The goal of this assignment is to help you conduct background research on your idea for your senior design project. Remember information literacy is something you don’t ace and you gain these skills from multiple sources: Librarian, Professor, Group Members, Mentor, Friends, Family, Experts on the Internet.

Presentation Slides:

<https://docs.google.com/presentation/d/1I-qDl8M7E1CBk8GPXiQ-dv_FTy8AdFzL5nQRmg5oCoE/edit?usp=sharing>

Example: <https://docs.google.com/document/d/1sikRByGX8qv3rRf3kPjJTJZ4hhyG3gMBbfLSQD3QVGE/edit?usp=sharing>

# Learning Objectives

At the end of this assignment, you will be able to:

1. Investigate research idea options for your senior design project
2. Identify keywords related to your idea that is associated with prior research
3. Understand what research has been done related to your idea
4. Identify and evaluate what other research could be used for your project

# Learning Activities

1. **Share:** Use the Google Doc share feature to share add your Group Members (5 min)
2. **Collaborate:** Use the Comment feature to mention Jenny Wong-Welch, STEM Librarian (2 min)
3. **Brainstorm:** Craft a project idea for your senior design project (10 min)
4. **Draft:** Create a viable search string that produces results related to your idea a search string (15 min)
5. **Search:** Conduct searches in different library databases (10 min)
6. **Review:** Scan through results to evaluate if your search string is good (15 min)
7. **Cite:** Select 3 results from your searches and cite them in the APA-style (15 min)
8. **Summarize:** Describe how your selected results related to your project idea (30 min)

# Q&A

* Resources for this Assignment
  + <https://libguides.sdsu.edu/mechanical-engineering/490>
* If you have questions about this assignment, contact Jenny Wong-Welch
  + Zoom Chat: Search for Jenny Wong-Welch and send me a message
  + Email: [jwongwelch@sdsu.edu](mailto:jwongwelch@sdsu.edu)
  + Book a Zoom: <https://jennywongwelch.youcanbook.me/>

# Instructions

1. **Share with your Group Members** 
   1. When you opened the shared Google Doc link, you made a copy in your own Google Drive. Now, you need to share that Google Doc with your Group Members.
   2. Use the “Share” button in the top right corner to share it with their SDSU email address

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| Add their names here too   1. John Berger 2. Conor Vasiliadis 3. Thuya Sathiamurthi 4. Ali Alquod 5. Daniel Kenner 6. Elias Wooten 7. Jose Baez 8. Abigail Dabu 9. Max Merritt  * Can't downgrade member permissions * Can't downgrade member permission |

1. **Collaborate with the STEM Librarian**
   1. To help the librarian provide feedback on your search and results, use the “Comment” located to the left of the “Share” button to use the mention feature
      1. Add a Comment that says [+jwongwelch@sdsu.edu](mailto:+jwongwelch@sdsu.edu)
2. **Brainstorm Ideas**
   1. Your professor will suggest ideas for your senior design project

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| Using SDSU library to research microgreen germination  Using Google Scholar to research Patents for automatic gardens |

1. **Draft:** Create a viable search string that produces results related to your idea a search string (10 min)
   1. Identify keywords from your project idea,
      1. Consider the who, what, where, when, why, how
      2. Include synonyms related to the keywords you have identified

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| Add your keywords here   * Hydroponic * Germination * Mold   + Mold mitigation * humidity * control   + Automated garden |

* 1. Create a search string based on your keywords
     1. Combine your keywords together to form a possible search string
     2. Remember you’re searching a computer database
        1. Consider this searching as similar to computer programming
        2. Your search strings should not be complete sentences
        3. Rather your search string should look like different variables in word formats
     3. Search String hints
        1. “ “ quotation marks
           1. means that you’re looking for a phrase and the order of words must appear as typed
        2. \* asterisk
           1. means that you want any prefixes or suffix
           2. Example: print\* would search for print, printing, printed, printer
        3. Boolean Operators
           1. AND - **narrows** a search by telling the database that ALL keywords used must be found
           2. OR - **broadens** a search by telling the database that *any* of the words it connects are acceptable
           3. NOT - **narrows** your search by telling the database to eliminate all terms that follow it from your search results

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| Combine your keywords to create a search string to test out   * Automatic AND Garden |

1. **Search:** Conduct searches in different library databases
   1. Now let’s test out your search string in different library databases to see what results come back

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| --- | --- | --- | --- |
| Database Name | URL | Number of Results | How are the Results Sorted |
| Academic Search Premier | <https://libguides.sdsu.edu/Academic-Search-Premier> | 788 | Relevance |
| Scopus | <http://libproxy.sdsu.edu/login?url=http://www.scopus.com> | 179 | newest |
| Google Scholar | <https://scholar.google.com/> | 427,000 | Date (Newest) |
| Compendex | <https://libguides.sdsu.edu/Compendex> | 423 | Relevance |

1. **Review:**
   1. As you look through the results be sure to identify additional (more relevant) keywords

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| Any new keywords to use? \*Hint\* look through your results from Compendex   * Computer * Temperature * Indoor * Grow * Microgreen * Automation |

* 1. Based on the results, redraft your search string
     1. To get less, more relevant results
     2. Or to get more, results

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| Updated Search strings:  225 results from google scholar with “Automatic AND Garden AND microgreens”  2 results from Compendex with “Indoor AND temperature AND automated AND garden” |

1. **Cite:** Select 3 results from your searches and cite them in the APA-style
   1. Based on your results from the Scopus databases, select 3 that would be useful for your project
   2. Cite these in the APA format
      1. Remember you can use the “Create bibliography” feature under “More” to have the computer create the citation for you
      2. For additional citation help,
         1. check the Purdue OWL - <https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/general_format.html>
         2. Try the SDSU Library APA Citation Tutorial - <https://libguides.sdsu.edu/onlineinstruction/APA7>

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| 1. Prathyusha, A., Suman, C. Design of embedded system for automation of drip irrigation(2012) International Journal of Application Or Innovation in Engineering & Measurement (IJAIEM), Retrieved from Scopus 2. [Samuolienė](https://www.frontiersin.org/people/u/344075), [G](https://www.frontiersin.org/people/u/344075).,  [Brazaitytė](https://www.frontiersin.org/people/u/622263), [A](https://www.frontiersin.org/people/u/622263)., [Akvile V](https://www.frontiersin.org/people/u/311092)., (2019) Nutrient Levels in Brassicaceae Microgreens Increase Under Tailored Light-Emitting Diode Spectra Plant Sci., 14 November 2019 Retrieved from Google Scholar 3. Roberta Bulgari, Ada Baldi, Antonio Ferrante & Anna Lenzi (2017) Yield and quality of basil, Swiss chard, and rocket microgreens grown in a hydroponic system, New Zealand Journal of Crop and Horticultural Science, 45:2, 119-129, DOI: [10.1080/01140671.2016.1259642](https://doi.org/10.1080/01140671.2016.1259642) Retrieved from Google Scholar |

1. **Summarize:** Describe how your selected results related to your project idea
   1. Now let’s take knowledge from prior research and decide how it might be applied/used in your project
   2. Summarize your 3 chosen results
      1. Remember these results are not meant to be exactly what you plan to do
         1. If someone has already done it, then why should redo it?
         2. If you want to do something similar to what has been done before, then change one aspect of their project and experiment to see what the project outcome becomes
      2. Instead, the results should be about one part or aspect of your proposed project
         1. Example: 1 . bee life cycle affected by humidity; 2. Implement IOT equipment in remote, outdoor environments; 3. Tracking bee life through IOT equipment

Citation 1

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| * Food Borne Illness can be common in leafy greens, frequent cleaning of the machine as well as sourcing of sterilized seeds is essential. * Use of microcontroller to keep from overwatering * Off the shelf parts such as PVC will aid in growing environments manufacturability |

Citation 2

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| * Nutritional value is directly related to light wavelength * An array of LED banks is necessary to maximize nutrition for each species of microgreen * specific wavelengths (eg 447, 638, 655) will enhance different nutrient concentrations in the greens such as β-carotene, iron, and magnesium |

Citation 3

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| * Smaller testing batches will increase testing efficacy and shorten time required to test * Ventilation is key for stopping mold growth * Hydroponic inherently keep the leaves dry which inhibits mold growth |