# Project Idea

We reviewed everyone in the team’s project ideas.  These are summarised below;

* Alex: Recycling tool
  + Raspberry Pi based solution to tell you whether something should be recycled or not.
* Shane: RFID Power Switch
  + A smart switch to power on or off a PC using a Arduino technology.
* Brandon: Learning Style App
  + An app that lets students/teachers assess what learning style suits best.
* Natalie: Communal delivery App
  + App that lets remote towns arrange and split shipping costs for group deliveries.
* Emily: An online academic assistance app
  + Allowing STEM Students to search for help and resources based on their profiles.

We then decided as a team that Brandon and Emily’s ideas had a number of similarities and treated them as a single idea.  This then gave us two paths to go down, a hardware focused path with Shane and Alex looking at using Raspberry Pis or a software defined path with Emily, Brandon and Natalie looking at developing applications.  We did look at a number of approaches to choosing the idea we wanted to work with for the remainder of this course, looking at their merits, relative complexities and our skill sets. We decided to focus on the software path and as we are students learning, we saw a lot of merit in the combined idea of Emily and Brandon’s projects.

The project idea is a mobile app or interactive website that allows STEM students to search for help or assistance on a particular topic and filters the resulting resources based off of the student’s individual profile (for example, the units they are taking and the level they are studying at).  In addition to this, the app would also incorporate assessing what learning styles best suits the students’ needs and using this to influence the resources provided. For example, providing more video content to a visual learner or practical exercises to a kinaesthetic learner.

## Why do we think this is a good project idea?

STEM is an already underrepresented area of education within Australia that will drive jobs for the workforce of the future.  In addition, more universities and teaching resources are available online than ever before. Even if a student is studying on campus, the chances are that they will need to access online content and extra resources outside of the teaching materials given. As every student is different, and has different learning requirements and styles, a way to better tailor and filter the huge amount of information and assistance out there could really benefit a lot of people.

A 2018 report titled Programme for International Student Assessment (PISA) details the long-term decline in Australian students in Science, Reading and Mathematics subjects in comparison to Chinese students. Specifically, the report details that Australian students are on average 3.5 years behind Chinese students in mathematics.  With this information, we see a market for our project, not just in Australia, but in every country.

## How do we anticipate the project working?

A student will register on either the website or download the mobile application.  Then the service will require students to go through a preliminary profiling process. We anticipate this would to include the following.

* Student fills out an entry profile, information about them will then be taken into account when producing search results for them as an individual user, such as their skill level, learning style, previous studies and even special circumstances (for example, specialised support for minorities, those with a disability, etc).
* A qualifying quiz is then taken after they set up their profile for each subject or study area, they select that will help to ascertain their current strengths and weaknesses in that subject.

Once the student has registered, appropriate resources can be allocated based on a library.  The intention is that the library is dynamically populated based on content that is available on the internet.  Although academic help will be the main focus, other support services like those touched on above will also be recommended or given as an option.   The resources would have to be classified as part of the search and delivered to the users. Resource distribution would be influenced by the following:

1. Auditory learners
   1. Resources that can be converted to speech
   2. Discussions that the user can be involved in
   3. Providing audio recordings of the user to reinforce learning points.
2. Visual learners
   1. Photo essays to tell stories.
   2. Mind maps, diagrams and flowcharts to show links between items.
   3. Playing videos to reinforce learning points.
3. Kinaesthetic learners
   1. Activities that can be hands on, such as games or interactive stories.
   2. Resources that encourage the user to participate
   3. Immersive experiences

A review system will also be put in place, and students will be able to “upvote” different resources depending on how helpful they are with a particular concept or issue. The idea is that the recommended websites, videos, articles and so on will improve in accuracy and helpfulness for each individual.

## What tools and skills are required?

There are four key components required to deliver the service.  These are the website/mobile app, the data storage solution for users and resources, the content indexing tools to grab and index content and the rating system which would use machine learning and feedback loops to rate and provide appropriate content.

The tools used to initially build the site/service would probably include an interactive programming language, such as JavaScript. If a mobile application was developed to compliment the website, it would most likely be written in something like Swift for iOS and Java for Android.  It would require a team with a very good understanding of the programming language that is going to be used. The team here would also be responsible to the user experience and so a front-end developer would be key here.

The data storage and indexing solutions would need to be created to store user information and resource access.  This would require a team with skills in relational databases and also big data to collate the resources we would recommend.  This could be achieved with a combination of SQL and NoSQL databases. Web crawlers would be needed to understand educational sites and the content they have. Security would also be key here to prevent user information from being exposed.  There would need to be checks in place to ensure resources are linked rather than copied to maintain copyright with the original owners.

The algorithms designed for the user to find accurate and personalised information would require knowledge of machine learning tools and languages. This would require a team of engineers that understand Python and how to build a recommendation engine using an environment such as TensorFlow.

Outside of these areas, we will need an overview team that consists of architects and project management to deliver the project effectively.  This would ensure consistency of the deployment and keep the project to scope and on time.

## What does a successful outcome mean?

Upon successful completion, it would open up personalised academic help to all students able to access the site (depending on where the service is made available). It would help bridge the gap between online students and specialised support, and help finding online study resources an easier and more accurate process for everyone. This could potentially bring Australian STEM students to a higher standard, giving every student a chance to learn the way that they learn best.  This project would encourage and empower students in completing their education.