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**Assignment 1: Innovation &
Research**

ACCA5033_BIRM

Lecturer: Dr Osman Elgawi

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<https://sites.google.com/view/ihydrasmartwaterbottle/home>

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Ideation

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Introduction

The iHydra Smart Water Bottle is a simple and cost-effective product designed to help people stay hydrated and healthy. It uses basic smart features to remind users to drink water and track their intake throughout the day.

Target users for this bottle include students, office workers, gym users and anyone who wants to improve their daily water consumption. This project shows how innovation can be used to create an affordable and practical solution for everyday life.



Figure 1 iHydra Concept Design

Ideation & Mind Map

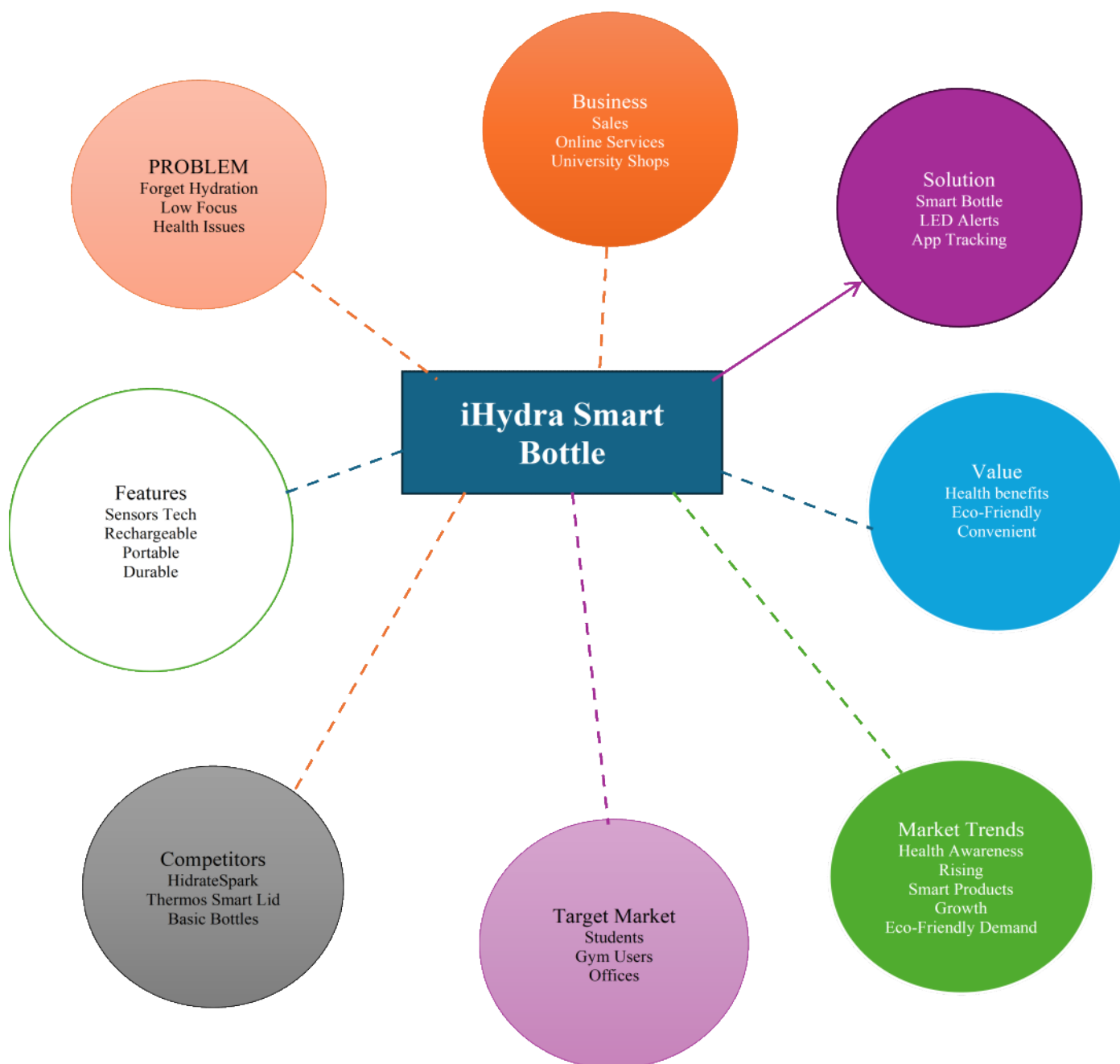


Figure 1 Ideation Mind Map

Figure 2: Mind map for iHydra.

iHydra Smart Bottle is a smart hydration device that helps prevent dehydration using sensors, LED reminders and app tracking. Designed for students, gym users and office workers it provides

a convenient healthy and eco-friendly way to maintain daily water intake. Compared to basic water bottles and products such as the Thermos Smart Lid iHydra offers a more complete solution by combining hydration tracking, LED alerts and app connectivity in one product. Unlike premium competitors such as HidrateSpark, iHydra focuses on affordability and accessibility while still delivering the essential smart features users need.

Aim and Objective

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Aim & Objectives and Research area

iHydra smart water bottle is a modern and practical device designed to help people maintain good hydration habits [1] throughout the day and good for the environment [2]. Unlike a regular water bottle, it uses built-in technology to support users in tracking and improving how much water they drink. iHydra bottles include sensors that measure water intake and can connect to a smartphone app using Bluetooth. This allows users to monitor their daily hydration levels and set personal goals based on their needs.

iHydra provides smart reminders to encourage regular drinking. These reminders may come in the form of LED lights on the bottle or notifications sent to a phone, which is particularly helpful for students or busy individuals who may forget to drink water. iHydra models also include a digital temperature display on the lid allowing users to quickly check whether their drink is hot or cold without opening it.

Another useful feature found in some versions is UV-C [3] self-cleaning technology. This feature helps kill bacteria inside the bottle, making it safer and more hygienic for everyday use [4]. The bottle is usually made from stainless steel and is insulated meaning it can keep drinks cold for up to 24 hours or hot for several hours. Overall, as a student iHydra smart water bottle is a helpful and innovative product. It combines technology with convenience making it easier to stay hydrated and maintain a healthy lifestyle.

References

[1] R. Tommy, V. Raja V., and A. S. Krishna, "Interactive Water Bottle Application on a Smart Phone to Enhance User Water Consumption," in 2017 International Conference on Current Trends in Computer, Electrical, Electronics and Communication (CTCEEC), IEEE, Sept. 2017, pp. 1072–1073. doi: 10.1109/CTCEEC.2017.8455048.

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[3] M. A. Würtele et al., "Application of GaN-based ultraviolet-C light emitting diodes – UV LEDs – for water disinfection," *Water research (Oxford)*, vol. 45, no. 3, pp. 1481–1489, Jan. 2011, doi: 10.1016/j.watres.2010.11.015.

[4] W.-Y. Ouyang, W.-L. Wang, Y.-L. Zhang, H.-Y. Cai, and Q.-Y. Wu, "VUV/UV oxidation performance for the elimination of recalcitrant aldehydes in water and its variation along the light-path," *Water research (Oxford)*, vol. 228, no. Pt A, Art. no. 119390, Jan. 2023, doi: 10.1016/j.watres.2022.119390.

Research Strategies

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Research area and Strategies

For my IHydra Smart Water Bottle project I will use different research strategies to make sure my results are accurate and trustworthy [1]. **Validity** is important because it shows that the research is measuring what it is supposed to measure. To improve validity, I will make sure my survey questions are clearly related to hydration habits and smart bottle features [2]. I will avoid confusing questions and keep them simple, so participants understand them easily. I will also do a pilot study before the main research to check for any problems and improve the questions. Reliability is an important factor and means that the results should be consistent if the research is repeated. To make my research **reliable**, I will use the same survey questions for everyone and collect data in the same way. Use of one online survey and structured questions like multiple choice or rating scales. **Generalisability** is about whether the results can apply to a wider group of people. To improve this collecting data from different types of people like students, gym users and office workers. This will help me understand different opinions and make my findings more useful. Ethical considerations are also very important. I will make sure participants give consent before taking part and I will explain the purpose of the research clearly, keeping their answers anonymous and protect their privacy. This makes the research fair and protects participants.

Data collection

I will use a mixed method approach meaning collecting both quantitative and qualitative data [3]. Quantitative data will come from an online survey [4] with closed questions which will allow me to collect numerical data such as how often people drink water or if they would use a smart bottle. Qualitative data will come from open ended questions or short interviews where participants can explain their opinions and experiences. Quantitative research focuses on numbers while qualitative research focuses on opinions and meanings. Using both methods together will give me a better understanding of user needs. Before carrying out the full research conducting a pilot study with around 8 to 10 people. By carrying out a pilot study this will ensure research works properly and can correct any problems early. Asking participants to complete the survey and give feedback. Feedback will determine if some questions are unclear or that the survey is too long. This will improve the survey by simplifying questions or removing unnecessary ones. They may also suggest new ideas for the IHydra bottle. This will help improve my research before collecting the final data.

After collecting the data analyse it using both quantitative and qualitative methods. For quantitative data use of simple statistics like percentages and charts to show patterns e.g. how many people are interested in the smart bottle. I may also compare results between different groups like students and gym users. Quantitative analysis helps show patterns in numbers. For qualitative data I will use thematic analysis which means reading through responses and finding common ideas or themes such as health benefits, convenience or interest in technology. This helps me understand why people think or behave in a certain way. By using both types of analysis, I can get better and more accurate results and understand how to improve the iHydra Smart Water Bottle to meet user need.

[1] Madecraft, J. Stampe, linkedin.com, and Madecraft\$\$FMadecraft, Carpenteria, CA. *Maximizing Your Market Research: Strategies for Success.*, (2024). [Online Video]. Available at: <https://www.linkedin.com/learning/maximizing-your-market-research-strategies-for-success?u=>

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[3] J. W. Creswell and T. C. Guetterman, *Educational research: planning, conducting, and evaluating quantitative and qualitative research*, Seventh edition, Global edition. Harlow, England: Pearson, 2025.

[4] J. E. Salmons, *Doing qualitative research online*, 2nd edition. London: SAGE Publications, 2021.

Search Tools

Boolean Operators

- AND – Finds results containing both keywords.
- Smart Water Bottle AND Hydration Tracking
- IoT AND Smart Bottle
- OR – Finds results containing either keyword.
- Smart Water Bottle OR Hydration Monitor
- Wearable Device OR Smart Bottle • NOT – Excludes unwanted keywords.
- Smart Water Bottle NOT Sports
- Hydration Tracking NOT Fitness Band
- Quotation Marks (" ") – Searches for an exact phrase.
- "Smart Water Bottle"
- "Hydration Reminder System"

These search techniques can be used in Google Scholar, IEEE Xplore, and the ACM Digital Library to find relevant academic sources for your research.

Research Database

Google Scholar – Academic articles, journals, theses, and conference papers.

The screenshot shows the Google Scholar interface with the search term "Smart water bottles". The results list several articles, including "SmartStuff: A case study of a smart water bottle" and "Monitoring fluid intake by commercially available smart water bottles". The left sidebar contains filters for time, sort order, and article type. The bottom of the page has a link to "Search deeper on Scholar Labs".

Articles About 220,000 results (0.11 sec) My profile My library

Any time Since 2026 Since 2025 Since 2022 Custom range... Sort by relevance Sort by date Any type Review articles

☐ Include patents ☒ Include citations ☒ Create alert

SmartStuff: A case study of a **smart water bottle** [PDF] researchgate.net
 E. Jovanov, VR Nallathimmaireddygar... - 2016 38th annual ..., 2016 - ieeeexplore.ieee.org
 ... of an intelligent **water bottle** that can precisely measure the amount of liquid in the **bottle**, ...
 We evaluate two system configurations: a **smart water bottle** integrated into a personal body ...
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Monitoring fluid intake by commercially available **smart water bottles** [PDF] nature.com
 R. Cohen, G. Fernie, A. Roshan Fekr - Scientific Reports, 2022 - nature.com
 ... available **water bottles** are a viable solution for researchers and patients alike. We compare
 four commercial **water bottles** in terms of performance and functionality. These **bottles** are ...
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[PDF] A **smart water bottle** for new seniors: Internet of Things (IoT) and health care services [PDF] gvpress.com
 NE Lee, TH Lee, DH Seo, SY Kim - ... Journal of Bio-Science and Bio ..., 2015 - gvpress.com
 ... Based on Internet of Things (IoT) technology, in this study, a **smart water bottle** was ... of
 positive **water** intake habits. The **bottle** could also automatically detect **water** volume and had an ...
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Hydration reminding **smart bottle**: IoT experimentation
 PB Pankajavalli, R Saikumar... - 2017 Innovations in ..., 2017 - ieeeexplore.ieee.org
 ... **Smart water bottle** cap is similar to normal **water bottle** caps and also allows user to replace
smart water bottle caps instead of normal caps. **Smart Bottle** Cap can be connected with a ...
 ☆ Save Cite Cited by 16 Related articles

Search deeper on Scholar Labs

Figure 5 Google Scholar

IEEE Xplore – Engineering, technology, and smart device research publications.

The screenshot shows the IEEE Xplore search results for "smart water bottles". The interface includes a top navigation bar with links to IEEE.org, IEEE Xplore, IEEE SA, IEEE Spectrum, and More Sites. The search results section shows 1-25 of 106 results, with filters applied for Conferences, Journals, Early Access Articles, Magazines, and Books. There are also promotional banners for IEEE Xplore access, saving search criteria, and an Automotive Cyber Security course.

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Figure 7 IEEE Xplore

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RESULTS VIDEOS

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Figure 8 ACM Digital Library

Appendix

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APPENDICES

E-portfolio Using Google site

<https://sites.google.com/view/ihydrasmartwaterbottle/home>

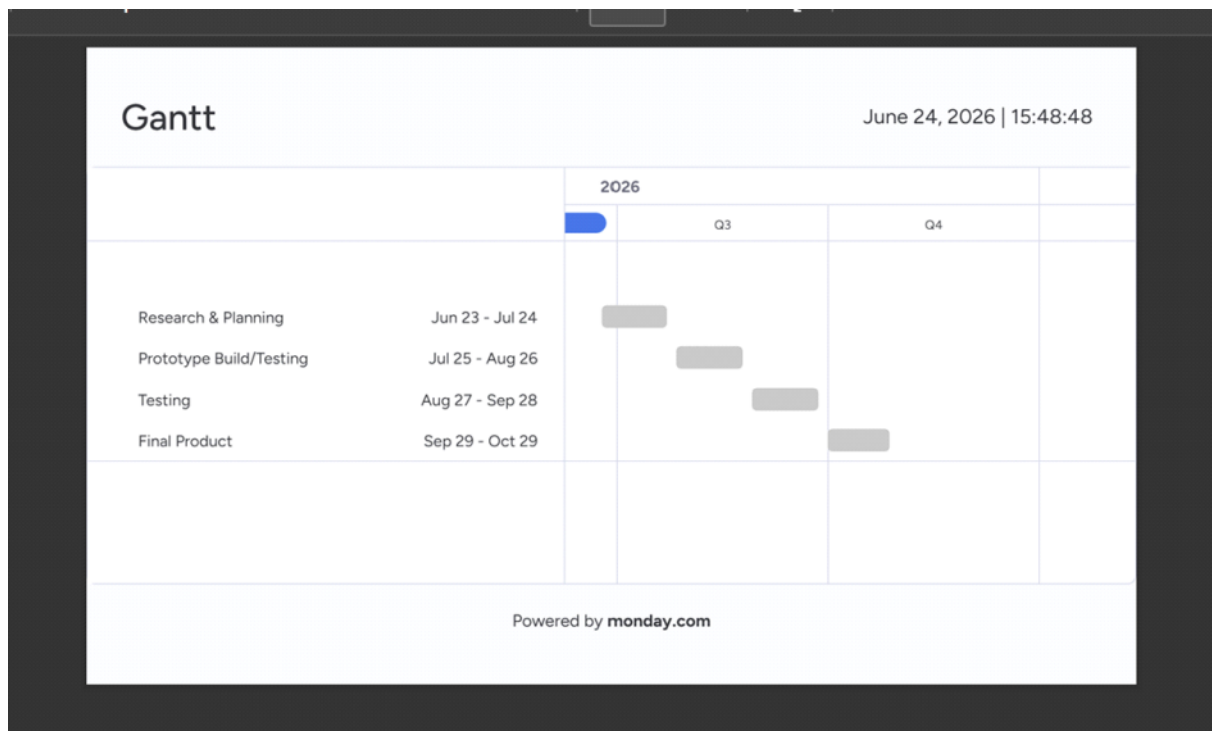


Figure 3 Gantt Chart



Figure 5 Poster