**Project Research Worksheet**

At this point, you’ve received extensive ratings and feedback on your ideas based on various "synthetic perspectives" generated by ChatGPT. To help you process these data and conduct research to focus your project, please **complete the following steps below** and submit your work to Canvas by the deadline.

1. **10 pts**: Evaluate all the quantitative metrics you received across your ideas, and use them to ***narrow your*** ***focus to 3 potential ideas*** for the next step. Below, provide a detailed explanation of how you analyzed the data and why you chose these ideas to focus on.

* a sensor capable of measuring air quality data and automatically pull that data onto a public website for people to see and learn about air quality. The project is designed specifically for people in Vietnam, where public health information is limited and there is a need for monitoring public health information online.

I'm choosing the air quality sensor idea because, upon reviewing the data, it showed a solid foundation of appeal across various demographics, with high average creativity scores. This score indicates that respondents found the idea to have a good level of innovation and potential impact. The idea topic resonates with me due to its broad applicability and potential to address needs for air quality in Vietnam. The average age and income data suggest that this idea could have widespread appeal, making it a versatile option for further development.

* This Arduino and Python-powered modular workstation enhances workspace ergonomics through smart, customizable modules. Users can adjust components like monitor stands, keyboard trays, and lighting based on real-time feedback for posture, ambient light, and usage patterns. The system uses sensors to collect data, which is analyzed by a Python-based application to provide personalized ergonomic suggestions. The workstation aims to prevent strain and improve productivity by adapting to the user's needs throughout the day.

The modular workstation idea stands out because of its creativity score, suggesting that it is viewed as highly innovative and engaging by respondents. This high score, coupled with an average income of $93,720 and an average age of 43.68 years, indicates that the idea has strong appeal among a mature and financially stable demographic. This demographic could provide a reliable market base for launching a novel solution. The idea itself intrigues me due to its potential for significant impact.

* a recycling sorter using Arduino to control the sorting mechanism and Python for image recognition capabilities. Users can throw their recyclables into a single bin, and the system will sort them into categories (paper, plastics, metal, etc.) based on visual cues. This project combines hardware programming with basic machine learning for image recognition.

The reason I choose the recycling sorter is because its high creativity score, mirroring workstation innovative potential. What sets this idea apart is its even higher average income level and a slightly younger demographic. This combination suggests a unique market opportunity targeting affluent professionals who value innovation and are likely to invest in new ideas. The topic of the recycling sorter is particularly appealing to me because it addresses an emerging need or trend that has not been fully explored, offering a chance to lead in a niche market with a product or solution that is both novel and highly valued by its intended users.

1. **10 pts**: For each idea chosen in the previous step, you are now going to analyze the qualitative feedback received. To do this, identify the top 10 & bottom 10 ratings, and read through the comments in each set to find common themes / patterns. Below, explain the primary strengths and weaknesses for each idea based on the feedback, and use this to ***identify 1 main idea*** for the next step.

|  |  |  |
| --- | --- | --- |
| **Description of idea** | **Main Strengths** | **Main Weaknesses** |
| a sensor capable of measuring air quality data and automatically pull that data onto a public website for people to see and learn about air quality. | -Respondents from diverse demographics find the idea appealing, it suggests that the idea has a broad appeal. This wide-ranging interest can be a significant strength, indicating the idea's versatility and potential market size.  -Positive feedback on its innovation suggests that the idea is perceived as fresh. This can be a strong foundation for differentiation in a crowded market. | -Some feedback questions the idea's focus or specificity, this could indicate a weakness in its potential to address specific needs effectively.  -Any concerns mentioned in the feedback regarding the feasibility or complexity of implementing the idea could highlight significant challenges ahead. These could involve technical, regulatory, or market adoption hurdles. |
| modular workstation enhances workspace ergonomics through smart, customizable modules. | -The high creativity score suggests that the idea is seen as highly innovative.  -feedback highlights specific features or benefits that resonate well with a mature and financially stable demographic, it indicates a strong product-market fit within this target group. | -Feedback indicating the idea's appeal is concentrated within a niche market could suggest limitations in scaling or broadening its appeal.  -Concerns about the resources required for development, whether financial, time, or expertise, could point to significant barriers to entry. |
| a recycling sorter using Arduino to control the sorting mechanism and Python for image recognition capabilities. | -Positive feedback highlights its uniqueness suggests a clear differentiation from existing solutions. This unique positioning can be a potent advantage in attracting attention and establishing a new market segment.  -The idea has particular appeal to affluent professionals, this demographic's willingness to invest in innovative products could provide a strong revenue base and advocacy. | -Any feedback suggesting the idea might be too tailored or exclusive for a wealthy demographic could indicate weaknesses in broader market accessibility or inclusivity. This focus might limit the potential user base.  -Feedback that raises questions about the idea's complexity or usability could suggest that significant work is needed to make the product approachable and user-friendly. |

**Main idea to focus on**: Air quality sensor

Based on this idea, ***identify as many different*** ***keywords*** as you can that may be relevant to this idea. For each keyword, try to also identify various [***synonyms***](https://www.powerthesaurus.org/) for that keyword. For example, if your idea is to create a new "electric bike,” then your entry should include many other synonyms such as “electric bike | bicycle | e-bike | motorized bike | battery-powered bike." The more thorough and comprehensive your keywords, the better.

* Air quality
  + - Air sensor
    - Air data website
    - Arduino sensor
    - Monitor website
    - Air quality index (AQI) monitoring
    - Pollution data visualization
    - Open data platform for environment
    - API for air quality data
    - Environmental health and safety

1. **10 pts**: Using the following ***non-patent databases*** (and the keywords above), conduct a thorough search of existing projects that could be similar or related to your idea. Provide at least 10 links of the most relevant examples below (1pt each).

Non-Patent Databases: [Wayback Machine](https://archive.org/web/), [Google](http://www.google.com/) ([with advanced search syntax](https://support.google.com/websearch/answer/2466433?hl=en)), [Google Scholar](https://scholar.google.com/)

* + - https://books.google.com/books?id=H1beEAAAQBAJ&lpg=PA148&ots=gsBgPI6wiA&dq=Air%20quality%20sensor%20arduino%20vietnam&lr&hl=vi&pg=PA148#v=onepage&q=Air%20quality%20sensor%20arduino%20vietnam&f=false
    - https://archive.org/details/ijra.v11i2.pp141-160/05-20439?q=Air+quality+sensor+arduino+vietnam
    - https://www.mdpi.com/1996-1073/15/13/4924
    - https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjSkpbHvdKEAxWUIDQIHWO3BRk4ChAWegQIDBAB&url=https%3A%2F%2Fwww.skyfilabs.com%2Fproject-ideas%2Fair-pollution-meter-using-iot&usg=AOvVaw3UHevwLKFJif8dCIa3kb0k&opi=89978449
    - https://link.springer.com/chapter/10.1007/978-3-030-28191-5\_8
    - https://link.springer.com/chapter/10.1007/978-3-031-45316-8\_18
    - https://www.mdpi.com/1660-4601/19/3/1522
    - https://link.springer.com/chapter/10.1007/978-3-030-36987-3\_20
    - <https://ieeexplore.ieee.org/abstract/document/9701498/>
    - https://ieeexplore.ieee.org/abstract/document/9950495

1. **10 pts**: Using the following ***patent databases*** (and the keywords above), conduct a thorough search of existing patents that could be similar or related to your idea. Provide at least 10 links of the most relevant examples below (1pt each).

Patent Databases: [ESPACENET](file:///C:\Users\lkqua\Downloads\•https:\worldwide.espacenet.com\classification%3flocale=en_EP#!/CPC=/), [Google Patents](http://www.google.com/patents) (Old), [Google Patents](http://patents.google.com/) (New), [Free Patents Online](file:///C:\Users\lkqua\Downloads\•%09https:\www.freepatentsonline.com\search.html), [USPTO](http://patft.uspto.gov/), [WIPO Patentscope](https://patentscope.wipo.int/search/en/search.jsf), [Public Pair](https://portal.uspto.gov/pair/PublicPair)

* + - https://patents.google.com/patent/US10805697B2/en?q=(Air+quality+sensor)&oq=Air+quality+sensor&peid=61280a1f64890%3A6f%3A63b8b564
    - https://patents.google.com/patent/US10982869B2/en
    - https://patents.google.com/patent/US7302313B2/en
    - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7400061/
    - https://patents.google.com/patent/US11662336B2/en
    - https://patents.google.com/patent/US10514177B2/en
    - <https://princeton.userservices.exlibrisgroup.com/discovery/openurl?institution=01PRI_INST&vid=01PRI_INST:Services&%3Fctx_ver=Z39.88-2004&ctx_enc=info:ofi%2Fenc:UTF-8&rfr_id=info:sid%2Fsummon.serialssolutions.com&rft_val_fmt=info:ofi%2Ffmt:kev:mtx:book&rft.genre=bookitem&rft.title=Smart%20Geography&rft.au=Lim,%20Kenneth%20Y.%20T.&rft.au=Vu,%20Hieu%20Nguyen&rft.au=Sim,%20Jun%20You&rft.au=Yuen,%20Ming%20De&rft.atitle=The%20Use%20of%20Microclimatic%20Data%20in%20Authentic%20Learning:%20A%20Two-Site%20Case%20Study%20Between%20Hanoi%20and%20Singapore&rft.series=Key%20Challenges%20in%20Geography&rft.date=2020-01-01&rft.pub=Springer%20International%20Publishing&rft.isbn=9783030281908&rft.issn=2522-8420&rft.eissn=2522-8439&rft.spage=91&rft.epage=104&rft_id=info:doi%2F10.1007%2F978-3-030-28191-5_8>
    - https://www.lens.org/lens/patent/042-300-319-100-838/frontpage?l=en
    - https://www.lens.org/lens/patent/129-530-292-732-226/frontpage?l=en
    - https://www.lens.org/lens/patent/130-436-973-887-009/frontpage?l=en

(NOTE: Points will be deducted if you do not conduct thorough research across ***multiple databases***. Feel free to use your keywords from above and natural language search in these databases to expand your research and find similar projects / patents.)