

# *Fruit Sorting Robot*

...to automate the process of fruit sorting

By,

**TEAM - 10**

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# **Problem Statement**

- To built a real time, user friendly system that will automate the process of sorting a perticular type of fruit based on its features such as size,color etc. & Reduce the human intervention required in this task.

# Requirements Specification

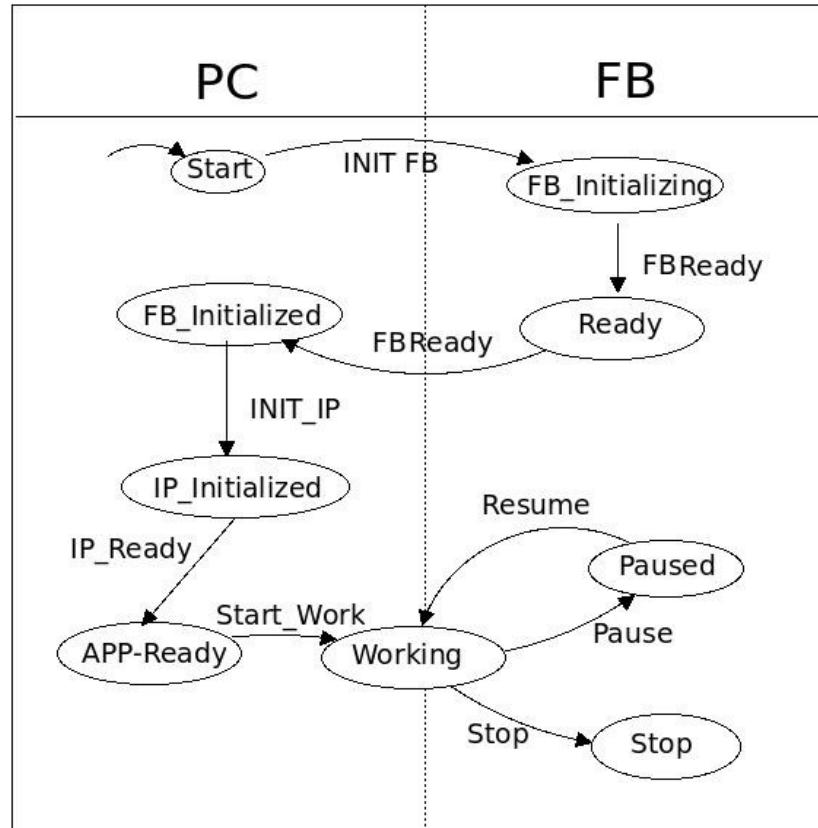
- A real time system to sort the fruits w/o human intervention.
- UI to take users choice as input e.g. no. of classes, characteristics on which to sort etc.
- Modularity in h/w & s/w; so 3 different modules those can be independently built & unit tested
  1. Dispensing module
  2. IP module
  3. Routing module
- Extensibility the same system can be used for different type of fruits, with some more features with some customized hardware so we have generalized hardware design.
- Portability

# Final system

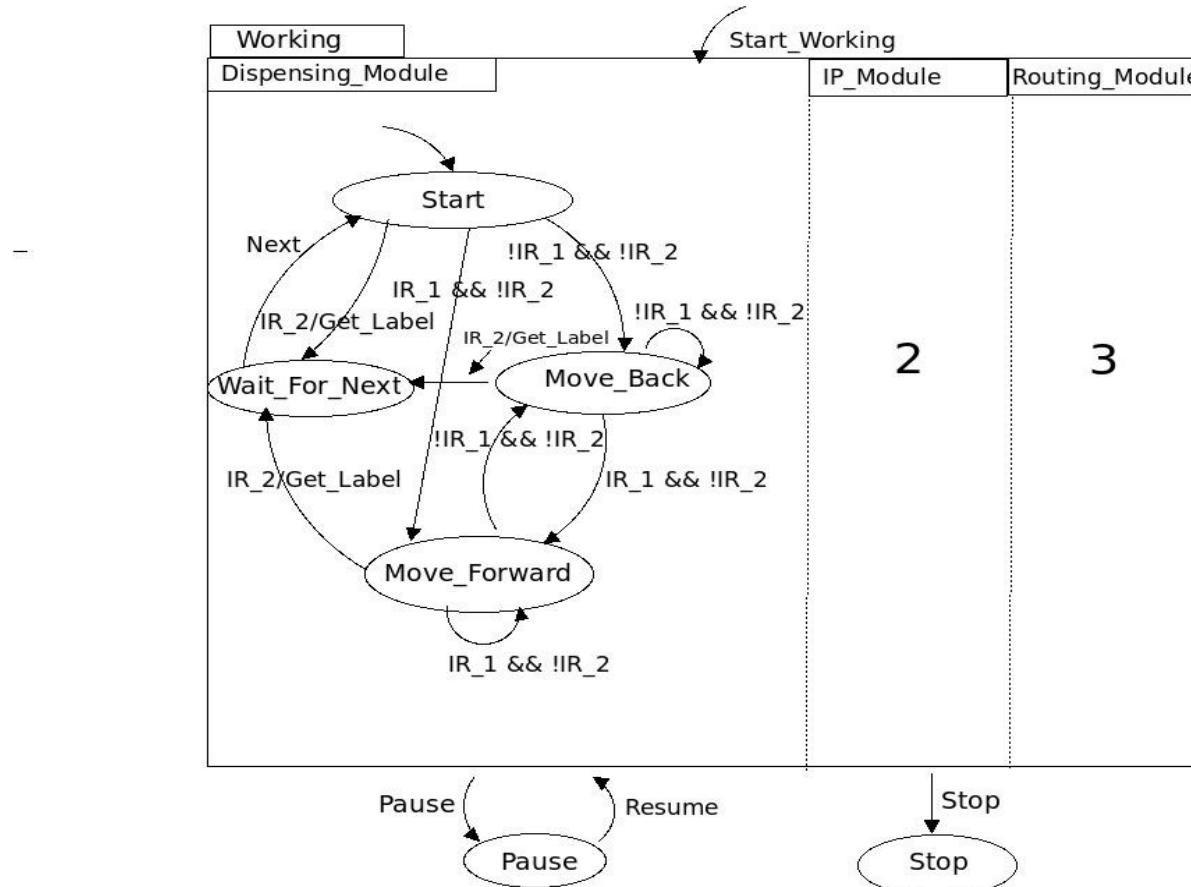
*what we had promised:*

- ✓ It should have a container to hold number of fruits, so that user can put a pile of fruits into it.
- ✓ It should Identify a fruit.
- ✓ It should extract the features of fruit as its size(small/medium/large) ,Its color etc using image processing
- ✓ It should classify the fruit based on its feature & route it to appropriate container based on its class
- ✓ Should have user friendly GUI which will accept users choices as type of fruit, no. Of classes etc., (But according to scope of our project, type of the fruit & number of classes will be fixed.We are aiming Lemons & to sort it into 3 classes small,medium, large). We are giving these choices in GUI taking into the consideration future extensions
- ✓ Three main different hardware & software modules which can be unit tested separately. Those are:
  1. Fruit dispensing module
  2. Image processing module
  3. Fruit routing module
- ✓ Extensible e.g. Libraries for different fruits

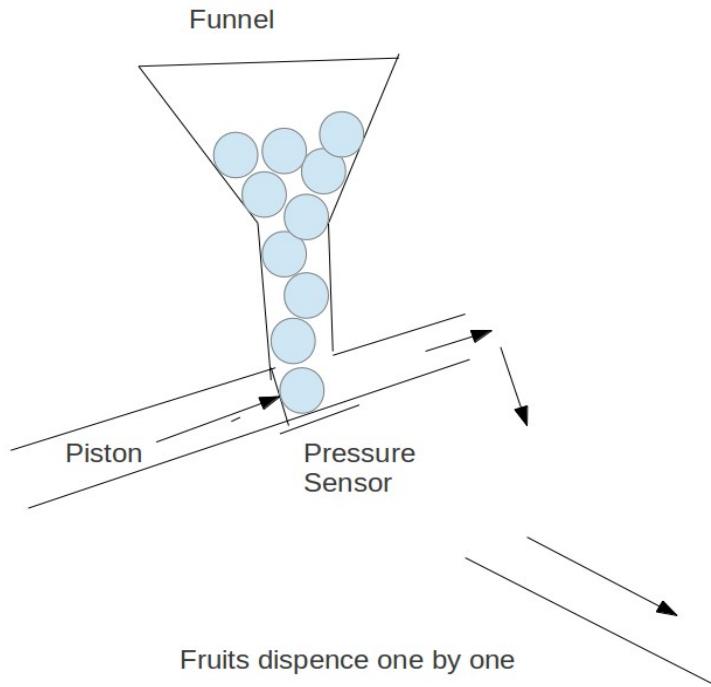
# State Diagramme for the whole system. (Bird eye view)



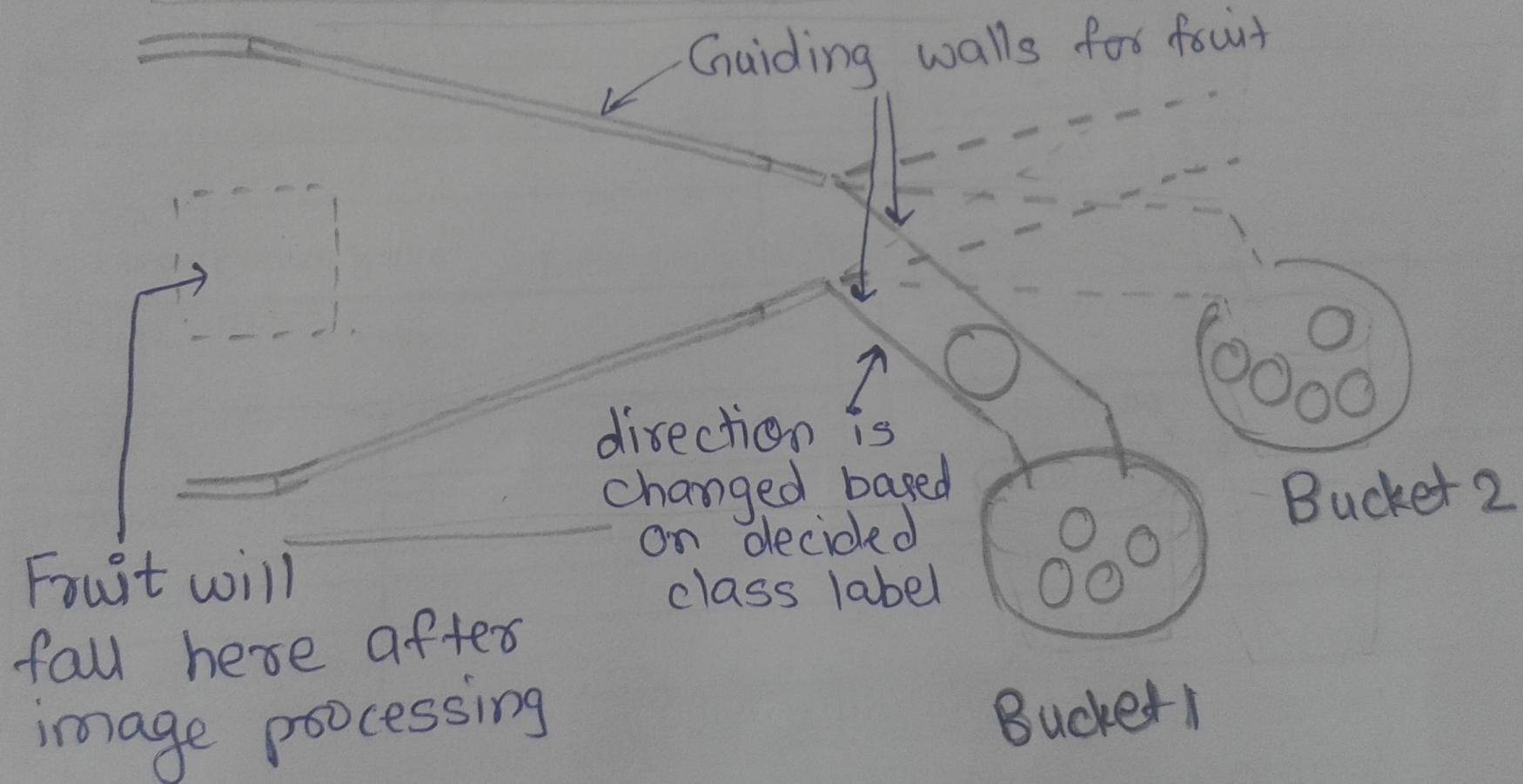
# Statechart diagram of the system

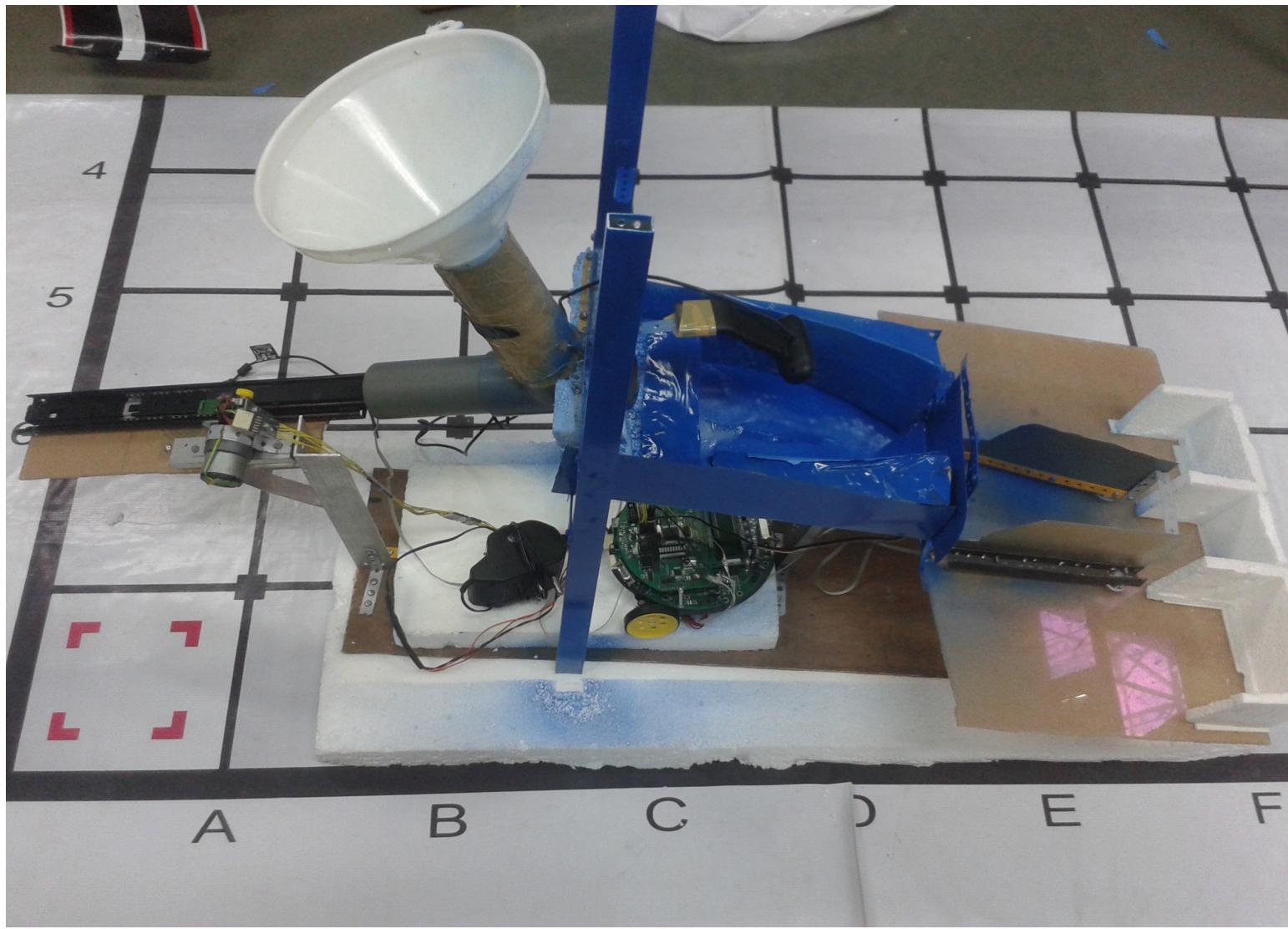


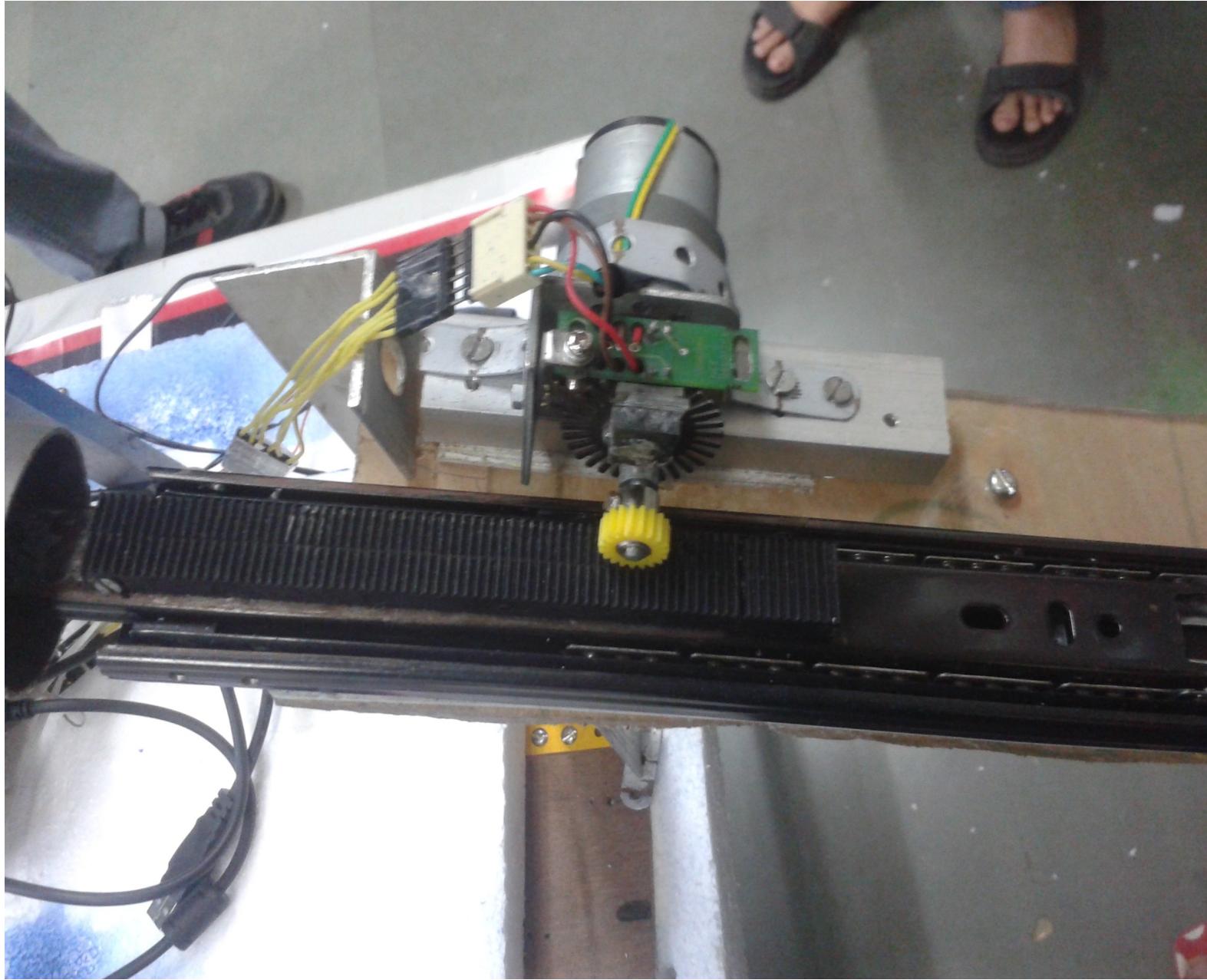
# Dispensing mechanism



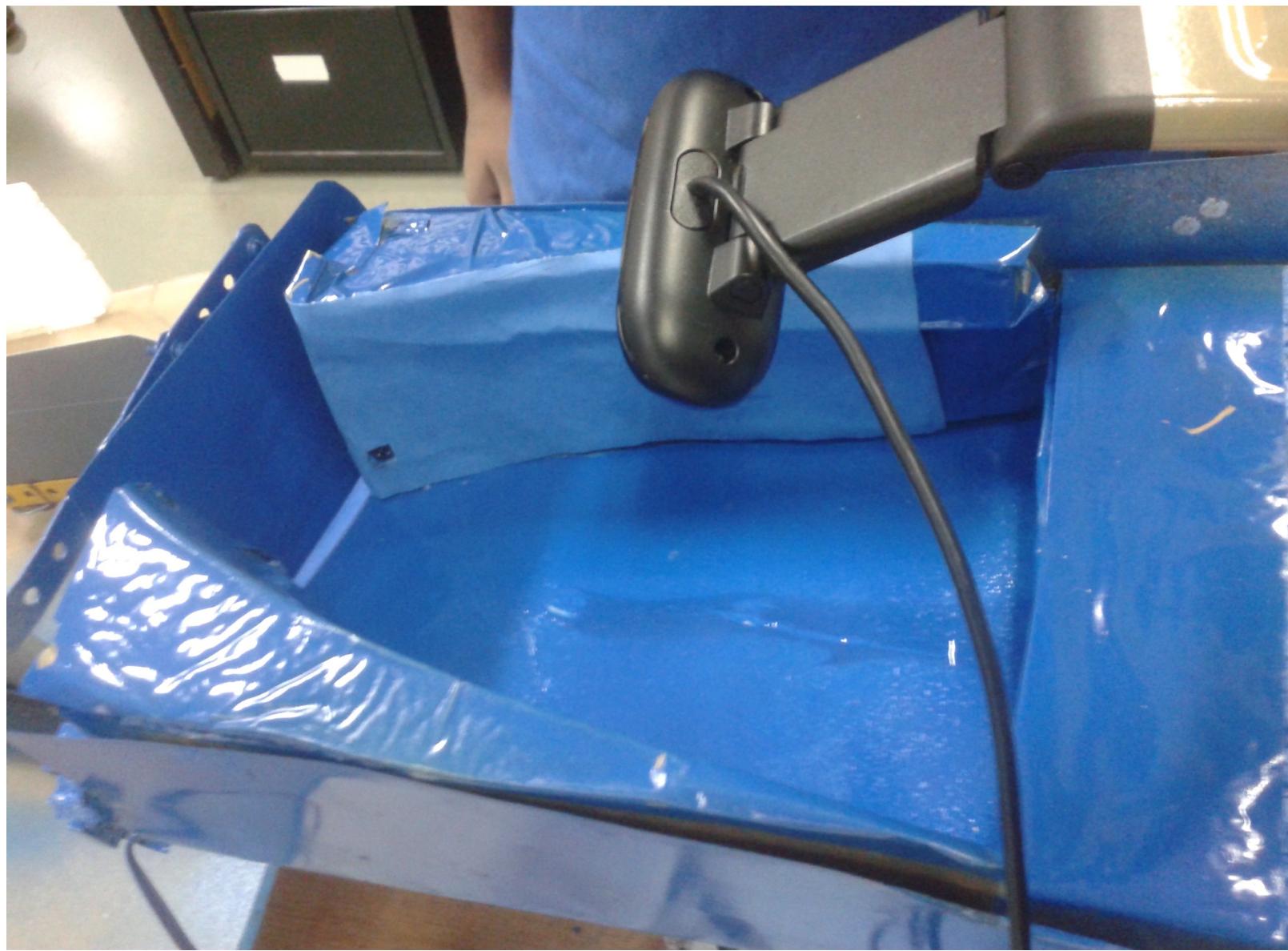
# Routing mechanism (top view)

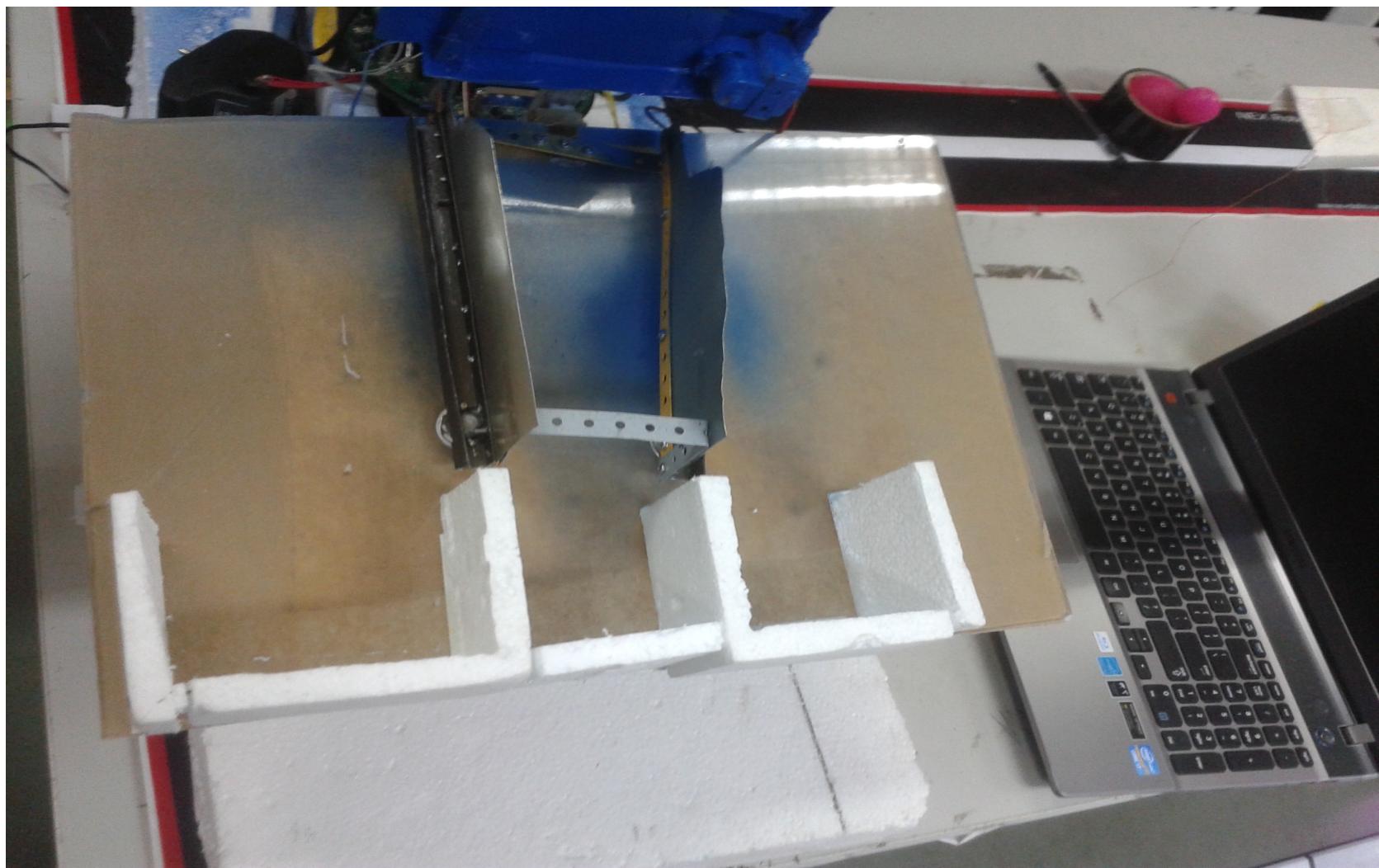












# Add On (surprise factor)

- We are sorting fruit & along with Confidence level displayed to the user
- System is capable of learning
- Scalable on the basis of attributes so attr can be extended e.g weight can be added
- Dynamic in terms of criteria for sorting user can change it & set via profile

# Insights gained

- Deterministic behavior of system is important in embedded system
- Modular design eases the pain
- Initial Prototyping plays an important role on understanding the system and hence helps in redesigning
- Quick Prototyping is important..(Thermocol has its own advantage for fast prototyping)
- Industrial Design Techniques are not meant to enhance the workload, they actually help in accurate modelling of the system.
- Understanding mechanical and electrical aspects of each component is essential (CRITICAL: This cuts down the development time drastically)
- Limitations in the system are not bad. But It should be known....

# Future work

- Power??
- Extending API
- 360 degree view of fruit
- Detecting Empty Container
- Provide web based operation
- Add extra features
- Fault fruit detection & performance improvement

*Thank You..!!!*



*Questions are most welcome :)*