

A Translation Tool for Teachers of English Language Learners

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments



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ARCHITECTURE AND DESIGN

Summary

Common computer-driven language translation has progressed significantly over the past few years. However, typical language translation applications provide useful high-level translations (users can get a reasonable “feel” for the translated meaning), but they often fall short when it comes to translating the meaning for a given context, in this case school. At this point in time, only humans are consistently able to provide detailed, nuanced translations of words and phrases. The Translation Tool is meant to fill this gap by providing accurate, human vetted translations of words and phrases, ultimately with audio playback of the pronunciation of these terms. Currently, the Translation Tool is hosted at <https://http://translationmachine.uk.r.appspot.com/>

Purpose and Scope

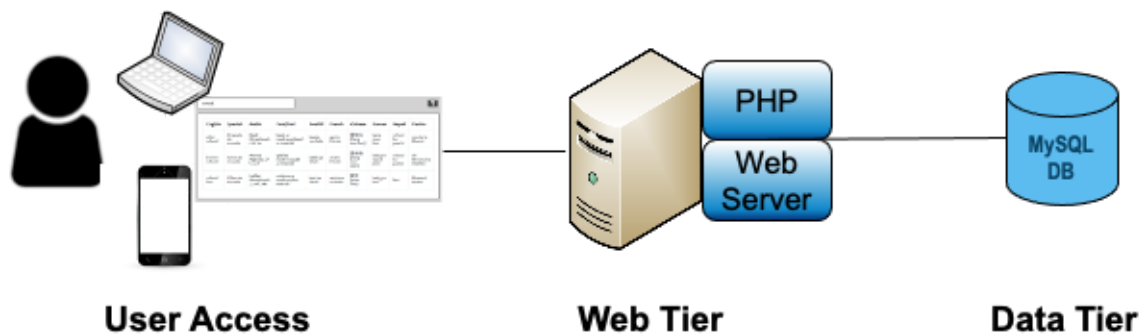
The Translation Tool provides accurate, human vetted translations of common words and phrases that are useful in a school context across the following languages:

- English
- Arabic
- Chinese
- Farsi/Dari
- French (partial)
- Korean
- Nepali
- Pashto
- Spanish
- Swahili

The translations provided by the Translation Tool are not Tool generated. They are provided by native speakers and vetted for accuracy by several University of Virginia instructors and students and a small group of Albemarle County Public Schools secondary students. While the number of translations is initially limited in scope, new entries can be added to the Translation Tool, including audio playback of pronunciation for each entry, to provide as extensive a list as desired.

Architecture

The Translation Tool is a web application built with PHP, HTML, and Javascript that uses a MySQL database to store language translation entries as shown below:



Users access the Translation Tool from a web browser or mobile device. User actions are sent to the Web Tier where PHP scripts process the action and access data (translations, audio playback, etc.) from the MySQL Data Tier. Responses are sent back to users, appropriately formatted on their device of choice with HTML templates. Javascript is also used to provide for real-time client-side scripting.

KEY DESIGN DECISIONS

Admin access

Most users of the Translation Tool only need to view, search, select languages and play back audio files associated with translated text. A select few users, however, may need to update entries, delete entries and add new entries to the application. Granting universal access to these “administrative” tasks would run the risk of corrupting or diminishing the quality of the translations. In order to balance the need for modifications with the need to restrict access to these functions, an administrative “locking” feature is provided. Unlocking this feature allows users to update Translation Tool entries.

One alternative that was considered was to use full user-based access control. This would have required usernames and passwords, and all of the associated functionality that comes along with user-based access control (such as the ability to change passwords, reset forgotten passwords, and providing unique usernames). A design decision was made to use a simple, universal, administrator’s “access code” to unlock administrative functionality. While this method is not as secure as user-based access control, it was determined to be a superior approach given the expected use of the application and the limited user community. If more secure control is required in the future, full-blown user-based access control can be added at that time.

Database vs. spreadsheet

The origin of the Translation Tool was a spreadsheet that contained multi-language translation entries. Based on this, Google Sheets was used as a back end for a prototype web application. While the prototype provided the end-user functionality desired, significant difficulties resulted from using a spreadsheet back end. For this reason, a design decision was made to use a MySQL database back end. Using a database on the back end of the application

provides a much more efficient environment for manipulating Translation Tool entries, including creating new entries, reading, sorting and filtering existing entries, editing existing entries and removing entries.

User Interface

Since the original list of translated terms was in a spreadsheet and most users would be familiar with such a format, the entries in the Translation Tool were made to look similar to a spreadsheet. The entries were placed alphabetically in English in a scrollable, searchable, and filterable table designed for universal accessibility. Additionally, Javascript was used for the majority of table actions so that these actions could be performed in real-time without the need for page refreshes and waiting on the server.

As an effort to reduce clutter on the main interface, audio playback files can be attached to the table cell belonging to the entry for that language. This way, the user can simply click on a term in the table to play the audio for it. Since not every term may have an audio file attached to it, the decision was made to change the mouse style from a pointer to a hand when hovering over a term with audio. This makes it so that the user is able to easily tell which terms have audio without clicking on every single entry.

USER ACTIONS

Search

The search bar allows for real-time filtering of terms based on the content typed. Searching is only based on English terms, and will include terms that have the search content anywhere in the term. For example, typing “af” in the search bar will narrow the English terms to “after”, “after school”, and “cafeteria.” Another example, using “school” as the search term, is shown below.

Select Languages

English	Spanish	Arabic	Farsi/Dari	Swahili	French	Chinese	Korean	Nepali	Pashto
after school	Después de escuela	Baad Almadrasah بعد الغداء	baad az madrsese/baad az maktab	baada ya shule	après l'école	放学后 (fang xue hou)	bang gwa hoo	school ko paachi	roosta la khonzi
before school	Antes de escuela	Athnaa Alghada قبل المدرسة	qabl az madrese/qabl az maktab	kabla ya shule	avant l'école	放学前 (fang xue qian)	hak gyo si jack jeon	school ko paelai	de khwanzina makhke
school bus	El bus de escuela	Hafilat Almadrasah باص المدرس	otoboos-e madrese/bus maktab	basi ya shule	autobus scolaire	校车 (xiao che)	hak gyo bus	bus	khwanzi motar

By default, all of the included languages are shown. However, users can select only the languages that they want translated. See below.

Select Languages

The “Select Languages” button **Select Languages** to the top right of the table of terms and translations is used to select which languages (columns) are shown. Click the button once to reveal a container with nine checkboxes with names of languages next to them. Click the button again to hide the container. Checking the boxes on or off will add or remove the respective language column in the table. Below is a screenshot of the table when only Spanish and Arabic are checked.

Select Languages


<input checked="" type="checkbox"/> Spanish	<input checked="" type="checkbox"/> Arabic	<input type="checkbox"/> Farsi/Dari	<input type="checkbox"/> Swahili
<input type="checkbox"/> French	<input type="checkbox"/> Chinese	<input type="checkbox"/> Korean	<input type="checkbox"/> Nepali
<input type="checkbox"/> Pashto			

English	Spanish	Arabic
absolute value	el valor absoluto	qeemah mutlaqa قيمه مطلقه
add (+)	sumar	ijmaa
after	despues de	baed
after school	Después de escuela	Baad Almadrasah بعد الغداء
algebra	algebra	aljabr علم الجبر
angle	ángulo	zaawiyah زاوية


Play Audio

Each term and translation in the table can have a sound file attached to it. If there is a sound file attached to a term or translation, dragging the mouse over its table cell will cause the mouse to change from an arrow to a pointer. Clicking anywhere in the table cell of that term will play the audio that is linked.

Example of the mouse hovering over a translation with no audio file attached:



English	Spanish	Arabic
absolute value	el valor absoluto 	qeemah mutlaqa قيمه مطلقه
add (+)	sumar	ijmaa

Example of the mouse hovering over a translation with a valid audio file:

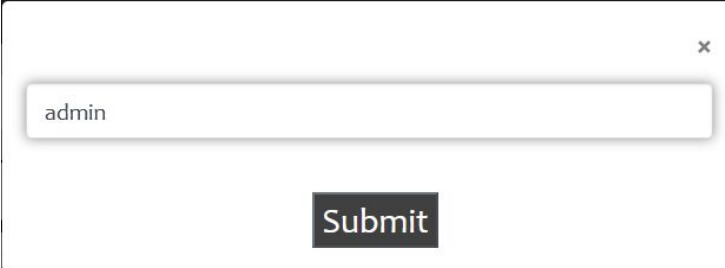
English	Spanish	Arabic
absolute value 	el valor absoluto	qeemah mutlaqa قيمه مطلقه
add (+)	sumar	ijmaa

ADMIN ACTIONS

Unlock


Clicking on the lock icon  in the top right corner of the screen will cause a pop up modal to appear, prompting the user for an access code. The current temporary access code is “admin”, all lowercase. Anything else will cause an error message to appear and access denied. Typing the correct code will cause the lock icon to turn into an  unlock icon, indicating that the user is now able to make changes to the page.

Below is a screenshot of the correct access code being typed:




A screenshot of a pop-up modal window. The window has a title bar with a close button (x) in the top right corner. Inside the window, there is a text input field containing the text "admin". Below the input field is a dark button with the text "Submit" in white.

Lock

Once admin access is granted and the lock icon becomes unlocked, clicking on the unlocked icon  will cause the page to become locked again and admin capabilities will be revoked.

Add Entry

With Admin capabilities unlocked, the “+ Add Entry” button will be added to the bottom of the table. Clicking this button allows the user to add a new entry to the table. There are text inputs for the English term and each language in the table. Leaving a text field blank will automatically fill the table cell with “No translation found” when clicking the “Submit” button.

On the “Add terms” page, there is also a speaker icon  next to the text fields for each language. Clicking this icon will prompt the user to select an audio file, intended to be the pronunciation of the term. As the file is uploaded, the name of the file will be displayed next to the speaker icon. Uploading nothing will not cause any errors and can always be changed later.

Clicking the “Submit” button at the bottom of the page will save all of the text entered and files uploaded and create a new term with the data. The “Cancel” button will ignore the changes and return to the home page.











Screenshot of the bottom of the table with the “+ Add Entry” button:

y-intercept	la intersección Y	taqaatu al shaaqulii التقاطع في المحور (المحور)	hayel-e y	herufi ya y kamata	No translation found	y轴截距 (y zhou jie ju)
yes	Sí	Naam , نعم فعلنا	bale	ndiyo	Oui	是的(shi de)

[+ Add Entry](#)



Screenshot of the “Add terms” page for reference:

Add terms

English:	<input type="text"/>	
Spanish:	<input type="text"/>	
Arabic:	<input type="text"/>	
Farsi/Dari:	<input type="text"/>	
Swahili:	<input type="text"/>	
French:	<input type="text"/>	
Chinese:	<input type="text"/>	
Korean:	<input type="text"/>	
Nepali:	<input type="text"/>	
Pashto:	<input type="text"/>	

[Submit](#) [Cancel](#)

Edit Entry











With Admin access, a new column in the table will appear to the far right, labeled “Actions” (you might need to scroll horizontally to see it). In this column, there are two icons, a pencil  and a trash can,  in the cell for each row. Clicking the pencil icon will bring up the “Edit translations” page for that row. From here, the user is able to view and make changes to the terms for each language and the audio files attached to them. See [Add Entry](#) for more information about the page. Once changes are made, the user is able to click the “Submit” button at the bottom to save their changes, or the “Cancel” button to ignore the changes and return to the home page.

Screenshot of the table with “Actions” column on the far right:



Dari	Swahili	French	Chinese	Korean	Nepali	Pashto	Actions
gh/qadr-e	nambari kamili	No translation found	绝对值 (jue dui zhi)	jul dae gap/chi	No translation found	matlaq arzekht	 
n kardan/jama	ongeza	additionnez	加上 (jia shang)	yoyaghada or deohagi	jaur nu	Ezafa kray	 

Screenshot of the “Edit translations” page for reference:


Edit translations for "absolute value"

English:	<input type="text" value="absolute value"/>	 absolute value.mp3
Spanish:	<input type="text" value="el valor absoluto"/>	 absoluto.mp3
Arabic:	<input type="text" value="qeemah mutlaqa قيمة مطلقه"/>	
Farsi/Dari:	<input type="text" value="ghadr-e motlagh/qadr-e motlaq"/>	
Swahili:	<input type="text" value="nambari kamili"/>	
French:	<input type="text" value="No translation found"/>	
Chinese:	<input type="text" value="绝对值(jue dui zhi)"/>	
Korean:	<input type="text" value="jul dae gap/chi"/>	
Nepali:	<input type="text" value="No translation found"/>	
Pashto:	<input type="text" value="matlaq arzekht"/>	

Delete Entry

With Admin access, a new column in the table will appear to the far right, labeled “Actions” (you might need to scroll horizontally to see it). In this column, there are two icons, a pencil  and a trash  can, in the cell for each row. Clicking the trash can icon will prompt the user to delete the corresponding row from the table. There is no way to retrieve a row once it has been deleted.

Screenshot of the table with “Actions” column on the far right:

Dari	Swahili	French	Chinese	Korean	Nepali	Pashto	Actions
gh/qadr-e	nambari kamili	No translation found	绝对值 (jue dui zhi)	jul dae gap/chi	No translation found	matlaq arzekht	 
h kardan/jama	ongeza	additionnez	加上 (jia shang)	yoyaghada or deohagi	jaur nu	Ezafa kray	 

Prompt that appears when clicking the trash can icon on the “absolute value” row:

