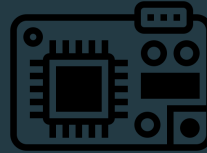


# Wio Link For SVH

Group E24's Solution For Saint Vincent Hospital





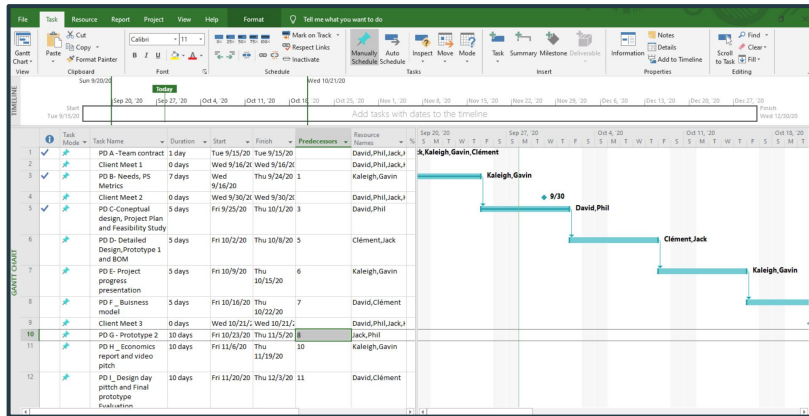
# Team Dynamics & Project Plan

# Task Delegation & Team Management

- 2 people per deliverable
- Rotation of responsibilities
- Product work shared
- Weekly meetings
- Recap meetings
- Asking for help
- Methods of communication



# Plan



- Deliverables Rotate Responsibility
- Some group members always head specific tasks
- Get group feedback before submission



What Is The Problem?

# First Meeting

## Wio Link User Interface

St-Vincent Hospital

**Client's level of interest:** Moderate

**Possible technologies involved:** Programming,

**Project type:** General.

**Expected cost of the project:** \$50 or less

**Expected time to completion:** Design day date\*\*

### Client:

**Client Name:** Bocar N'diaye.

**Client Interaction:** Direct (face to face virtually).

**Client Background:** Bocar N'diaye is a technologist at SVH (Saint-Vincent Hospital) in Ottawa. He has been creating and modifying accessibility devices to fit needs of the patients for many years. Mr. N'diaye is an experienced professional with a deep understanding of issues patients are facing at SVH.

### Project background:

Wio Link ([https://wiki.seeedstudio.com/Wio\\_Link/](https://wiki.seeedstudio.com/Wio_Link/)) is a microcontroller that can host many sensors that are used for assistive devices. Since every patient is different, various combinations of devices and user interfaces are needed. To make these customizations for each patient, a nurse, occupational therapist or other aid needs to be able to easily understand and use the platform. The Node-RED dashboard (<https://nodered.org/>) has been identified as a good potential solution since it is a visual browser based editor and some Wio modules have already been implemented in Node-RED (<https://flows.nodered.org/node/node-red-contrib-wio-seeed>). Your task is to continue and improve the work on this dashboard to make an easily attainable user interface for the Wio Link for its uses at SVH.

### Past experience / attempts:

There has been no previous attempt to solve this problem.



- What problem do you wish to address with this project?
- What technologies do you want this project to work with?
- Who will use this device? Who will use it more frequently?
- What are your long-term goals with this project?
- What are your fears about this project?
- What do you like best about your current system?
- How would you describe an ideal User interface for Saint-Vincent Hospital?
- What have you heard from your colleagues about this technology?
- What frustrations have you experienced working with user interfaces in the past?
- In what way(s) do you feel this project will help Saint-Vincent Hospital?
- What do you think we should keep in mind when developing this user interface?
- What questions do you have for us?

# Client Meet 1

*~ Bocar N'diaye ~*

*"The patients have their own accessibility devices, we want them to work with technologies in our hospital"*

*"I want a user friendly Dashboard to help build these solutions"*

*"I want the product to be accessible for people with disabilities (physical, visual, cognitive,etc)"*

*"[The patients] devices can work using the internet of things concept"*

*"I Prefer to use open source low cost devices for people with disabilities"*

# Empathization

- What does it feel like to be the medical staff? How about the patients?
- What would I want to do with my device if I had mobility issues?
- What kind of illnesses do the patients have?
- What would improve the quality of life of these patients?



# Problem Statement

**St. Vincent hospital has expressed a need for an accessible, user friendly system that enables patients with disabilities to communicate with medical staff and interact with the technologies in their environment using their everyday devices.**



# Problem Refinement Loop

# Benchmarking

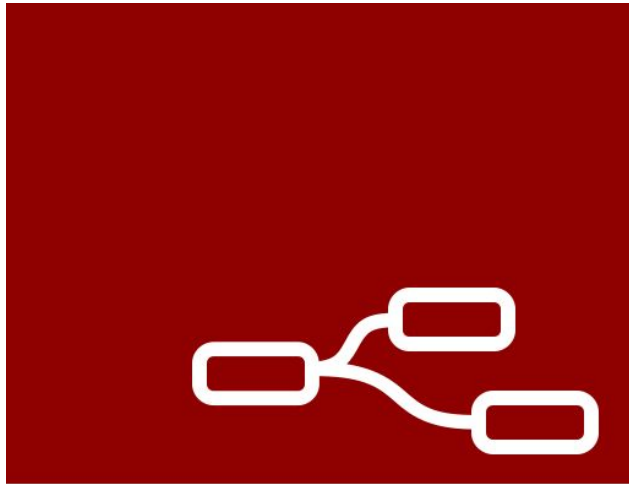
[1] A. Karmel, A. Sharma, M. Pandya, and D. Garg, “IoT based Assistive Device for Deaf, Dumb and Blind People,” *Procedia Computer Science*, vol. 165, pp. 259–269, 2019.

[2] S. M, J. Joy, A. Kuriakose, B. M. B, A. K. Babu, and M. Kunjumon, “VIZIYON: Assistive handheld device for visually challenged,” *Procedia Computer Science*, vol. 171, pp. 2486–2492, 2020.

[3] “IOT based system for person with physical disability,” *Ijireeice*, vol. 4, no. 2, pp. 157–160, 2016.

Metric #	Need #	Metric	Imp	Units	VIZIYON	Procedia Device	Xbee Module
1	5	Cost	3	\$	N/A	“Low”	Low
2	1,8	Connection to wifi	2	Mbps	--	--	Yes, no value given
3	1,9	Connection to Bluetooth	2	RSSI	--	--	no
4	2	Tv Remote	4	cm <sup>-1</sup>	--	--	--
5	10	User Feedback	4	Satisfaction grade (1-10)	10	8	N/A
6	3,4	Ease of Use	5	ISO 9241-11 standard	9	9	N/A
7	7	Aesthetics	3	subj	Appealing	Appealing	Poor
8	15, 14	Customizability	4	# of input/output pairings possible	0	1	12
9	13	Instil Confidence	4	subj	Yes	Yes	N/A
10	6	External materials	3	#of materials	0	1	0-1
11	12,11	Device Compatibility	4	# of compatible devices	0	~3	~4

Research



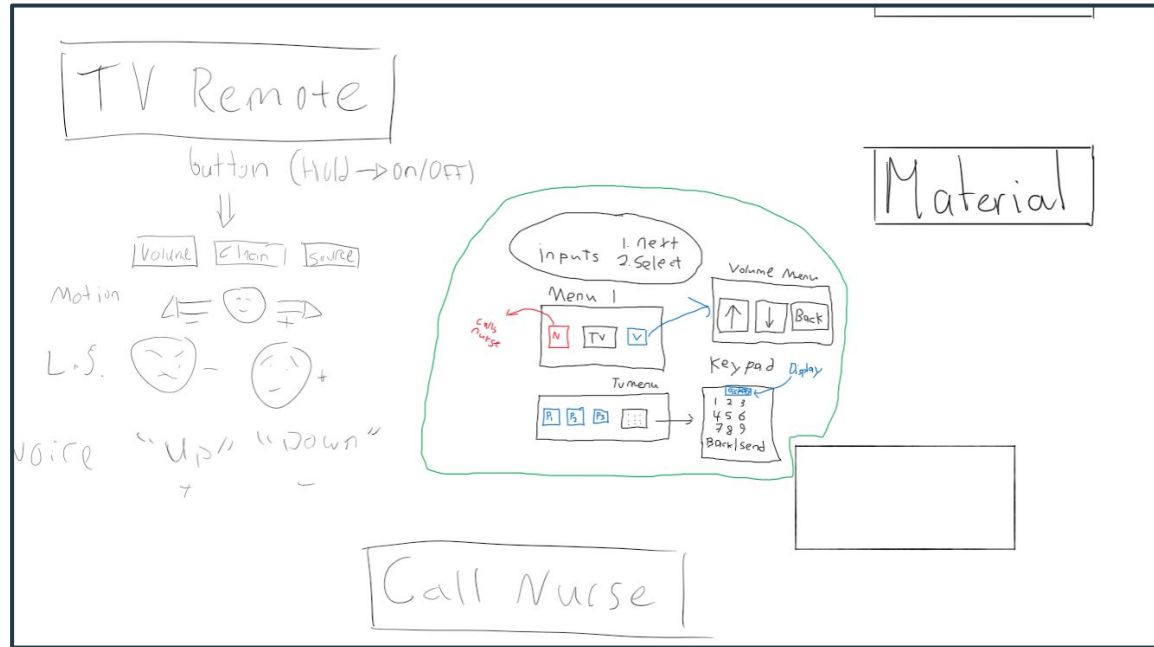
**Node-RED**



WIO LINK



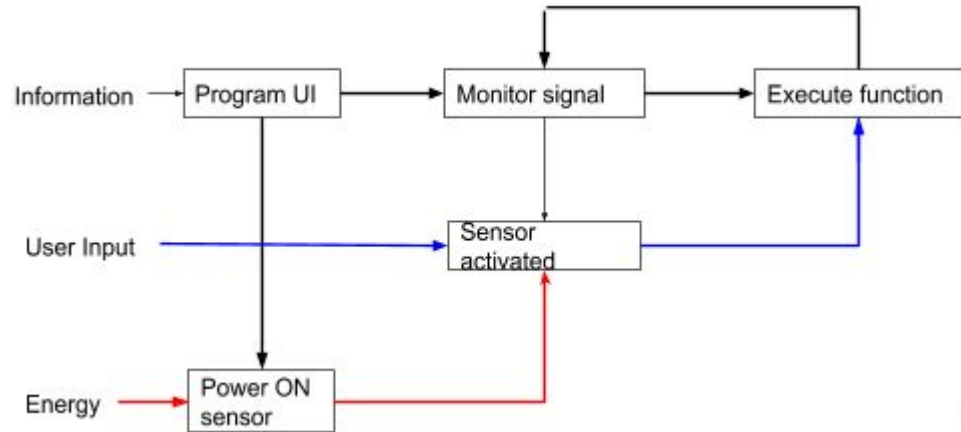
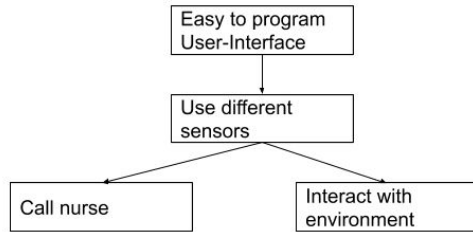
# Ideas





# Concept Generation

# Functional Decomposition



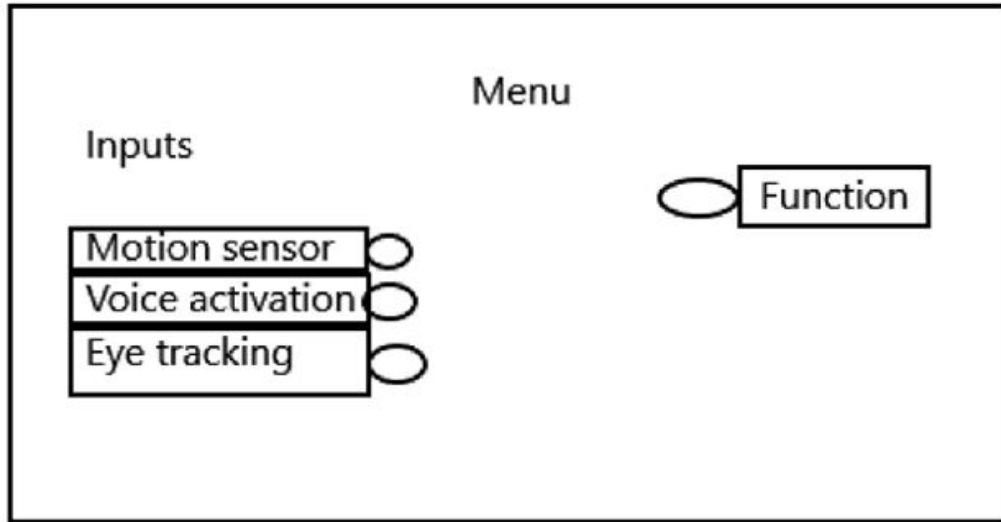
# Concept Evaluation

Target specification	Weight	Concept options								
		David			Jack			Gavin		
		C1	C2	C3	C1	C2	C3	C1	C2	C3
Cost	0.1	10	1	10	7	5	3	10	5	5
Connection to wifi	0.07	10	10	10	10	1	7	10	10	1
Connection to Bluetooth	0.07	10	10	10	10	1	7	10	10	1
Ease of Use (Patient)	0.2	4	7	10	3	3	3	7	4	4
Ease of Use (Nurse)	0.2	10	10	3	10	5	6	8	10	10
Aesthetics	0.05	3	7	2	2	1	2	5	5	4
Customizability	0.1	2	1	1	7	1	10	10	6	3
Instil Confidence	0.1	5	8	3	4	3	6	6	6	5
External materials	0.01	10	10	10	5	1	1	10	10	5
Device Compatibility	0.1	10	5	10	1	1	2	10	10	1
Score		7.15	6.75	6.60	6.05	2.80	4.99	8.35	7.25	4.59

Target specification	Weight	Concept options								
		Philippe			Kaleigh			Clément		
		C1	C2	C3	C1	C2	C3	C1	C2	C3
Cost	0.1	10	1	5	10	3	4	2	1	3
Connection to wifi	0.07	10	10	1	10	1	1	1	10	5
Connection to Bluetooth	0.07	10	10	10	10	10	1	1	10	5
Ease of Use (Patient)	0.2	7	7	5	5	10	10	5	6	7
Ease of Use (Nurse)	0.2	8	10	10	7	5	6	5	2	7
Aesthetics	0.05	5	7	5	5	7	7	6	4	7
Customizability	0.1	10	1	1	1	2	1	1	3	4
Instil Confidence	0.1	6	8	8	8	5	6	6	6	9
External materials	0.01	10	10	4	4	5	5	4	1	2
Device Compatibility	0.1	10	5	1	1	1	1	1	1	1
Score		8.35	6.75	5.56	6.09	5.27	4.94	3.48	4.31	5.57



# Final Concept



- Digital UI for Nurses
- Customizability between patients depending on physical ability

# Feasibility Study

## **Technical**

- Node-RED

## **Economic**

- Budget

## **Legal**

- Node-RED
- Wio Link Compatibility Module

## **Organizational Constraints**

- Inability to Meet in Person

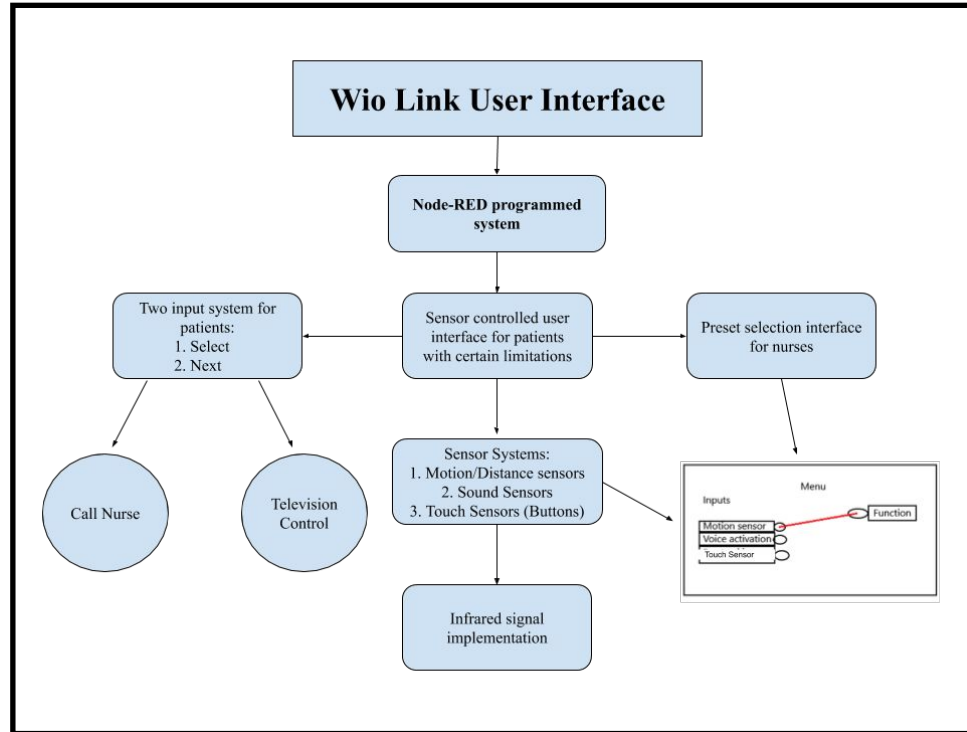
## **Schedule**

- Rotating Pair of Coordinators

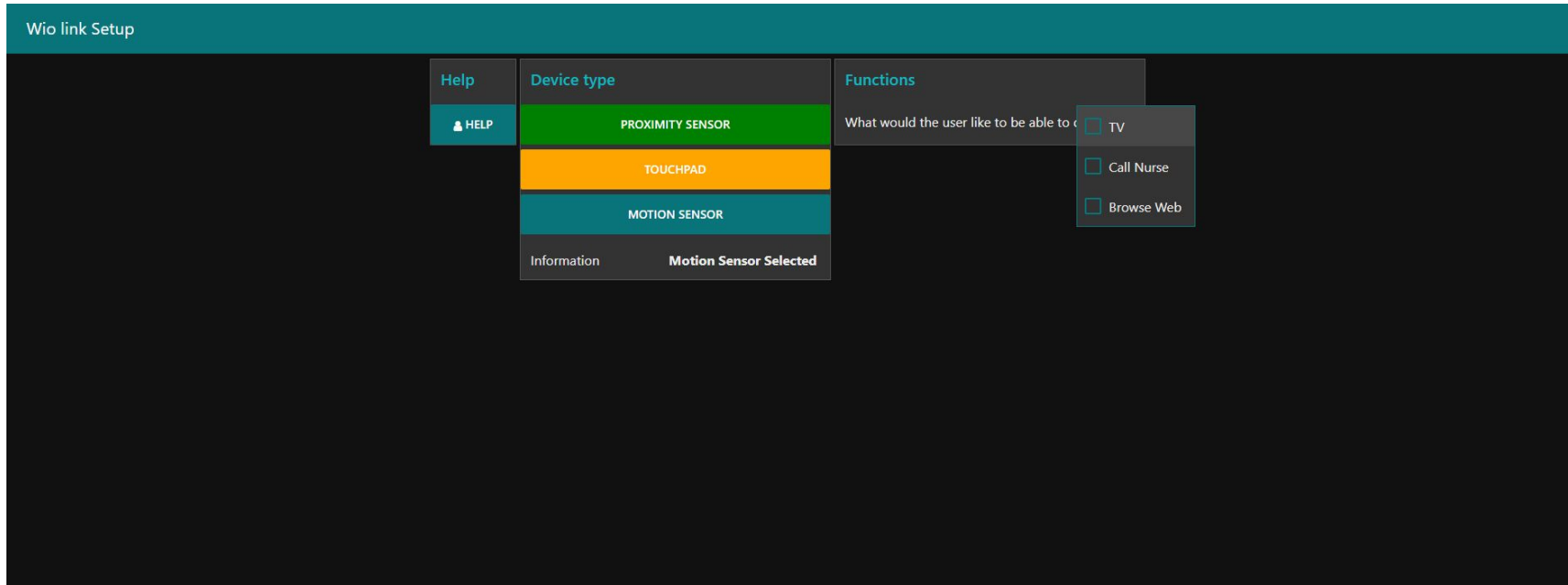


# Prototyping

# Detailed Design








# Prototype 1



<https://youtu.be/lxSr-98eg0o>

# Bill of materials

Part #	Part Name	Description	Qty	Units	Picture	Unit Cost	Cost
1	Wio Link	<ul style="list-style-type: none"> <li>- Wio Link is designed to simplify your IoT development.</li> <li>- ESP8266 based open-source Wi-Fi development board to create IoT applications by virtualizing plug and play modules to restful APIs with mobile APPs.</li> </ul>	1	55mm x 48mm x 6.5mm		\$14.00	\$14.00
2	Button	<ul style="list-style-type: none"> <li>- Standard 12mm square momentary button.</li> <li>- Great for user input on a PCB.</li> <li>- Breadboard friendly.</li> <li>- RoHS Compliant.</li> </ul>	1	12mm x 12mm x 12mm		\$0.67	\$0.67
3	Touch Sensor	<ul style="list-style-type: none"> <li>- Force sensing resistor.</li> <li>- Analog output.</li> </ul>	1	N/A		\$11.17	\$11.17
4	IR Receiver	<ul style="list-style-type: none"> <li>- Miniaturized IR receiver modules for infrared remote control systems.</li> <li>- A PIN diode and a preamplifier are assembled on a lead frame</li> </ul>	2	N/A		\$1.78	\$3.56
5	IR Sender	<ul style="list-style-type: none"> <li>- IR emitter (950 nm, 150 mA Radial)</li> </ul>	2	N/A		\$0.84	\$1.68
Total			7	(Links included in references at the end)			\$31.08



# Reflection

# Project Plan

- Keeping up with our original plan
- High variation in responsibility
- Good quality of work



# Client Feedback

- Narrow Our Focus → Call nurse button is a priority
- Create a Simple Proof of Concept Prototype
- Likes the UI for nurses idea
- Wants to see the concept work



Next Steps

# Future Prototypes

- Prove Connectability Between Devices and UI
- Show Different Inputs Possible
- Show Ability to Change Between Inputs and Outputs
- Show the Client
- Have a Working Call Nurse Function
- Improve Usability

# Future Prototypes

- Prove Connectability Between Devices and UI
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Thank You

# Links

Wio Link:

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

Button:

[https://www.robotshop.com/ca/en/sfe-12mm-push-button-switch.html?utm\\_source=google&utm\\_medium=surfaces&utm\\_campaign=surfaces\\_across\\_google\\_caen&gclid=CjwKCAjwiOv7BRBREiwAXHbv3GmlQlqbCgopWG9Ahqm4AYRp-kRKiMbtw\\_vospYEHUufAxPft4T0UBoCTawQAvD\\_BwE](https://www.robotshop.com/ca/en/sfe-12mm-push-button-switch.html?utm_source=google&utm_medium=surfaces&utm_campaign=surfaces_across_google_caen&gclid=CjwKCAjwiOv7BRBREiwAXHbv3GmlQlqbCgopWG9Ahqm4AYRp-kRKiMbtw_vospYEHUufAxPft4T0UBoCTawQAvD_BwE)

Touch Sensor:

[https://www.digikev.ca/en/products/detail/ohmite/FSR06BE/10127623?utm\\_adgroup=Touch%20Sensors&utm\\_source=google&utm\\_medium=cpc&utm\\_campaign=Shopping\\_Product\\_Sensors%2C%20Transducers\\_NEW&utm\\_term=&productid=10127623&gclid=CjwKCAjwiOv7BRBREiwAXHbv3HADc3svJhaM9Wx3hILPrfWKdd4Ev-0Mb1pieOTiNvFOTv\\_L-ThUuBoCF8cOAvD\\_BwE](https://www.digikev.ca/en/products/detail/ohmite/FSR06BE/10127623?utm_adgroup=Touch%20Sensors&utm_source=google&utm_medium=cpc&utm_campaign=Shopping_Product_Sensors%2C%20Transducers_NEW&utm_term=&productid=10127623&gclid=CjwKCAjwiOv7BRBREiwAXHbv3HADc3svJhaM9Wx3hILPrfWKdd4Ev-0Mb1pieOTiNvFOTv_L-ThUuBoCF8cOAvD_BwE)

IR Receiver:

[https://canada.newark.com/vishay/tsop4838/ir-receiver-45m-950nm-sip/dp/60K6999?gclid=CjwKCAjwiOv7BRBREiwAXHbv3NMfdpxMrOO9UVAaq6i7x1mbw14ghuZACai42BUji6Lp3NUOnHq32hoC5LoOAvD\\_BwE&mckv=srVDYqAk0\\_dclperid/462047784706/plid/keywordmatch/slid/product/60K6999/pgrid/114068673771/ptaid/pla-947807530042/&CMP=KNC-GCA-GEN-Shopping-VervLow-Optoelectronics](https://canada.newark.com/vishay/tsop4838/ir-receiver-45m-950nm-sip/dp/60K6999?gclid=CjwKCAjwiOv7BRBREiwAXHbv3NMfdpxMrOO9UVAaq6i7x1mbw14ghuZACai42BUji6Lp3NUOnHq32hoC5LoOAvD_BwE&mckv=srVDYqAk0_dclperid/462047784706/plid/keywordmatch/slid/product/60K6999/pgrid/114068673771/ptaid/pla-947807530042/&CMP=KNC-GCA-GEN-Shopping-VervLow-Optoelectronics)

IR Sender:

[https://www.digikev.ca/en/products/detail/vishay-semiconductor-opto-division/TSUS5202/4073538?utm\\_adgroup=Infrared%2C%20UV%2C%20Visible%20Emitters&utm\\_source=google&utm\\_medium=cpc&utm\\_campaign=Shopping\\_Product\\_Optoelectronics\\_NEW&utm\\_term=&productid=4073538&gclid=CjwKCAjwq\\_D7BRADEiwAVMDdHoYcO5dOyCvMPuDmYcvUItDTZJUi7OjVHR3j-BsypfYZ1agiKPoVhoChoQQAvD\\_BwE](https://www.digikev.ca/en/products/detail/vishay-semiconductor-opto-division/TSUS5202/4073538?utm_adgroup=Infrared%2C%20UV%2C%20Visible%20Emitters&utm_source=google&utm_medium=cpc&utm_campaign=Shopping_Product_Optoelectronics_NEW&utm_term=&productid=4073538&gclid=CjwKCAjwq_D7BRADEiwAVMDdHoYcO5dOyCvMPuDmYcvUItDTZJUi7OjVHR3j-BsypfYZ1agiKPoVhoChoQQAvD_BwE)