

Meeting Data Analytics for IoT-enabled Communication Systems

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Introduction

Meeting design characteristics are specified by meeting organizers and participants. The different design characteristics have a direct impact on the quality of the meeting. The meeting design characteristics are procedural, attendee, and environmental characteristics.

- Procedural characteristics refer to the protocol and agenda of the meeting. These include preparation of the agenda and minutes taken and following the agenda
- Attendee characteristics include the presence of meeting coordinator, important stakeholders and meeting size.
- Environmental characteristics include meeting space, noise, temperature, illumination, modality, noise, seating and space arrangement. These factors can divert participants' focus, minimizing their comfort.

In this paper, different meeting characteristics are assessed to determine the optimum conditions for effective meetings as perceived by the meeting members.



Figure 1: IoT-related icons represented in the application control panel [1]

- IoT-enabled meeting management systems (IoT-MMS) are designed to provide a rich enterprise communication experience and maximize efficiency.
- IoT-MMS framework integrates sensory input and enterprise data, such as agenda, calendar data, and attendees' details, and updates the capabilities of the participants through IoT related icons shown in Figure 1.
- In this work, sensors are deployed in two meeting rooms to acquire sensor data related to the environment using IoT-MMS framework.

Experimental Methodology

Data Acquisition Strategies

Data collection includes user surveys and data from heterogeneous IoT-based sensor system. A number of meetings took place in an IoT-enabled meeting environment.

Survey Data Collection Method

A total of 44 participants from 28 organizational meetings rated the meeting in terms of procedural, attendees' behavioral and environmental factors.

Questionnaire to Assess the Meeting Performance

- The questions in the first section were related to Meeting and Agendas, focusing on the meeting procedure.
- The second section of the questionnaire relates to the remote attendees.
- The third section focused on psychological and behavioral factors dealing with the interest of attendees.
- The final section captured information on environmental factors and included the status of the equipment and illumination, temperature, and humidity.

Sensor Data Acquisition Method

The IoT multimodal sensor system, MEMSIC's TelosB Mote TPR2420 captured temperature, humidity and visible light in two meeting rooms, namely A and B.

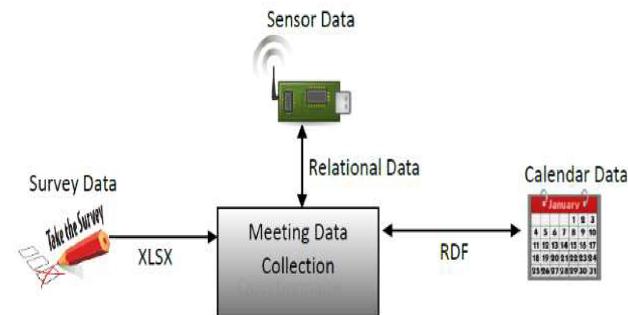


Figure 2: Meeting Data Collection from Heterogeneous Sources

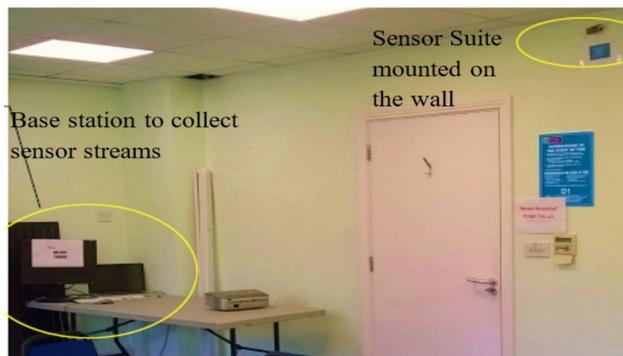


Figure 3: Technical Setup for Sensor Data Acquisition in the Meeting Room

Results

The data collected from questionnaires and sensors are analyzed and their correlations are presented.

Observing Survey Data for Meeting Effectiveness

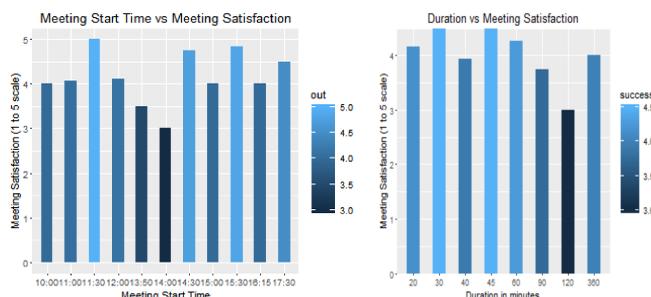


Figure 4: a) Meeting Satisfaction vs. Duration; b) Meeting Start Time vs. Meeting Satisfaction

- The static meeting data was analyzed using statistical methods. The results from the survey data suggest that there exist dependencies between the environmental, procedural, and attendee characteristics.
- The results have shown that procedural characteristics such as decision making, achieving the objectives, preparing and following the agenda, presence of important stakeholder and following the protocol are all interrelated to each other.
- The findings confirm the direct association of procedural and attendee characteristics with meeting satisfaction.
- The results also show the effect of environmental factors on psychological characteristics of the participants thereby indirectly affecting the quality of the meeting.
- The findings from this study such as effective meeting start time, the association of environmental factors with stress and posture, can be applied to rule definitions and recommendation engines for IoT enabled meeting management systems (IoT-MMS).

Observing Sensor Data for Meeting Effectiveness

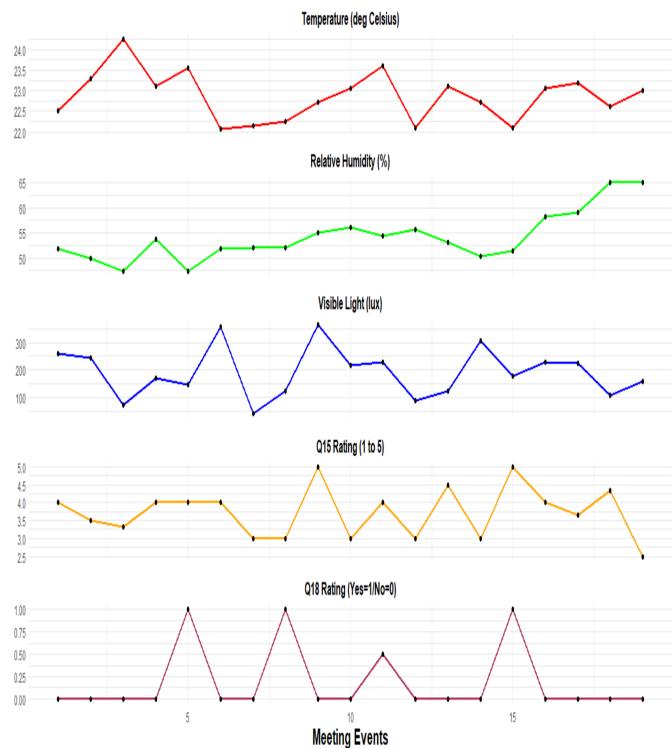


Figure 5: Pattern of sensor data and the ratings captured during the number of meeting events a) Temperature in degree Celsius b) Relative Humidity in percentage c) Visible light in lux d) the Ratings for Q15 (Posture showing Interest in the Meeting) and e) the Ratings for Q18 (Participants seeming Stressed)

- It is observed in figures Figure 5(a) and Figure 5(d) that participants interest in the meeting (Q15) is rated average at low temperature and high humidity level.
- While the temperature was at marginally recommended level (below 23°C) [21] in two meeting sessions for which the Q18 rating (participants seeming stressed) is 'yes' as seen in Figure 5(e).
- Similar associations are observed comparing lighting data with Q15 and Q18.

Conclusion

- The purpose of this study was to examine the dependencies between different meeting factors and identifying key factors influencing the meeting effectiveness.
- In this project, the data acquisition mechanism was defined to collect the meeting-related data from heterogeneous sources.
- The evaluations confirmed that procedural, attendee behavioral characteristics and environmental factors have a direct or indirect effect on the meeting satisfaction and are consistent with the literature.
- The outcomes of this study can be used to enhance the capabilities of IoT-MMS infrastructure to facilitate smart decisions in real-time.

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References

- [1] Ali, Muhammad Intizar, et al. "Real-time data analytics and event detection for IoT-enabled communication systems." Web Semantics: Science, Services and Agents on the World Wide Web (2016).