Wio Link For SVH

GNG 2101 - Deliverable J

Submitted by Team E24

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Abstract

The purpose of this document is to provide insight into the process of creating the user interface product. With this, any user should be able to read this paper, and understand the steps taken to create the final product. Accordingly, this manual will outline the functions and capabilities of the product, various installation processes, any notable health and safety guidelines, as well as troubleshooting procedures. Finally, any lessons learned throughout the construction of this project will be shared to give future users possible beneficial advice.

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Introduction

Over 5.3 million Canadians suffer from a disability that severely impacts their mobility. These people require a vast network of devices and aides that allow them to overcome the physical obstacles they may encounter. These devices are life changing because they allow the patients to retake some of their freedom, but they are still lacking in their ability to allow these people to interact with the world around them. The main reason for this is that the devices, great as they are, cannot interact with many other devices. At Saint Vincent Hospital these people are cared for and rehabilitated if possible so the need for a product that bridges the gap between accessibility devices and the systems the patients wish to use is paramount.

The solution must satisfy the condition that the patients can interact with a system normally outside their ability to interact with. The solution must also be inexpensive and simple to use so that any therapeutic assistant or healthcare provider can implement their own solution with minimal assistance. These conditions are essential to the success of this product. Other solutions that have been benchmarked are excellent in their ability to connect to other devices using the IOT idea, but lack in their versatility. Viziyon for example is a product which allows deaf people to sign using a glove which then communicates with a computer. While that communication aspect is valuable, the device itself requires adequate mobility of the hand to work (which isn't the case for some patients).

Our solution utilizes an open source software and inexpensive microcontroller to fulfil the mandate. It is a versatile, modular device which takes some predefined input (button push, abnormal heat, etc) which can be provided by a patient, and translates it to a desired output which interacts with another device or system. The product is used as a call nurse button in this prototype, but has the potential for a myriad of applications. This button alone is useful as some patients may have a hard time reaching over and pressing a button, or may lack the physical ability to actuate said button. This product gives a user with decreased motility the ability to call for help if needed which is extremely important. This device stands out from the rest as it can be easily programmed and easy to use with an inexpensive price tag, all while providing it's functions effectively.

Functions and capabilities

The general structure of the product includes a user interface that was coded using Node-Red in order to ensure simplicity within the design. The interface has a simple two menu function. The first menu includes the client's interface; it displays a "call nurse" button, a technical support button and the input option(s) pre-selected by the nurse to fit the needs of the patient. When the "call nurse" button is selected, it contacts a nurse through the hospital's pre-existing means. Additionally, if the technical support button is selected, an email will be sent to a user-selected person who has a general knowledge of the system and can offer help. Subsequently, the input option(s) displayed is simply a reminder of how the call nurse function can be activated.

In the second menu, the nurse can select the prefered input through the provided sensors, depending on the patient's needs. For example, the sensor type can be changed to compensate for any mobility limitations of a specific patient. In that instance a voice activated input may be used.

As a result, the product offers a versatile selection of inputs and outputs to be added by the user. The base system only consists of the call nurse button and uses a physical button to activate the process. However, the Wio link and node-red programs attached to the system have the capability of accessing and using a variety of modules. This way the user can add any other functions they may choose.

Working the prototype

The prototype is divided into three "parts": the Wio link, the user interface and Node-red

How it was made

The user interface and Node-red section was made using *node.js* logic. Linking together different nodes in Node-red to create a user interface. The full code can be found in appendix A. The grove modules that are used with the Wio link were made using protoboards, wires, and assorted electronic components.



Figure 1: Electronic circuit configuration of Button module



Figure 2: Electronic configuration of Relay module Accessed from <u>https://www.circuitbasics.com/setting-up-a-5v-relay-on-the-arduino/</u>

These circuits were then soldered on to a protoboard. If the user decides to use homemade circuits, make sure the correct wire are connected to the correct port (Gnd, Vcc and 1) using female connection wires

However, it is recommended that the user buys the grove modules from seeed to save time and lower the likelihood of errors. Finally, the relay is connected to a simple led circuit to show that the prototype works.

How it works

The Wio link and Node-red are initialized. When the pushbutton is pressed, the Wio link connects with Node-red using wifi and an individualized token. From there, Node-red is coded to trigger both a prompt on the user interface and the relay. The prompt tells the user that a nurse has been called and the relay activates. Once the relay is activated the LED will turn off showing that the nurse has successfully been called.

Installation

As previously mentioned, the prototype was made using two different platforms. The first one being node-red and the other the Wio Link.

- 1. Refer to Wio link installation and setup
- 2. Refer to Node-Red installation and setup

Wio Link Installation and setup

Equipement

• Wio Link (14.00\$)

https://www.seeedstudio.com/Wio-Link.html

• Grove Button (1.90\$)

https://www.seeedstudio.com/Grove-Button-P.html

• Grove Relay (2.90\$) https://www.seeedstudio.com/Grove-Relay.html

Setup

1. Create a seeed account

https://www.seeedstudio.com/customer/account/create/

- 2. Download the Wio link mobile app and follow the instructions on how to pair your board
- 3. Select slot *DIGITAL 0* and add the button module
- 4. Insert Grove Button into DIGITAL 0 slot
- 5. Select slot *DIGITAL 2* and add the relay module
- 6. Insert Grove Relay into DIGITAl 2 slot
- 7. Click Update Firmware
- 8. When done, the Update Firmware button should now read View API



Figure 3: Screenshot of the Grove Button and Grove Relay installed on the Wio link mobile app

Node-Red Installation and setup

Setup

1. Download Node-red to run on windows

https://nodered.org/docs/getting-started/local

- 2. Open the computer command prompt (Search cmd in windows search bar) and write *node-red*
- 3. Open a internet page and go to this website *localhost1880*
- 4. Go to the top right corner of the screen select the three lines
- 5. Select Manage Palette
- 6. Under the install tab, install the following palettes
 - a. Node-red-dashboard
 - b. Node-red-contrib-wio-seeed
- 7. Go to the top right corner of the screen, select the three lines then click import
- 8. Paste the code in the import tab
- 9. To access the user interface, open a new tab and go to *localhost1880/ui*

See appendix A for the code

	show notification		
	Technical Help		
	Tining payload		
Device 📥			
📑 too aibun			
Proximity sensor			archa (domportan)
Button		Call nurse	Relay
show notification 🖻	(Wio link 1	
mag.payload		\sim	

Figure 4: Example of how the copy-pasted code should look in node red

With the setup completed, the user should have node red installed and have flow 1 active on their computer.

Linking the Wio link to Node-red

So far, the wio link is set up, and Node-red has all the required libraries to work. The next step is establishing a link between the board and the computer.

1. Login to your seeed account and copy paste the token for wio v1 https://wio.seeed.io/login

- 2. On the flow, select the node named *Wio link 1*
- 3. Click the icon under edit, this will bring you to another screen

- 4. Ensure the server is *us.wio.seeed.io*
- 5. Paste the token from your seed account
- 6. A node should now appear at the node area in *Wio link 1*

Adding new grove modules

Wio link supports many different grove modules and the prototype is able to use many of them. To add a new grove module to the prototype, you need to add it on the wio link and in node-red

- 1. Adding the grove module to Wio link
 - a. Using the phone application, select which port you want to connect the grove module to
 - b. Click on the desired module
 - c. Click Update Firmware
- 2. Adding the grove module to Node-red
 - a. Use this link to ensure the wanted module is compatible with Node-red.linked is all the compatible nodes as well as what each function does

https://flows.nodered.org/node/node-red-contrib-wio-seeed

- b. Add the corresponding node into the flow
- c. Make sure to properly define the node (link to correct board and make it perform the correct function
- 3. Adding the module to the user interface
 - a. Launch localhost1880
 - b. Add a button node from the dashboard section
 - c. Configure the node to the wanted group
 - d. Rename the button

From here, the user can modify the flow however they want to so it can perform the wanted function.

All files concerning the project can be found at the makerrepo link:

https://makerepo.com/jredm082/gng2101-wio-link-user-interface

Troubleshooting

For this prototype, there are two main issues that can prevail.

1. The grove modules do not work

The best way to see if the grove modules work or not would be to plug them into an arduino or a microcontroller and create a simple circuit. From there download an example code into the arduino and run it. If the circuit is not working properly, then you should replace or fix the wanted grove module

2. There was an issue linking the board to the computer

First use the Wio link app to check that the Wio link is online and running. If you click the blue *View API* button and scroll down, the last option will be called websocket. Click Connect, if the board connects it is not the problem. If the board did not connect, make sure it is active and/or reset the board.

[3] DISCONN	ECTED
[2] RECV: {"er	ror": "node is offline"}
[1] SENT: 3bd	36617303fb58c8ef73119ed9140e7
[0] CONNECT	ED

Figure 5: Screenshot from phone application of faulty connection to Wio link

If the board as well as the grove modules are working, the issue most likely is the node *Wio link 1* from Node-red. To fix a poor connection, go to the nodes configuration tab, make sure the server is correct and most importantly make sure the token pasted is the one corresponding to the user's seeed account.

Conclusion

Given the various technologies implemented into this prototype, a lesson learned was to focus on a single key feature. This allowed for timely completion of the final prototype. Two avenues

present themselves in this regard TV control and TV volume control. These key features will afford additional freedom to the patient improving the end user experience.

The other learnt lesson involves the choice of board. The prototype uses non mainstream software. The Wio link works well however, when prototyping issues showed up, it was difficult to find information on how to troubleshoot it. Limiting thus the scope of future projects since the prototype is essentially limited to the Wio link and Node-red compatible modules. It is recommended that the Wio link is switched with a Raspberry pi, these boards are also compatible with node-red and are much more commonly used.

Future recommendations

Avenues for future work include additional Grove input device compatibility and additional User interface features. For example, using a motion sensor to change the television channel. Additional grove input device compatibility will allow for more seamless integration into hospitals currently using different grove devices.

Bibliography

Campbell, S. C. (n.d.). 5V relay terminal and pins [Photograph]. Circuitbasics.Com. https://www.circuitbasics.com/setting-up-a-5v-relay-on-the-arduino/ node-red-contrib-wio-seeed. (n.d.). Flow.Node Red.Org. Retrieved December 3, 2020, from https://flows.nodered.org/node/node-red-contrib-wio-seeed node-red-dashboard. (n.d.). Flows.Nodered.Org. Retrieved December 3, 2020, from https://flows.nodered.org/node/node-red-dashboard https://flows.nodered.org/node/node-red-dashboard

Appendix A

Node-red code

[{"id":"8aa573c.f6d509","type":"tab","label":"Flow

1","disabled":false,"info":""},{"id":"d6ecdf70.747b2","type":"ui_button","z":"8aa573c.f6d509 ","name":"","group":"4906d91.97d6128","order":1,"width":0,"height":0,"passthru":false,"label ":"Proximity sensor","tooltip":"","color":"","bgcolor":"Green","icon":"","payload":"Proximity Sensor

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58","type":"debug","z":"8aa573c.f6d509","name":"","active":true,"tosidebar":true,"console":fa lse,"tostatus":false,"complete":"false","statusVal":"","statusType":"auto","x":430,"y":600,"wir es":[]},{"id":"d24e9c40.0e7d4","type":"ui_text","z":"8aa573c.f6d509","group":"4906d91.97d 6128","order":3,"width":0,"height":0,"name":"","label":"Information","format":"{{msg.payloa d}}","layout":"row-spread","x":430,"y":380,"wires":[]},{"id":"7c9ce35.3918f1c","type":"ui_a udio","z":"8aa573c.f6d509","name":"","group":"4906d91.97d6128","voice":"Google US English","always":"","x":440,"y":300,"wires":[]},{"id":"e9068b8.6420a78","type":"ui_toast"," z":"8aa573c.f6d509","position":"top

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"width":8,"height":1,"passthru":false,"label":" Technical

Help", "tooltip":"", "color":"", "bgcolor":"Dark Blue", "icon":"fa-user", "payload":"Calling for technical

help","payloadType":"str","topic":"","x":780,"y":100,"wires":[["a7e02cd2.09b79","60fcb6c6.a 07148","68b985bd.fe4b9c"]]},{"id":"a7e02cd2.09b79","type":"ui_toast","z":"8aa573c.f6d509 ","position":"top

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Appendix B

Bill of materials

Part #	Part Name	Description	Qty	Units	Picture	Unit Cost	Cost
1	Wio Link	ESP8266 based open-source Wi-Fi development board to create IoT applications by virtualizing plug and play modules to restful APIs with mobile APPs.	1	55mm x48mm x6.5mm	a trans	\$14.00	\$14.00
2	GroveButton	Button module compatible with Wio Link	1	20mm x20mm x20mm		\$1.90	\$1.90
3	GroveRelay	Relay module compatible with Wio Link	1	42mm x24mm x18.5mm		\$2.90	\$2.90
Total		3				\$25.71	

Note: Shipping from the seeed website cost 6.91\$