* user requirement gathering

To get a better understanding of the process we visited a factory with a sorting process. Thery had automated conveyor belt that carries tea leaves with a burning process and sorting them into baskets. There is a camera vision machine that detects the not burned tea leaves and sorts them separately.

A large room with machinery

Description automatically generatedA warehouse with yellow crates

Description automatically generated with medium confidence

We discussed with supervisor and ICT manager of the company about components embedded in the machine. As we talked about safety procedures of the machine with an employee. After taking consideration, we discussed with local businesses and conveyor belt workers what should be included for an effective process of sorting. We mainly considered following topics,

1. A complete flow of the process

The industry owners are expecting to have a fully automated process after placing the objects on the conveyor belt till saving the object counts on the database. The process should be simple, and handling should be carried out by the worker in the workplace.

1. Editing the sorted data

As there can be machine’s defects about the sorted data, the worker should have the ability to change the sorted data after the sorting process.

1. A mechanism for emergency cases.

For an emergency case the sorting process should be paused until the problem is solved.

1. Increase the speed of the sorting process.

The speed of the sorting process should be changed according to the objects on the conveyor belt.

1. A method to save the sorted data.
2. A method to retrieve the sorted data at anytime and anywhere.
3. Assign a driver according to the corresponding number of items to transportation.
4. A method to retrieve the data from the website as a driver.

* test cases.

We mainly tested our problems and tested with the researchers.

1.Initialization Test Cases

- Make sure the Arduino initializes correctly and without any problems.  
- Verify that at starting, every sensor, actuator, and peripheral is initialized correctly.  
  
2. Calibration Test Cases

- Verify that the manual calibration process appropriately modifies sensor thresholds by testing it.  
If automatic calibration is used, make sure it successfully modifies settings according to the surroundings.  
  
3. Color Detection Test Cases

- Use the sensor to separately exhibit several colored items to gauge the accuracy of color detection.  
- Confirm that the system can differentiate between colors or shades that are similar.  
  
4. Sorting Test Cases

- Feed items of various colors through the system to test the correctness of the sorting mechanism.  
- Check that every item is placed in the appropriate bin based on its color.

- Check the sorting speed to make sure it can handle the necessary throughput.

5. Error Handling Test Cases

- Examine error detection systems, like malfunctioning sensors or sorting machine jams.

- Check how the system handles failures, such as when it displays error messages or safely stops working.

6. User Interface Test Cases

- Check for errors in buttons, displays, and GUI, among other user interface components.

-Check that it is simple to start, stop, and keep an eye on the sorting process.

-Examine user feedback systems to make sure the operator receives understandable and instructive input.

7. Integration Test Cases

- To guarantee smooth functioning, test integration if the system connects with other pieces of machinery (such as conveyor belts).

- Check that data is being sent between the Arduino and any relevant external systems.

8. Strong Test Cases:

-Try putting the system through some unexpected stress, like abrupt changes in lighting or foreign items in the sorting path, to see how resilient it is.

-Check to make sure the system can smoothly and error-free recover from unforeseen circumstances.

9.Test cases for performance:

-Run the system to maximum throughput for a prolonged amount of time to test its performance under load.

-Check to see if the system remains accurate and dependable even after extended use.

10.Test cases for safety:

Test safety features, such as the ability to stop an emergency or, if necessary, protective enclosures.

Make that the system is safe to use and does not endanger surrounding equipment or personnel.

11. Checking the maximum weight that can be transported on the conveyor belt.

A small blue boxes on a white surface

Description automatically generatedA white scale with a silver top

Description automatically generated with medium confidence

* Forms response chart. Question title: 03.How satisfied are you with the overall outcome of the project?
  . Number of responses: 3 responses.Reviews by 3rd parties

Forms response chart. Question title: 06. How satisfied are you with the functionality of the project?
. Number of responses: 3 responses.

Forms response chart. Question title: 04. How satisfied are you with the design of the project?
. Number of responses: 3 responses.



* References

1.Fig. 9 The connection setup of tomato sorting system (no date). https://www.researchgate.net/figure/The-Connection-Setup-of-Tomato-Sorting-System\_fig5\_361952613.