SINGLE BUTTON KEYBOARD FOR BLIND PEOPLE USING MACHINE LEARNING

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Abstract -The KEYBOARD is aimed towards the welfare of visually impaired people. The visually impaired have an exposure to all or any the newest equipments made especially for them, but none has attempted a far better research over this issue. Hence, This paper is certain to make a revolution in its own field and ensure complete support from people of various societies. This helps the visually impaired to interact with the pc system at a maximum probability and easier to speak. At the international arena this paper will certainly achieve greater heights and is predicted to be welcomed by communities for helping the blind.

Key Words: Gesture, Keyboard, Arduino, SVM, PC, Blind.

1. INTRODUCTION

The keyboard plays a vibrant role in the computer system for the entry of data by pressing the number of keys. In today's generation screen touch keyboards are mostly used and gesture keyboards also used only for physically disabled people and for special use. There is plenty of variation in layouts of the physical keyboard such as AZERTY, QWERTY, Dvorak Colemak, Maltron, and JCUKEN. Not only this virtual keyboard also gets eminent and this is the era of mobile and networking devices generally people use speech to text technology but many times it does not provide the precise outcome. Remote based gesture keyboard is one of the electronic devices based on machine learning algorithms and organized by python programming language. It is a system that transforms gesture motion into text defined by the accelerometer in the air. It is being deliberate to help the user for entering text without using a specific layout. This model will also support multi linguistics functionality so the user doesn't need to use the different keyboards for entering text. It is similar to writing in a notebook using a pen where a remote act as a pen and notebook will be a text editor. The advantage of this project is users don't prerequisite for using the remote. The user also doesn't need to use various functional keys for different languages. The essential step for constructing this system is to create the motion tracking device that is based on 3 major components such as accelerometer, Arduino and switches. The Arduino serial monitor is configured and set the baud rate to 38400 at Arduino IDE, now the overall module will work on scikit learn's a library that converts signals into letters through accelerometer and every single character and digit will store in data set. When the data set is ready it will train the module through a machine learning algorithm.

1.1 System Description

Different keyboards are available within the market, with variations in size, layouts, programs, and functionalities. Recently, virtual keyboards also are in use except for every single keyboard, the user should remember the arrangement of keys so as to enter different characters. Remote based gesture keyboard may be a system that serves on the web of Things [IoT] architecture and embedded with Arduino also because the accelerometer and machine learning process that enforces the system to perform within the desired direction. The remote based gesture keyboard is that the model, where the user can enter text and number during a text editor by moving a hand to the precise motion of characters within the air using Arduino. Arduino operates as a foreign where gestures relocate into the air, translating into letters, and exposing them on a display screen.
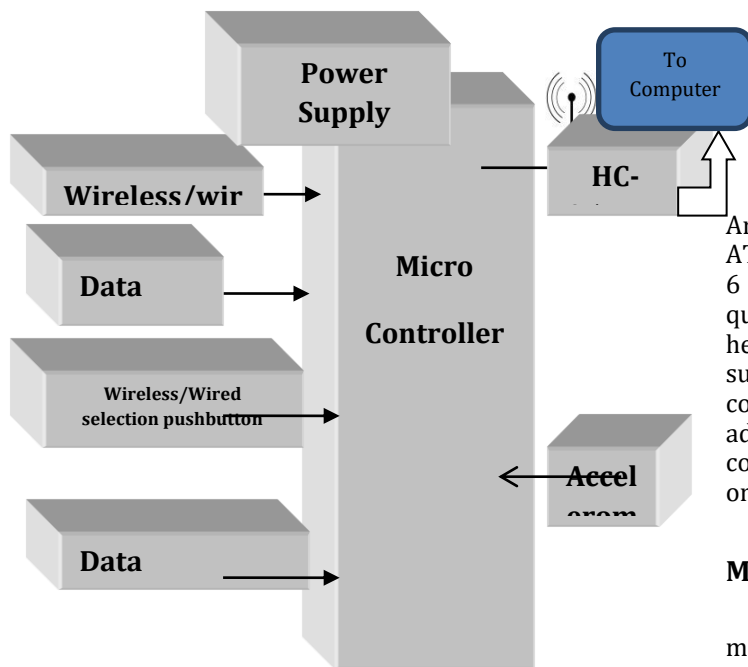
2. SYSTEM WORKIG

Step1: Press the first button to choose wired or wireless.

Step 2: Turn on Bluetooth connectivity of device which is used as an editor.

Step 3: Pushed and hold the second button until the gesture of the character moving into the air.

Step 4: Release the second button when motion is over.

Step 5: Switch off the first button.

Fig-2: Arduino Uno Interface With Sensor & Buzzer

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter. Arduino Uno has a number of facilities for communicating with a computer, another Arduino board, or other microcontrollers.

MEMS SENSOR DESCRIPTION

Microelectromechanical system (MEMS, also written a micro-electro-mechanical, MicroElectroMechanical or microelectronic and microelectromechanical systems and the related micromechatronics) is the technology of microscopic devices, particularly those with moving parts.

The accelerometer is a low power, low profile capacitive micro machined Accelerometer featuring signal conditioning, a 1-pole low pass filter, temperature Compensation, self test, 0g-Detect which detects linear freefall, and g-Select which Allows for the selection between 2 sensitivities Zero-g offset and sensitivity is Factory set and requires no external devices. This includes a Sleep Mode that makes it ideal for handheld battery powered elect.

3. TESTING DEFINITION

Testing is very vague term and to define it we should know and we should have some baselines. Basically to understand testing we should know few things:

1. Testing is not independent module it is interlinked with the system to be tested.

2. To test the system you should know the system, this actually means if you want to test anything first you should have a thorough knowledge of the system.

These are very basic things and can be applied to any system/scenario. For Embedded Systems testing we should be aware of the testing environment.
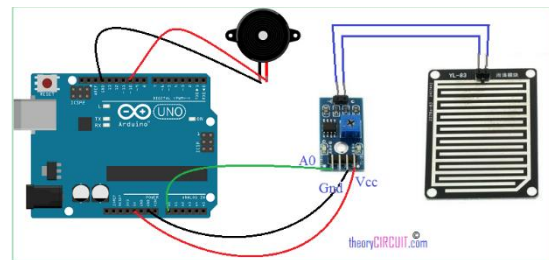
Three categories for testing:

Fig-1: Block Diagram

A module using an Arduino Pro Micro, a MPU-6050 as accelerometer and a HC-06 Bluetooth module for sending signals to the laptop. A Python library using Scikit-learn's SVM (Support Vector Machine) algorithm then translates the motion readings into characters that appear on the screen. When someone press the first button, the module starts to send accelerometer data to the pc. When the button is released, the transmission stops. The entire module gets powered by using a power bank.

Python program used to convert accelerometer data to a sequence of characters and sentences.

The Gesture Keyboard is a device that translates gestures into letters. It's made by an Arduino Pro Micro, an HC-06 module for bluetooth communication and a MPU-6050 accelerometer. It sends the data to a computer that, with a Machine Learning algorithm, translates the motion readings into characters. The library itself is written in Python and uses the Scikit-learn library for the SVM algorithm. Created using an Arduino Pro Micro an MPU-6050 accelerometer, and an HC-06 Bluetooth module for sending signals to his laptop, together with a Python library using Scikit-learn's SVM (Support Vector Machine) algorithm the system captures motion and transforms them into characters that appear on screen.

1. White box testing

2. Black Box testing

3. Grey Box testing

WHITE BOX TESTING

It is done with the actual code. If we are using some API's any other tool to see code coverage etc you are doing white box testing. If we are modifying the code to see whether it is working as expected is not, is white box testing.

BLACK BOX TESTING

If we believe that every system has a bug and tries to find defects without even knowing the internal coding of the   system.

GREY BOX TESTING

If we know how internal coding has been done and writing the test cases based on how the system will be used comes under grey box testing.

4. FUTURE SCOPE

The remote based gesture keyboard is a unique idea that provides joy at work and also contains multilinguistic functionality, this system can be embedded with smart watches with the addition of a high data transfer rate. This system could be part of the educational environment for teaching staff. We can enhance it to build the system in a waterproof environment so it can be used in underwater. This system can be combined with the projector so the user can write and explain the point by entering the content or point without using a traditional keyboard. This system can be more suitable for small children to engage them in a study that will be joyful and it can speed up their writing skills.

5. CONCLUSION

The remote-based gesture keyboard concept describes the new idea and it is not only for technical purposes but also can be used in for market potentials. This project will engage some various apparatus that is new for the educational organization. It will be very helpful in school for learning purposes, and also gives enjoyment. This system is also providing multilingual functionality, so the user can easily manage and make a gesture of a particular language. The aim of a project is the user could enter values or characters without seating in front of a computer and easy to use. The main factor of this project is users don't have to learn prerequisites and don't have to remember buttons as compared to a traditional keyboard, so it makes the huge difference between numerous different keyboards and gesture-based system. This project has some conflict issues such as 100% accuracy of letters because many people's handwriting is different so the data set will be large if enter number of the font family. This project can be used as a wired or wireless manner. in a wireless manner if some obstacles occur then bandwidth will be decreased these can be overcome in a future enhancement.

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BIOGRAPHY

Received B.E in Electronics and Communication Engineering from Bharadhidasan University Tamil Nadu, India in 2000 and M.E from Anna University, Tamil Nadu, India in 2008.Currently she is pursuing the Ph.D degree at Anna University, Tamil Nadu, India. Her research interests include Microstrip patch antennas, RF systems.

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