

## Case Study Title:

# Wireless Hand Gesture Data Acquisition through Wearable Device and Microcontroller

## Problem Background

Many parts of modern-day society rely on automation, both in the name of convenience, but also safety. Be it in the industry, agriculture or laboratory work, the role of technology has become rather significant and, in some cases, even vital. New devices have been invented to ensure the absence of accidents and provide new ways of interaction in workplaces. With many schools nowadays offering hands-on approaches to various applications found in the aforementioned sectors, it would be interesting to provide students with the necessary tools and guidance to come up with their own ideas and designs in order to solve said problems.

## STEM Topics Involved



**Physics**



**Maths**



**Biology**



**Chemistry**



**Technology**



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## Pedagogic Methods Suggested



**Lecture**



**Problem Based Learning**



**Inquiry Based Learning**



**Project Based Learning**



**Direct Instruction**



**Collaborative Based Learning**



**Game Based Learning**



**Story Telling**



**Peer Instruction**



**Simulation**



**Role Playing**



**Debate**



**Flipped Classroom Approach**

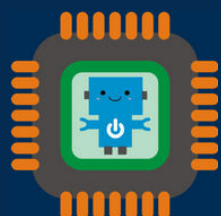
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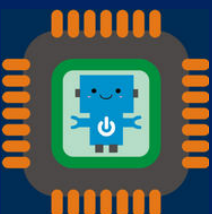
## Solution

The idea surrounding this specific case study is built upon the need to operate devices from a distance. In order to achieve that in a more natural way, the proposal involves tracking the motion and gestures of the human hand, through sensors attached to a wearable piece of clothing (i.e. a glove). The wearable will feature an Accelerometer to record general hand movement, as well as Flex Sensors (one for each finger and another for the wrist) to monitor individual states. The motion signals gathered by the sensors will be transferred to the Arduino microcontroller through RF transmission. There, the raw data will be collected for future usage in various applications such as Remote Control or VR Representations.

The proposed idea in its entirety aims to get students to be involved in the design process, as well as participate in problem solving sessions. At the same time, it focuses on explaining to them the need for innovation and cautiousness in a work environment, and allows them to deliver an end result that will actually be useful to a vast range of activities around school.

## Equipment & Materials Required

- Arduino board
- Arduino IDE software
- x6 Flex Sensors
- Accelerometer
- RF Module
- Breadboard, cables, jumpers, circuit components
- Hand tools (i.e. cable cutter)
- x1 Glove
- x1 Battery



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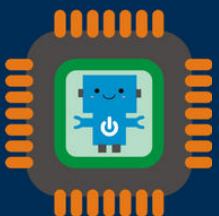
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## Assembly Instructions

1. Acquisition of the materials
2. Assembly of the Arduino unit
3. Preparation of the wearable device and its sensors
4. Coding of the device
5. Testing phase
6. Further discussion and proposals



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