preliminary application evaluation in Chinese reading tests, Biomedical Signal Processing and Control, 74. https://doi.org/10.1016/j.bspc.2022.103521

10. McLean, L., Espinoza, P., Tilley, K., Foote, L., Jones, N., & Kelcey, B. (2024). Expanding Education Researchers' Access to Classroom Observation Data With a Remote and Cost-Effective Video Data Collection Protocol. Prevention science : the official journal of the Society for Prevention Research, 10.1007/s11121-024-01659-w. Advance online publication. https://doi.org/10.1007/s11121-024-01659-w

11. Parvanta, C., Hammond, R. W., He, W., Zemen, R., Boddupalli, S., Walker, K., Chen, H., & Harner, R. N. (2022). Face Value: Remote facial expression analysis adds predictive power to perceived effectiveness for selecting anti-tobacco PSAs. Journal of health communication, 27(5), 281–291. https://doi.org/10.1080/10810730.2022.2100016

12. Rodd, J.M. (2024). Moving experimental psychology online: How to obtain high quality data when we can't see our participants. Journal of Memory and Language, 134. https://doi.org/10.1016/j.jml.2023.104472

13. Rosas, H. J., Sussman, A., Sekely, A. C., & Lavdas, A. A. (2023). **Using Eye Tracking to Reveal Responses to the Built Environment and Its Constituents. Applied Sciences, 13(21), 12071.** https://doi.org/10.3390/app132112071

14. Seernani, D., Pedersen, M., Wolf, K. (2023). WebET 3.0 -Validation Study Report, DOI: 10.13140/RG.2.2.32959.07849

15. Shin, E., Smith, C. L., & Howell, B. R. (2021). Advances in Behavioral Remote Data Collection in the Home Setting: Assessing the Mother-Infant Relationship and Infant's Adaptive Behavior via Virtual Visits. Frontiers in psychology, 12, 703822. https://doi.org/10.3389/fpsyg.2021.703822

16. Sprengholz, P., & Betsch, C. (2022). Ok Google: Using virtual assistants for data collection in psychological and behavioral research. Behavior research methods, 54(3), 1227–1239. https://doi.org/10.3758/s13428-021-01629-y

17. Ramirez, F.M.,Chkhetiani, L., Ehrenberg, A.,McHardy, R.,Botros, R., Khare, Y., Vanzo, A., Peyash, T., Oexle, G., Liang, M. Sklyar, I., Fakhan, E., Etefy, A., McCrystal, D., Flamini, S., Donato, D., Yoshioka, T. (2024). **Anatomy of Industrial Scale Multilingual ASR.** https://arxiv.org/abs/2404.09841

18. Wisiecka, K., Krejtz,K., Krejtz, I.,Sromek, D., Cellary, A., Lewandowska, B., and Duchowski, A. (2022). Comparison of Webcam and Remote Eye Tracking. Association for Computing Machinery, DOI: 10.1145/3517031.352961

19. Yang, X., & Krajbich, I. (2021). Webcam-based online eye-tracking for behavioral research. Judgment and Decision Making, 16(6), 1485–1505. doi:10.1017/S1930297500008512

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