# Gyropalm VIMPAACT

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### **Customer Background**

GyroPalm is a universal remote for your wrist. The company is dedicated to the research, development, and manufacturing of the patented wearable gesture control. With the power of their wearable technology combined with open-source software such as ROS you are able to have dynamic control of any and all IOT devices.

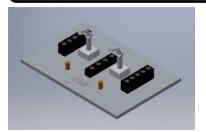
# Problem Statement / Scope of Work

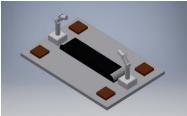
To complete this project, a problem related to sorting or handling will be addressed using a robotic arm powered on Robot Operating System (ROS) and the GyroPalm. A specific issue that has a significant impact on fulfillment, logistics, or other Pharmaceutical adjacent industries paired with a high return on investment will be selected. The advancement will integrate the technology of the GyroPalm with a 5 or 6-axis robotic arm. In addition, this robot arm will be a pivotal part of a larger assembly line. The end customer will be pharmacists, researchers, or production line workers who will integrate the robot arm assembly into their workflow for high efficiency. The user of the technology will be able to perform actions hands-

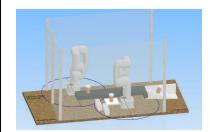
#### Requirements

teq. N	DESIGN REQUIREMENTS	DESCRIPTION	VALIDATION
	Completion Time	Project must be completed within 32 weeks.	Project Schedule
	The course and therefore project will last for 32 weeks .		
	Power	Device must be wall powered (120 VAC 60 Hz).	Power test
	The device will be operating on a conveyance		
	system that will require no downtime for recharging.		
	ROS controlled system	The robot will be operating on ROS.	Testing
	ROS is a popular open-source system with		
	compatibility and support for many robotics platforms.		
	Use the Intel Realsense Vision Kit.	The robot will need to recognize	Testing
	The Intel Realsense system is a popular	objects that are being sorted.	
	and effective solution for machine vision and object detection.		
	Use the GyroPalm API to communicate with the GyroPalm server.	GyroPalm has a cloud-based API to allow for	Testing
	A long-term goal of the project is to integrate with	communication between wearables and external hardware.	
	GyroPalm wearables for adaptive, gesture-based control.		
	The robot must be able to lift a minimum of 200g.	Robot must be able to lift a pill bottle.	Testing
	An example use case for the robot was in the pharma tech		
	industry, so it is important to be able to support the		
	weight of common items in that space.		
	Gripper must open to a minimum 40mm.	The gripper must be capable of	Measurement
	An example use case for the robot was in the pharma tech	holding objects such as pill bottles.	
	industry, so it is important that the robot will		
	be able to grasp a pill bottle.		
	Must have 5 degrees of freedom (DOF).	The robot must be capable of	Analysis
	The exact use case for the robot is not yet known, so it	interacting with a desktop sized work envelope.	
	is important to have a versatile system capable		
	of performing many different tasks.		

#### **Experimentation and Concepts**









## Final Design





#### Failure Mode Effect Analysis

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#### **Testing**

			Robot Arm Functionality Test				
Step		Test	Details	Outcome			
	1	Robot Arm Movement	The purpose of this test is to determine if the robot arm	Pass			
			moves to specified location in an expected path.				
	2	Robot Arm Force Capacity	The purpose of this test is to see whether the servo motor of				
			the robot arms is effective enough to support the amount of				
			force that is expected to be held by each bottle as one of the				
			missions of the whole assembly line.				
	3	Robot Arm Collaboration	The purpose of the test is to see whether the two robot arms	Pass			
			of the system can work together to complete the task.				
			Vision System Test				
	4	Cluster and Color Recognition	The purpose of the test is to see whether the Trossen arm	Pass			
			can work properly using the vision system to determine the				
			desired location and color of the cluster to be sorted.				
		Measu	rement/Performance Component Test				
	5	Conveyor Belt Functionality	The purpose of this test is to see whether the conveyer belt	Pass			
			is working and running at the proper speed.				
	6	Load Cell Test	The purpose of the load cell test is to see whether the load	Pass			
			cell can read the correct value place on the scale and output				
			the value to the Pi.				
	7	Thermal Camera Test	The purpose of the test is to see whether the thermal camera	Pass			
			will correctly recognize temperature.				
	8	Emergency Stop Test	The purpose of the test is to see whether the emergency stop	Pass			
			functions properly and can shut down the entire assembly				
			line when the button is pressed.				