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Vocal Programming

Mitul Shelatkar[1], Dr. Pratibha Deshmukh[2]
[1, 2]*Bharati Vidyapeeths IMIT, Navi Mumbai*

Abstract: Vocal Programming or voice programming is going to be the need of the world as Programmers around the world are facing Repetitive stress injuries (RSI) in their upper limbs. RSI further causes cubital tunnel syndrome. The syndrome occurs when ulnar nerve gets pinched at the elbow causing pain and numbness in hands and fingers. We are interacting with our gadgets by talking to them with the help of voice assistants. But what if the software itself could be built using voice? That's the idea behind vocal programming, an approach to developing software using voice instead of keyboard and mouse to write code. This paper talks about a system which will help RSI affected programmers to program with minimum use of their hands.
Keywords: Voice Coding, Voice Programming, RSI, Vocal Programming

I. INTRODUCTION

Repetitive Stress injury take the form of Carpal Tunnel Syndrome(CTS),bursitis, rotator cuff tendonitis, tennis elbow. The total cost for RSI of all types is estimated at almost $6 billion annually. Taking breaks from your desk for few minutes, stretching, wiggling your fingers are some recommendations to avoid RSI's, but unfortunately IT professionals have strict deadlines and they ignore these recommendations. Apart from RSI ,Upper Limb amputation is another issue which can be caused by accident, cancer etc. So questions arise, what if a IT Professional meets with a car accident and looses his upper limbs? How will he type? If he cant type, he cant code ,so why will a IT firm retain him? To address these issues we should use an alternate way of taking input such as voice.. To recover from RSI, the affected person needs to take breaks, do stretching but IT professionals have strict deadlines, for them taking breaks and stretching is not possible due to their busy schedule. So how will the affected area get rest? Giving maximum rest to the affected area is recommended but without compromising the deadlines . How will we achieve that? By using vocal/voice programming. The idea behind vocal programming or voice programming is to allow user to type code with minimum use of keyboard , so the hand affected with RSI gets the maximum rest and ensures speedy recovery.

II. LITERATURE SURVEY

Voice recognition is mainly used in voice assistant's like Apple's Siri, Googles Voice assistant, Microsoft's cortana, Amazons Echo(alexa) and many more. Voice recognition is also used in chat bots where user can interact with the bot without a need to click buttons on the keyboard.

So why not take the voice recognition a little bit further and use it for Voice Programming?.

VoiceAttack is a paid software which takes your apps and pc games to a different level by adding your voice as an additional controller. With VoiceAttack you can control the buttons on your keyboard through your voice , it also allows you to register new commands. After registering those commands you have to register a action (keypress or a text to type) or a sequence of actions for that command .for eg :-for command "new line" the corresponding action will be to press ENTER button on the keyboard, now whenever a user says 'new line', ENTER button will be clicked automatically.

A youtuber having a channel named 'learn coding by game' has used the capabilities of VoiceAttack combined with Microsoft Visual studio IDE for python programming.

'Programming by voice, Vocal Programming' by Stephen Arnold talks about developing a voice programming environment by using two commercially available software packages 'Dragon NaturallySpeaking' and Microsoft Visual studio IDE.

Talon is another software which enables you to write code and control your computer with **voice**, Talon also provides an extra feature of eye tracking .

III. OBJECTIVES

A. Identify the problems of Repetitive stress injuries (RSI).
B. Implement the solution for minimizing the problem of Repetitive stress injuries (RSI).

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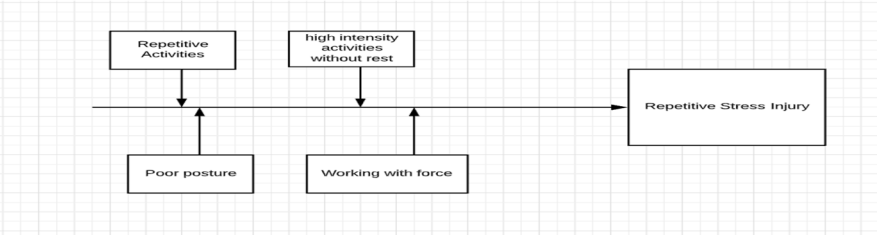
IV. PROBLEM DEFINITION

RSI(Repetitive Stress injury) refers to gradual buildup of damage to your muscles, tendons and nerves from repetitive motion.

Cause effect diagram



Repetitive task such as typing, using computer mouse, bending neck to hold mobile handset, gripping steering wheel.
High intensity activities such as training for sports, poor posture , working with force leads to RSI.
RSI affects your wrist , hands, forearms, elbows, neck and shoulder.

V. IMPLEMENTATION OF VocalPython

Product VocalPython will enable the user to code python with the help of his/her voice on a IDE named Pycharm. Using notepad was an option but Pycharm provides lots of features which notepad doesnot provide. While coding, python programmer needs indentation , otherwise the interpreter will throw an error. Code formatting is needed to keep the code readable and maintainable for fast coding we need auto suggestions. All these features are provided by Pycharm IDE. It takes care of indentation, code formatting and most importantly code auto completion so that the programmer can focus on the main logic. Pycharm takes care of many things, so now one can focus on other things such as voice input, converting the inputted voice to text, processing the text.

A. Enabling Technologies

1) Pycharm IDE
2) python's "speech_recognition" library which converts spoken words to text.
3) python's "pyautogui" library to take control over the keyboard.
4) python's "re" library also known as regex to identify patterns and process text.

B. User Manual for vocalpython

1) User has to say " open pycharm " after which pycharm opens up.
2) To type "a=20",user has to say " type a equals 20"
3) User has to say the following commands

Command	Result
Clear entire file	Clears entire file
Clear entire line	Clears the current line
Run program	Runs Program
Exit	Exits Pycharm
Undo	Ctrl+z
Define function function_name	def function_name():
End of line	Moves the cursor to the end of current line
Start of line	Moves the cursor to the start of current line
Call function function_name	fnction_name()
Click up	Moves the cursor one line up
Click down	Moves the cursor one line down
Click right	Cursor shifts one place to the right
Click left	Cursor shifts one place to the left

Punctuations

Command	Result
click full stop	.
click exclamation mark	!
click semicolon	;
click forward slash	/
click underscore	_
click comma	,
click space	
click ampersand	&
click question mark	?
click backslash	\
click hyphen	-
click apostrophe	'
click hashtag	#
click dash	-
click vertical bar	|
Click colon	:

Brackets

Command	Result
click single quote	‘
click double quote	“
click open parenthesis	(
click close parenthesis	)
click open bracket	[
click open angle bracket	<
click close angle bracket	>
click close bracket	}

Symbol

Command	Result
click percent	%
click equal	=
click minus	-
click multiplication	*
click greater than	>
click less than	<
click dollar	$

VI. LIMITATIONS

Python's 'speech_recognition' library is used which has a Recognizer class, this class contains 7 instance methods which will help us to recognize speech, out of which recognize_google() (google we speech API) has been used here but any speech recognition engine has the following challenges.

A. Different person may have different style of speaking ,a person might have American accent, Indian accent, Russian accent and so on.
B. Speech recognition engine might not be able to understand a pronunciation.
C. Isolated room and auditorium will have different background noise ,again echo might contribute to a lot of noise.

Cursor controlling and mouse clicks are some other challenges. Googles web speech API which has been used, is for natural language detection. The differences between natural language and computer languages is significant enough that attempting to use voice recognition software for programming quickly becomes so slow and frustrating that it makes it impractical.

VII. FUTURE ENHANCEMENTS

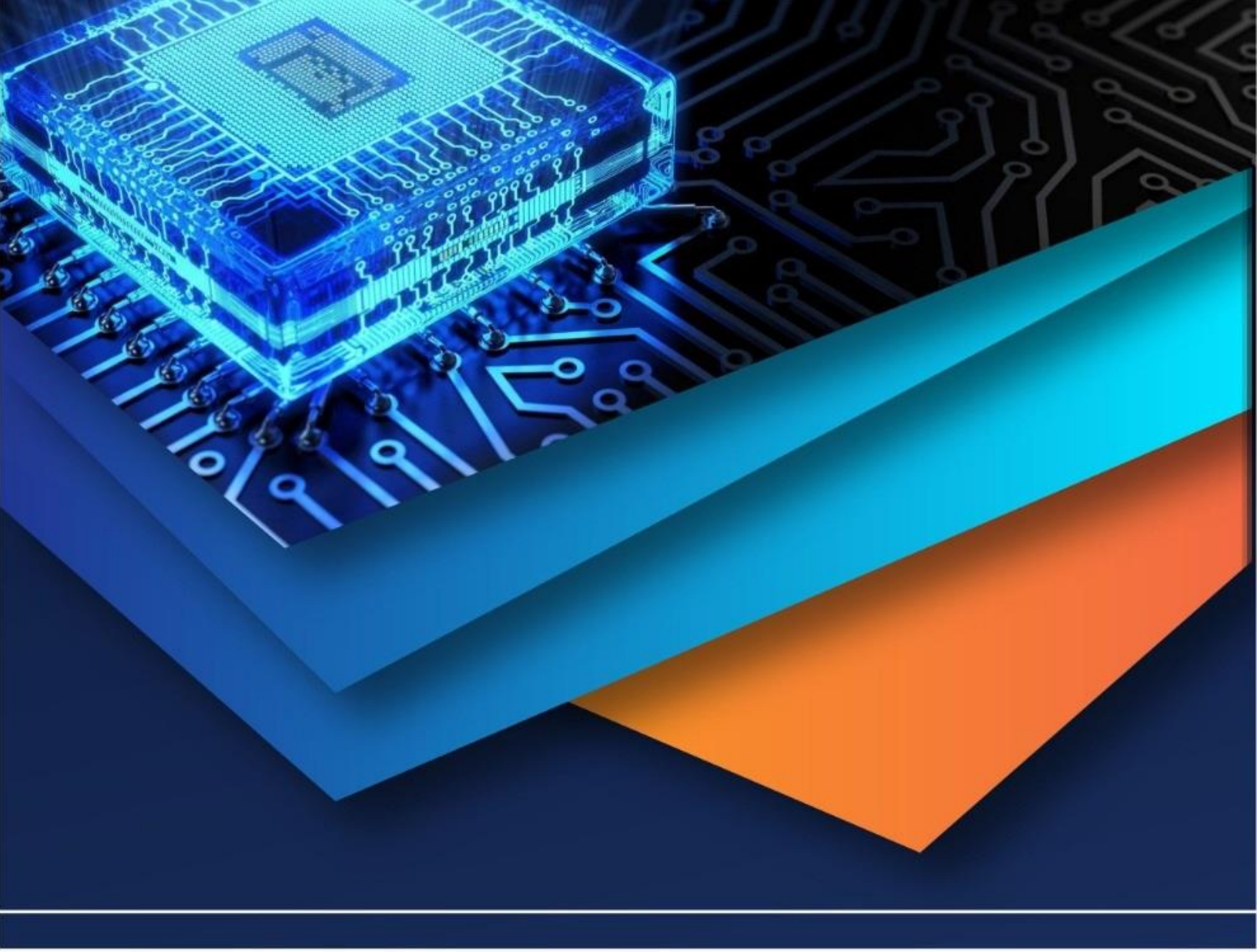
The Product is still in development phase, Cursor controlling is an important issue to be handled, the **cursor** movement of computer will be **controlled** by eye movement **using** Open CV. Camera will detect the Eye ball movement which can be processed **in OpenCV**. By this the **cursor** can be **controlled**. For Mouse clicks, python's pyautogui library will be used.
Instead of using google web speech API , Dragon NaturallySpeaking/VoiceAttack voice recognition systems can be used. Dragon NaturallySpeaking voice recognition system provides the voice recognition capabilities necessary for building a voice recognition system to support programming. The Dragon NaturallySpeaking allows us to build a library of vocabulary for a computer language. This library consists of the words that are used in writing a program. These words are the tokens of the programming language, that exist in the specific program being written. Talon voice is another tool built specifically to help software developers work without using their hands.
An interface similar to VoiceAttack will be provided , which will allow the user to register commands and corresponding actions

REFERENCES

[1] https://www.healthline.com/health/repetitive-strain-injury
[2] https://www.researchgate.net/publication/221652444 Vocalprogramming by stephen C. Arnold,Leo Mark and John Goldthwaite
[3] https://innovate.mygov.in/wp-content/uploads/2018/08/mygov1534863628147178.pdf
[4] Coding with voice dictation using Talon Voice (joshwcomeau.com)
[5] https://www.youtube.com/watch?v=sHeJgKBaiAI
[6] https://innovate.mygov.in/

SAMPLE VIDEO OF VocalPython

[1] https://drive.google.com/file/d/1T4EdYNLY8bTNOIs5Gw8RHpqtUtZ6Qfg-/view?usp=drivesdk



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