The College of Idaho

Morse Bot

The first cellphone designed for the deaf-blind.

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Americans with Disabilities Act:

Accessibility standards issued under the Americans with Disabilities Act (ADA) apply to places of public accommodation, commercial facilities, and state and local government facilities in new construction, alterations, and additions. The ADA Standards are based on minimum guidelines set by the Access Board. (*Americans with Disabilities Act (ADA) Standards*)

Purpose:

Morse Bot, A Cellphone invented with the hopes of mitigating the headache of hiring an interpreter to communicate with the deaf-blind, allowing the Internet of Things (IoT) to be accessible by anyone. This device allows a user to simply insert a working sim card and the device immediately starts functions as intended.

Original Publication (2018):

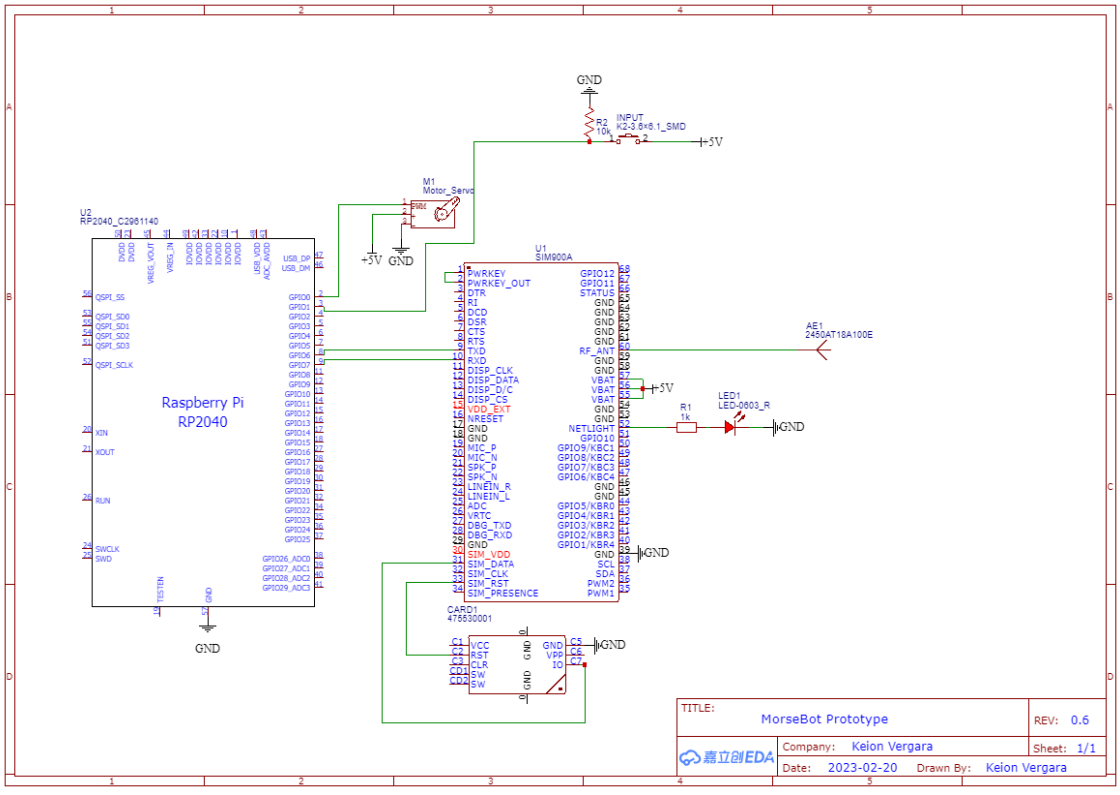
https://cdn5-ss21.sharpschool.com/UserFiles/Servers/Server_152990/File/Community/Newsletters/VIA%20June%202018%20Web.pdf (Page 3; *Almost in the Dragons' Den* 2018)

Definitions:

Deaf-Blind: having a severe impairment of both hearing and vision.

Board Schematic:

Prototype-0.6:



Morse Code Chart

Letters:

A	.-	B	-...	C	-.-.	D	-..	E	.	F	..-.
G	--.	H	....	I	..	J	.---	K	-.-	L	.-..
M	--	N	-.	O	---	P	.--.	Q	--.-	R	.-.
S	...	T	-	U	..-	V	...-	W	.--	X	-..-
				Y	-.--	Z	--..				

Numbers:

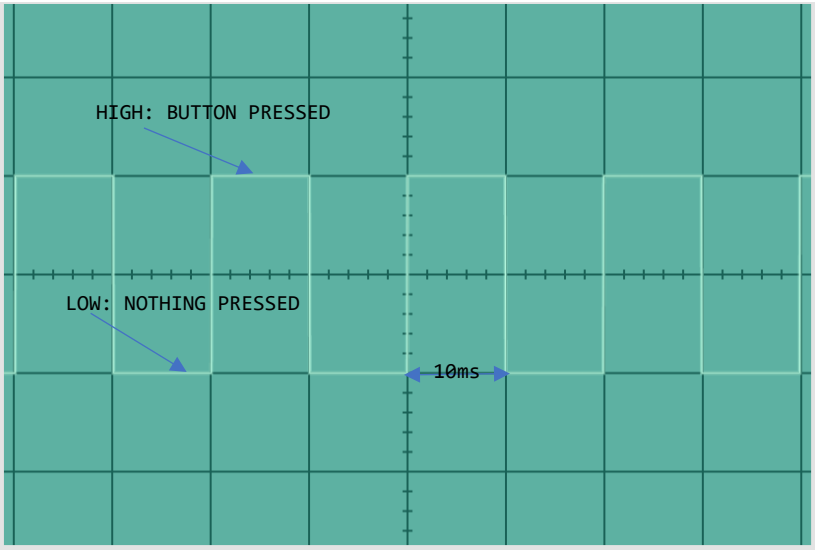
0	-----	1	.----	2	..---	3	...--	4	....-	5	.....
		6	-....	7	--...	8	---..	9	----.		

Custom Functions:

BACK_BUTTON / OVERRIDE	_
YES_BUTTON	-.-.-

Encoding Example:

Example: The Pattern "…." Or 'H' in morse code

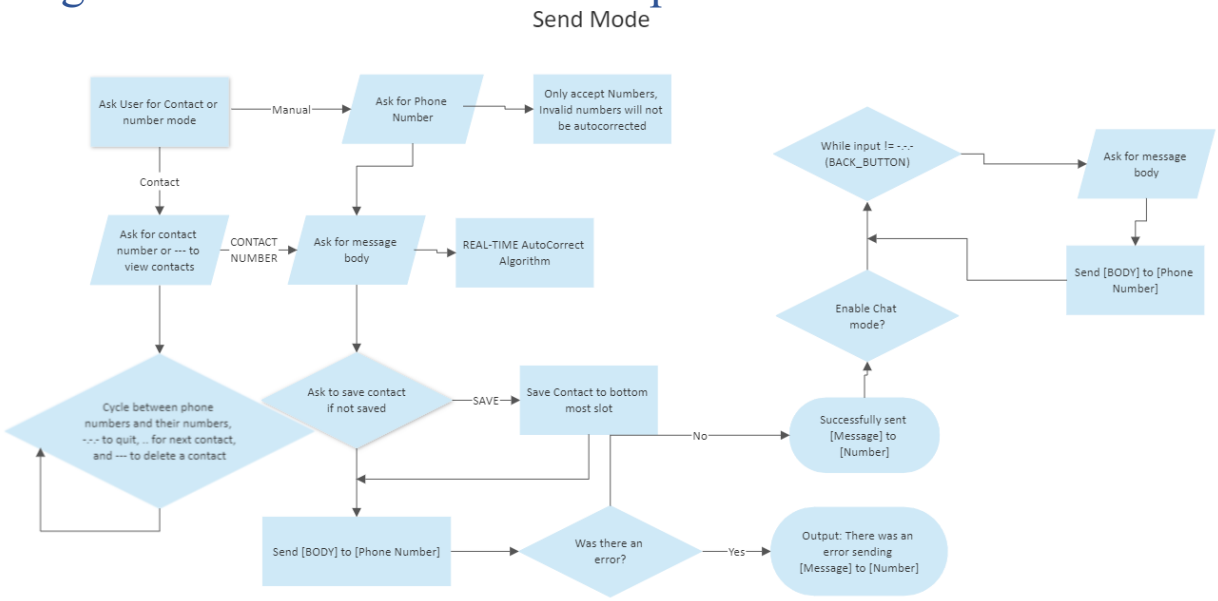


Single-Tap (.):
1ms - 14ms < PRESS_TIME

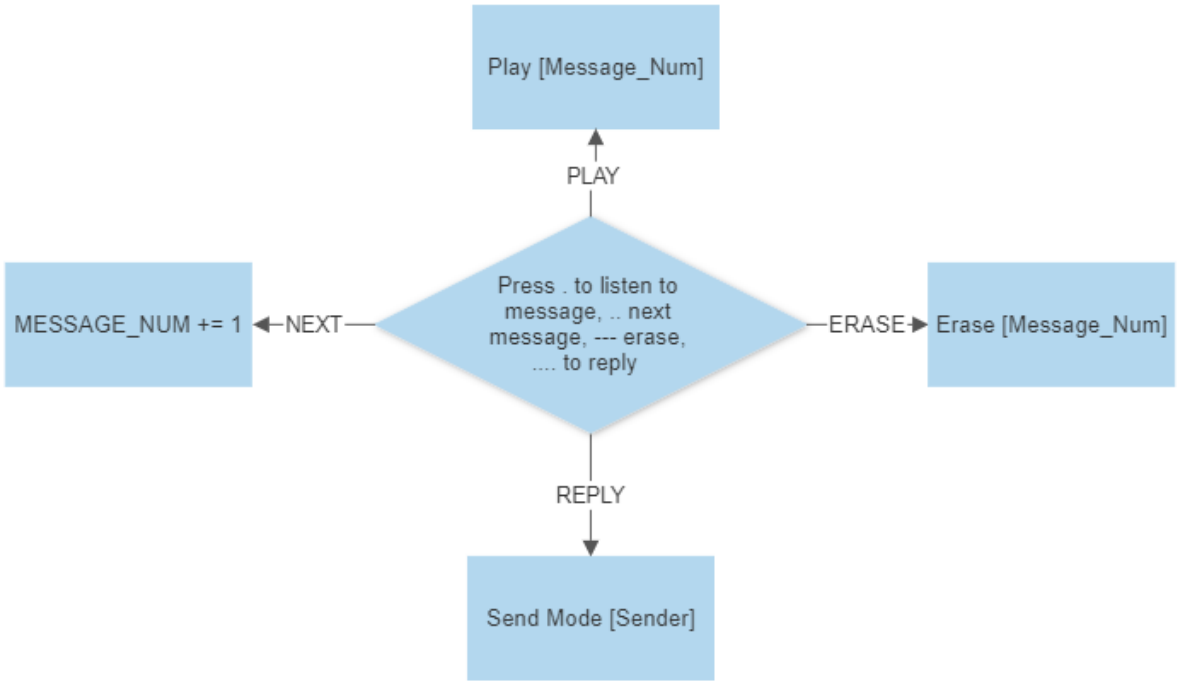
Long-Tap (-):
15ms – 299ms < PRESS_TIME

Long-Hold (_):
300ms < PRESS_TIME

Single Mode Menu Process Example:



Receive-Mode Menu Process Example:



Absolute Difference Algorithm (Rev. 0.2)

Time Complexity: O(n*n!)
Precision: ~75%
Constraints: Numerical-Input [0-9] per line
Compares and calculates the absolute difference between the input and a list of patterns. Whichever pattern is the most "similar" gets returned. Works on patterns with a set buffer width (Ex. Numbers with a consistent width of 5).

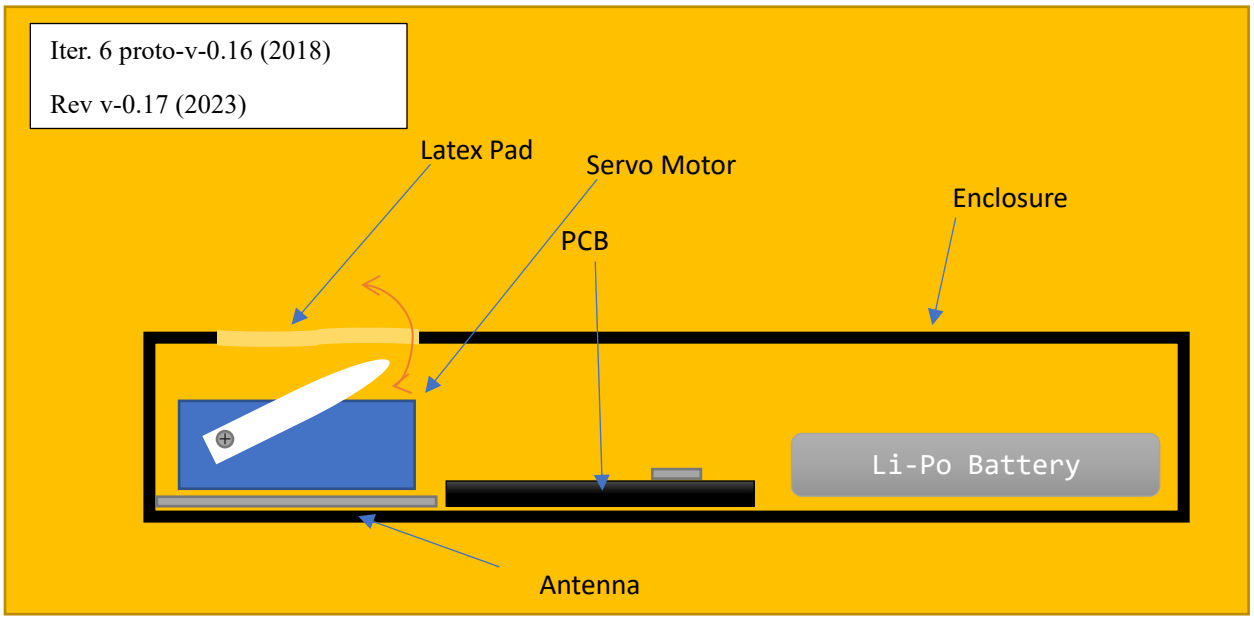
```
def accuracycoefficient(pattern: str, compare: str):
    #pattern and compare must be equal in length
    error = 0
    correct = 0
    for i in range(len(pattern)):
        if pattern[i]==compare[i]:
            correct+=1
        else:
            error+=1
    return correct/len(pattern)
def best_guess(valid_codes: list[str], code_to_test:str):
    BEST=max(valid_codes, key=lambda t: accuracycoefficient(code_to_test, t))
    return BEST, accuracycoefficient(code_to_test,BEST)
def sift_buffer(valid_codes: list[str], string_to_test:str, BUFFER_SIZE:int):
    if len(string_to_test)==BUFFER_SIZE:
        return best_guess(valid_codes,string_to_test)[0]
    for i in range(0,len(string_to_test)-BUFFER_SIZE+1):
        print(string_to_test[i:i+BUFFER_SIZE])
        guess = best_guess(valid_codes, string_to_test[i:i+BUFFER_SIZE])
        print(f"Best Guess: {guess[0]} Confidence:{guess[1]*100}%")
```

Highest-Complexity-First Algorithm (Rev. 0.3)

Time Complexity: O(N)
Precision: ~54.51%
Constraints: Matches only single patterns
Identifies accidental press' and attempts to return the most-similar accurate pattern

```
def errorProcess(self,pattern): # Predict what letter was misspelled
    SortedAlphabet = sorted(self.Alphabet, key=lambda c: c.count('-')+c.count('.'))[::-1]
       #sorts list with the most 'complex' patterns at the beginning
       possibleOthers = []
       for p in SortedAlphabet: # check every single letter to see if it is contained in pattern
           if p in pattern: # if so, we append it to the list of possible patterns, with the right most
patterns being the least complex
               possibleOthers.append(p)
       print(f"Possible patterns: {possibleOthers}")
       return possibleOthers[0] #Return first match (Temporary)
```

Side-View Design



[SUBJECT TO CHANGE]

Patent Abstract (2018)

Type: Utility Patent

Status: Pending

Monetization: Licensing

Invention: Machine/Apparatus/System & Concept

Abstract:

A Wireless and cellular-connected device that lacks visual or auditorial input/output rather using a motor & button to adhere its input and output functions. A pocket-sized enclosure is powered by an internal rechargeable 'Li-Po' battery and utilizes an onboard CPU / Microcontroller and a SIM900 Broadcom chip to interface with cellular connections. Internal Software that converts SMS text (ASCII) into a morse code sequence stored in binary than physically outputting that via a physical moving motor tapping sensation or physical moving motor vibration. A touch interface will convert a physical tapping or tactical user input sequence into binary morse code that will in-turn be used to as input to internal menu logic as well as user input that will be converted back to AHCII text and sent via SMS.

Claims:

First Wireless Cellular connected device to translate SMS to a physical tapping sensation Morse Code via vibration or motorized output.

First Wireless Cellular-connected rechargeable operated device to receive a morse code tactile input translated to human readable text and sent to a phone via SMS.

DESIGN PATENT

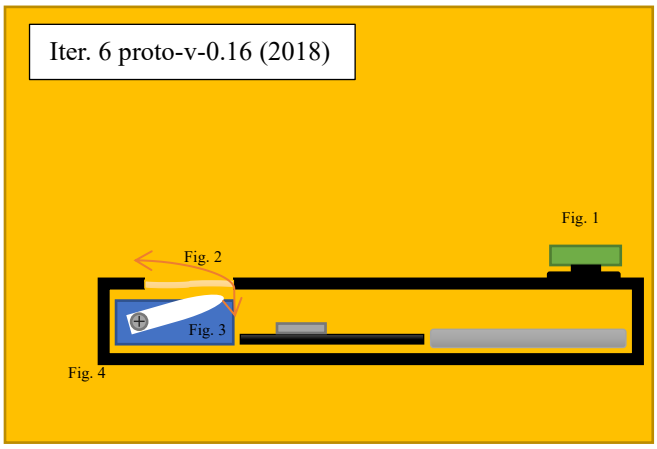


Figure 1. Input Button

Figure 2. arm moves up & down in a rotative motion (45 deg), simulating a tapping signal

Figure 3. Servo motor, latex pad above

Figure 4. Outer housing with a hole to provide a stationary place for the finger for user to receive tactile output.

References

"Americans with Disabilities Act (ADA) Standards." *Combined ADA Standards*, U.S. Department of Justice (2010) and the U.S. Department of Transportation (2006), 15 Sept. 2010, https://www.access-board.gov/files/ada/ADA-Standards.pdf.

Seine River School Division. (2018, June). *Almost in the Dragons' Den*. Via the Seine. Retrieved February 20, 2023, from https://cdn5-ss21.sharpschool.com/UserFiles/Servers/Server_152990/File/Community/Newsletters/VIA%20June%202018%20Web.pdf