

VEGETABLE SLICER FOR LARGE SCALE APPLICATIONS

PRESENTATION BY PANIMALAR
POLYTECHNIC COLLEGE

MEMBER LIST

- ▶ **PROJECT HEAD - BABU ARAVIND (CE)**
- ▶ **LIFE CYCLE PLANNER - BHARATHI P.S (ECE)**
- ▶ **REQUIREMENT ENGINEER - JEYASHANKAR .G (MECH)**
- ▶ **FEASIBILITY ANALYST - MANIKANDAN .B (EEE)**

**DESIGN IS NOT JUST WHAT IT
LOOKS LIKE AND FEELS LIKE.
DESIGN IS HOW IT WORKS.**

– Steve Jobs

CURRENT ART (EXISTING SYSTEM)

TYPICAL ROTATIONAL SLICER

The current market available for automatic vegetable slicer is manufactured in china, this slicer operates on concept of rotational slicing, where a motor will power a disc-blade located inside a casing. The blades spin at high speed which cuts the vegetables as they pass through them. The slicing arrangement can be adjusted to the desired thickness by varying the blade arrangement.



INTRODUCTION - I

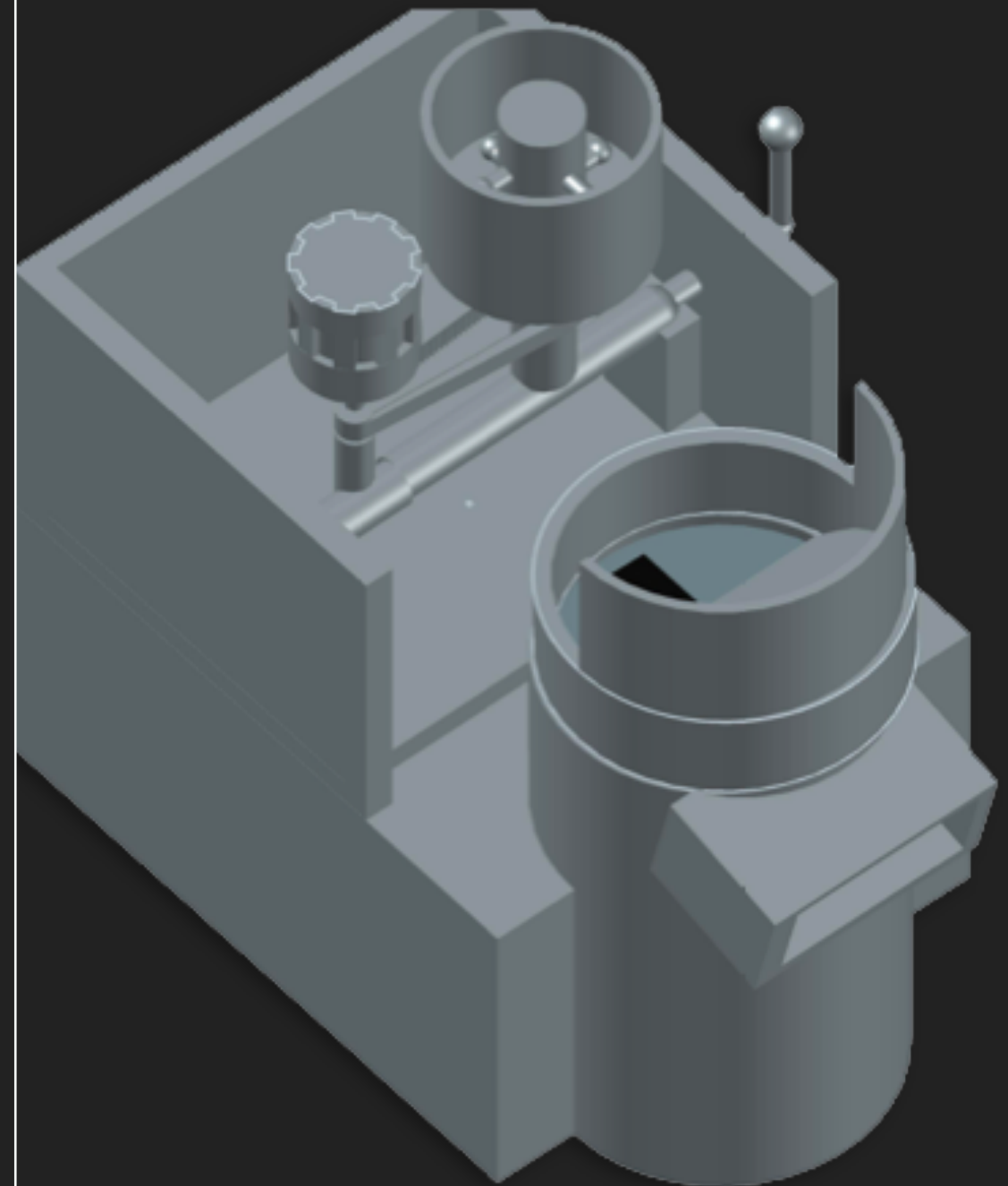
WHAT DO YOU KNOW?

- ▶ EXISTING SYSTEMS PERFORM ONLY ONE SINGLE TASK AT A TIME.
- ▶ DIFFERENT SYSTEMS ARE AVAILABLE TO PERFORM VARIOUS OPERATIONS.
- ▶ IT IS NOT PRACTICAL TO BUY MANY SYSTEMS FOR EACH USE CASE (COST AND FOOTPRINT REASONS).
- ▶ THERE IS A HUGE MARKET FOR AN ALL IN ONE VEGETABLE SLICER THAT PERFORMS MULTIPLE OPERATIONS (SLICING, DICING, PEELING AND WASHING).

PROPOSED ARRANGEMENT

SLICER-DICER SUPREME

The proposed system includes a sequence of operation where the vegetables are thoroughly washed, then they are further cleaned by a water jet mechanism. The vegetables are laid on top of trays and these trays are aligned for further operation using a stepper motor. The slicing and dicing are performed in two stages before they are sent for packaging.



INTRODUCTION - II

WHAT ARE THE BENEFITS OF THE PRODUCT?

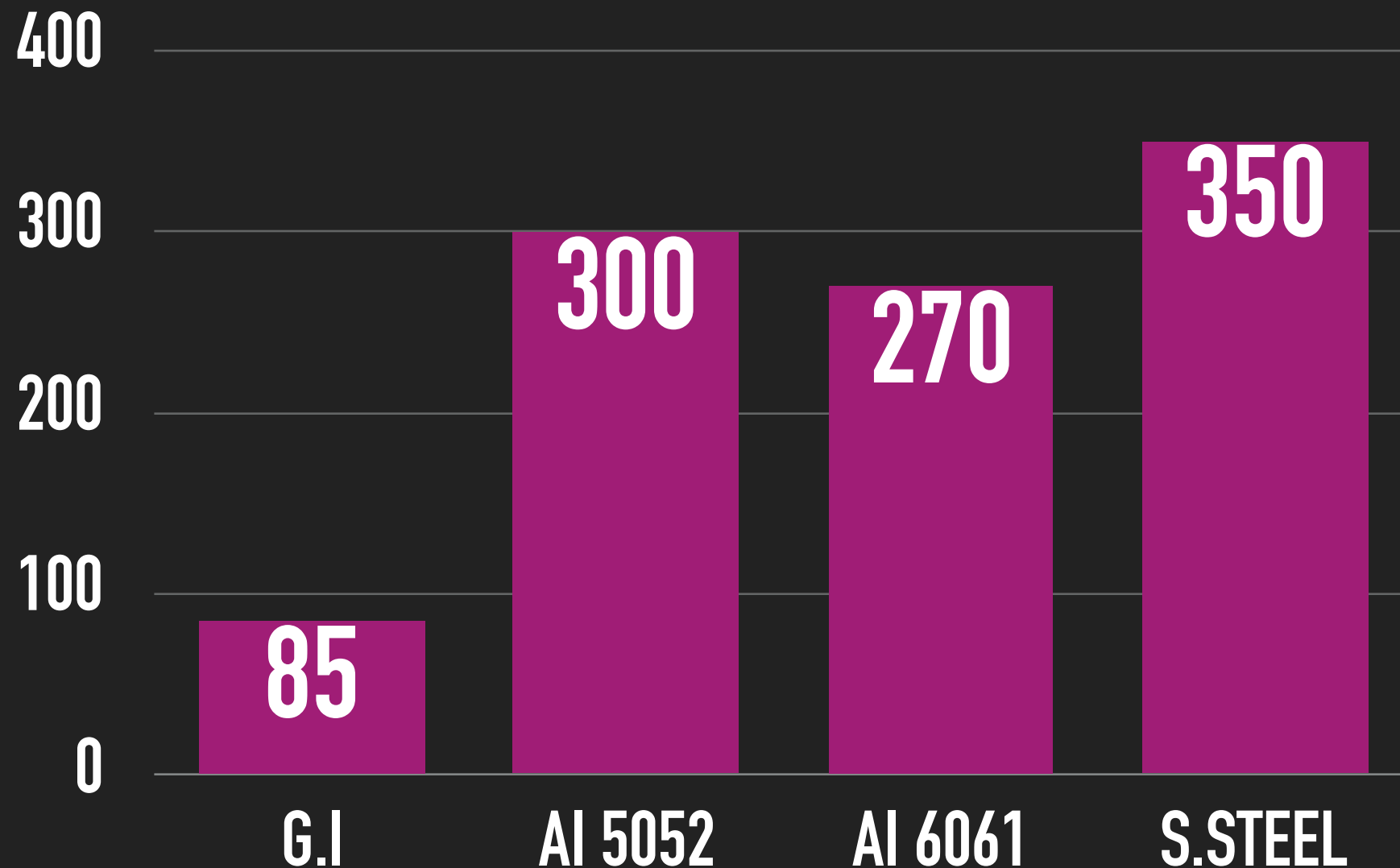
- ▶ ONE MACHINE, MULTIPLE FUNCTIONALITY.
- ▶ TAKES UP LESS FOOTPRINT.
- ▶ VARIABLE RPM INDUCTION MOTORS.
- ▶ SENSOR ACTIVATED SYSTEM.
- ▶ MODULAR BLADES FOR DIFFERENT OUTPUTS (SLICES, FRIES, SHREADS & DICES).
- ▶ INCLUDES PEELING FUNCTIONALITY(ONION).
- ▶ LESS OPERATIONAL COSTS.
- ▶ HIGHER THROUGHPUT (PEELING & OPERATION).
- ▶ UPTO 35% HIGHER EFFICIENCY (OUTPUT/COST).

WHAT ARE THE OPPORTUNITIES AVAILABLE?

- ▶ EASIER TO SETUP BUSINESS FOR START-UP CATERING COMPANIES.
- ▶ CAN BE INSTALLED IN RETAIL BUSINESSES OR VEGETABLE MARKETS.
- ▶ USEFUL IN RURAL AREAS WHERE AGRICULTURE IS A MAJOR SOURCE OF INCOME.
- ▶ CAN BE INSTALLED IN RESTAURANTS & MARRIAGE HALLS.

CHOOSING THE RIGHT MATERIAL

► COST PER KILOGRAM



ALUMINIUM – STAINLESS STEEL – GALVANIZED IRON

- ▶ CONCEPT OF VALUE ENGINEERING IS APPLIED.
- ▶ GALVANIZED IRON IS USED WHERE RIGIDITY IS NEEDED.
- ▶ ALUMINIUM IS USED IN COMPONENTS THAT DEAL WITH LIQUIDS.
- ▶ STAINLESS STEEL IS USED FOR THE BLADES TO ACHIEVE PRECISION AND HYGIENE.

MATERIALS - OTHER

SILICON CARBIDE(SiC)

- ▶ SiC IS USED AS AN ABRASIVE MATERIAL FOR THE PEELING PROCESS.
- ▶ IT IS A STRONG COMPOSITE THAT HAS GOOD DURABILITY AND LOW COST.
- ▶ MILTON SILICON CARBIDE WATER PROOF PAPER IS USED IN THE PROPOSED ARRANGEMENT.

COMPARISON - EXISTING VS PROPOSED

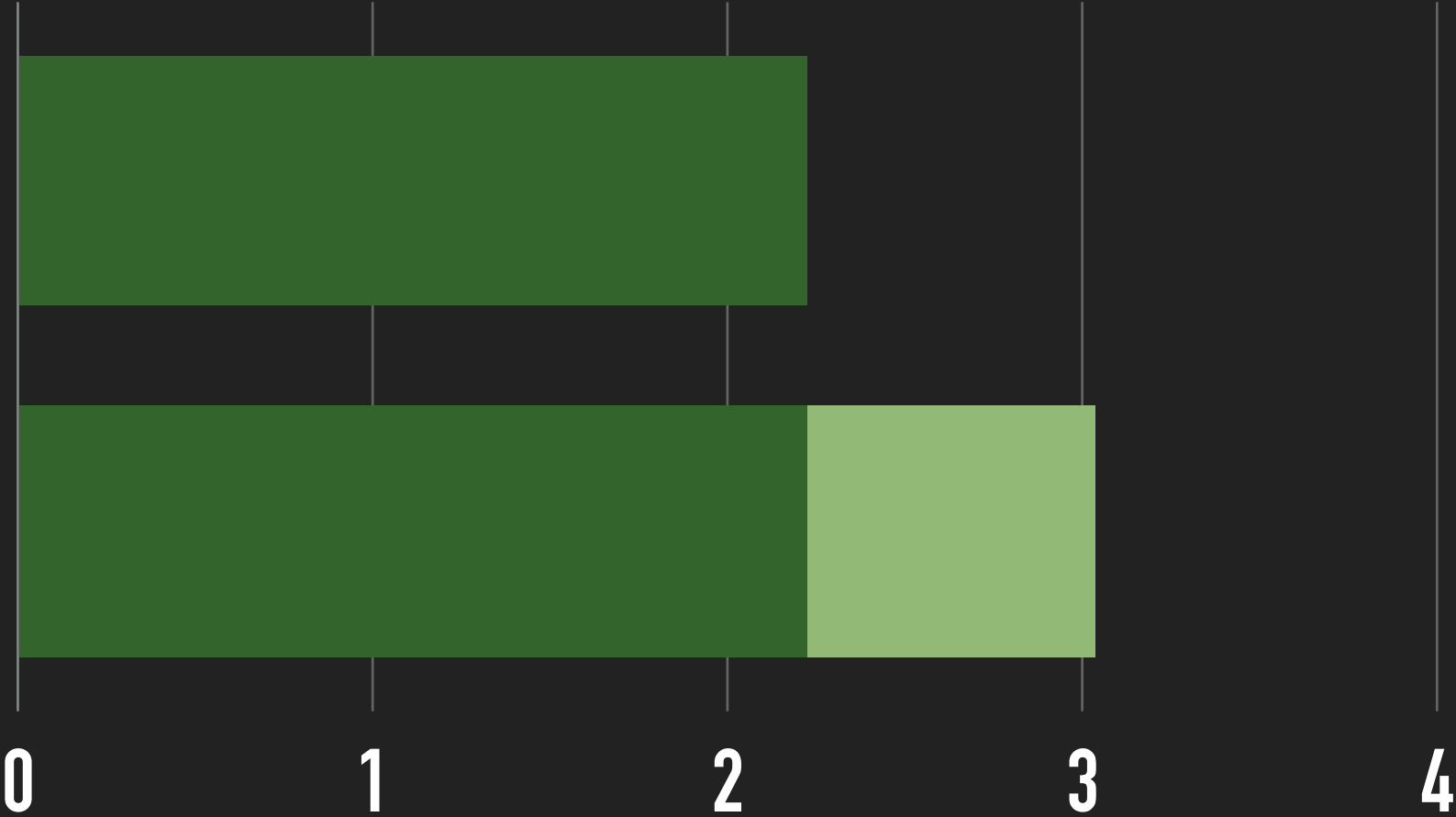
CURRENT ART VS PROPOSED ARRANGEMENT

- | | |
|---|---|
| <ul style="list-style-type: none">▶ COST: ₹90,000.▶ CAPACITY: 150-200KG/HR.▶ OPERATION: SLICING.▶ TYPICAL AC INDUCTION MOTOR.▶ NO MEANS TO CONTROL POWER CONSUMPTION. | <ul style="list-style-type: none">▶ COST ESTIMATE: ₹39,500.▶ CAPACITY: 80-120KG/HR.▶ OPERATION(S): WASHING, PEELING, SLICING AND DICING.▶ SENSOR ACTIVATED MOTOR(INDUCTION) WITH PWM CONTROLS(RPM).▶ REDUCED POWER CONSUMPTION. |
|---|---|

COMPARISON - THROUGHPUT

PROPOSED ARRANGEMENT

CURRENT ART



OUTPUT / COST

WORKING

▶ **PEELING**

▶ **WASHING**

▶ **SLICING**

▶ **DICING**

WORKING - CYCLE #1

PEELING MECHANISM FOR ONION

- ▶ PEELER IS INCLUDED FOR ONIONS.
- ▶ A ROTATIONAL CHAMBER MADE OF ABRASIVE MATERIAL RUBS THE BRITTLE SKIN OF ONIONS.
- ▶ RESIDUE IS REMOVED BY A VACUUM FILTER.



WORKING - CYCLE #1

WASHING MECHANISM(OTHER VEGETABLES EXC. ONIONS)

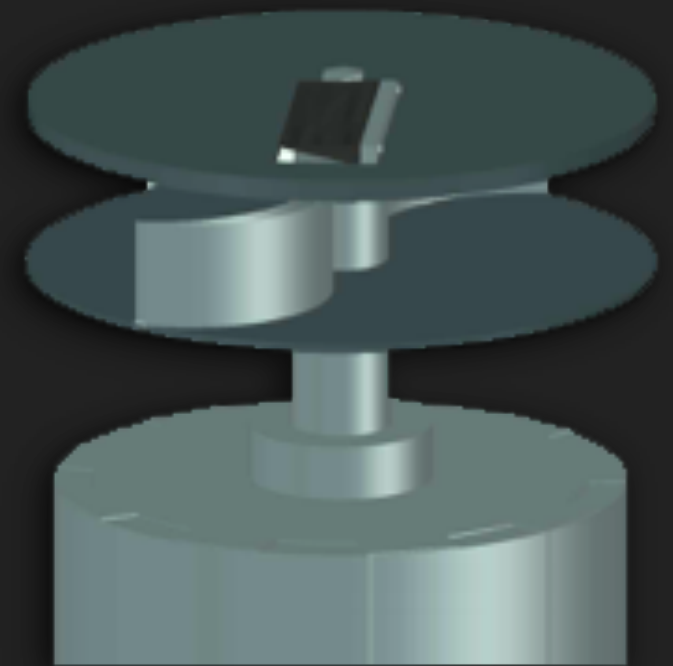
- ▶ AN INLET PUMP DIRECTS THE WATER INTO THE CHAMBER.
- ▶ THE DRAIN ARE CLOSED AND THE VEGETABLES GO THROUGH A THOROUGH WASH CYCLE.
- ▶ THE WATER IS NOW DRAINED, RESIDUE IS COLLECTED AT THE FILTER, THE VEGETABLES CAN NOW BE SENT TO THE OPERATIONAL UNIT.



WORKING - CYCLE #2

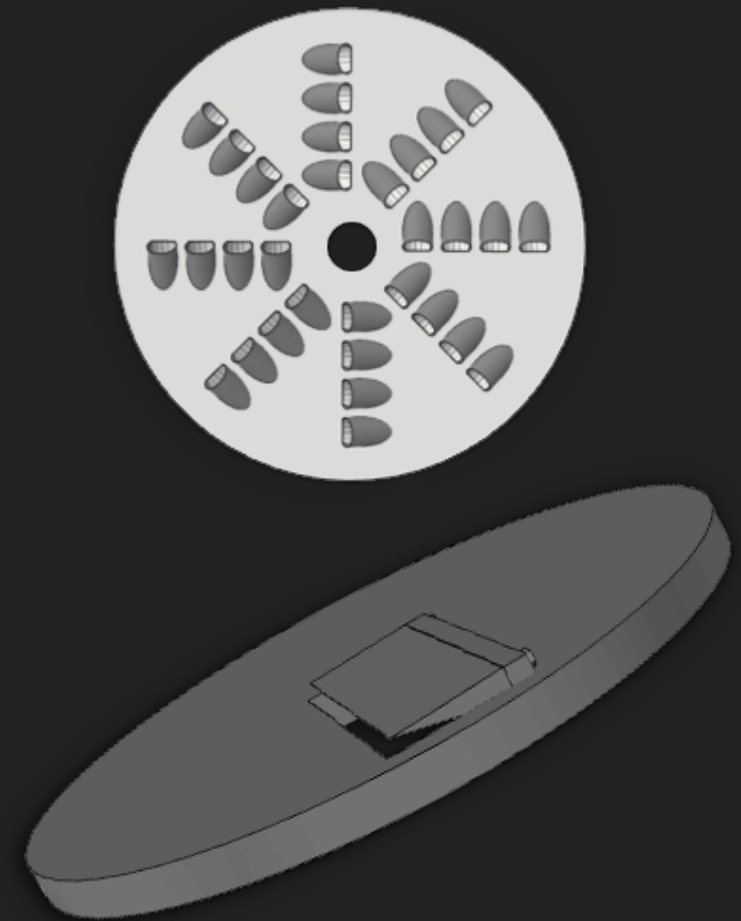
OPERATIONAL UNIT - THE SYSTEM

- ▶ THE VEGETABLES ARE FED INTO HOPPER.
- ▶ WHEN POWERED A LEVER ROTATES TO PREVENT VEGETABLES GETTING STUCK.
- ▶ A SENSOR PRESENT BELOW THE LEVER ACTIVATES THE MOTOR WHEN VEGETABLES PASS THROUGH IT.



OPERATIONAL UNIT - BLADES

- ▶ BY USING A MODULAR ROTATIONAL BLADE, THE REQUIRED OUTPUT CAN BE ACHIEVED.
- ▶ THE ANGLE_(SLICE THICKNESS) OF THE BLADE CAN BE ADJUSTED.



TECH & TECHNICAL

▶ **MICRO-CONTROLLER**

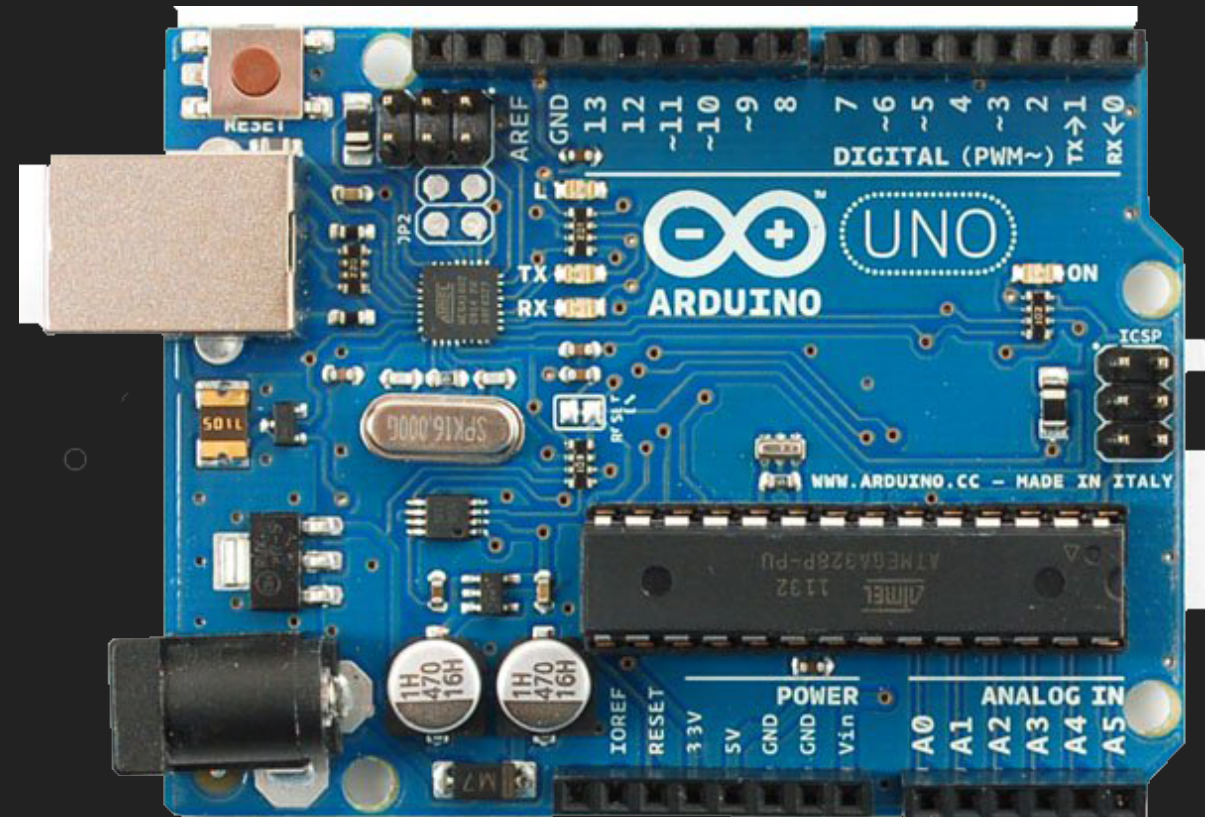
▶ **SENSORS**

▶ **MOTOR**

▶ **COST ANALYSIS**

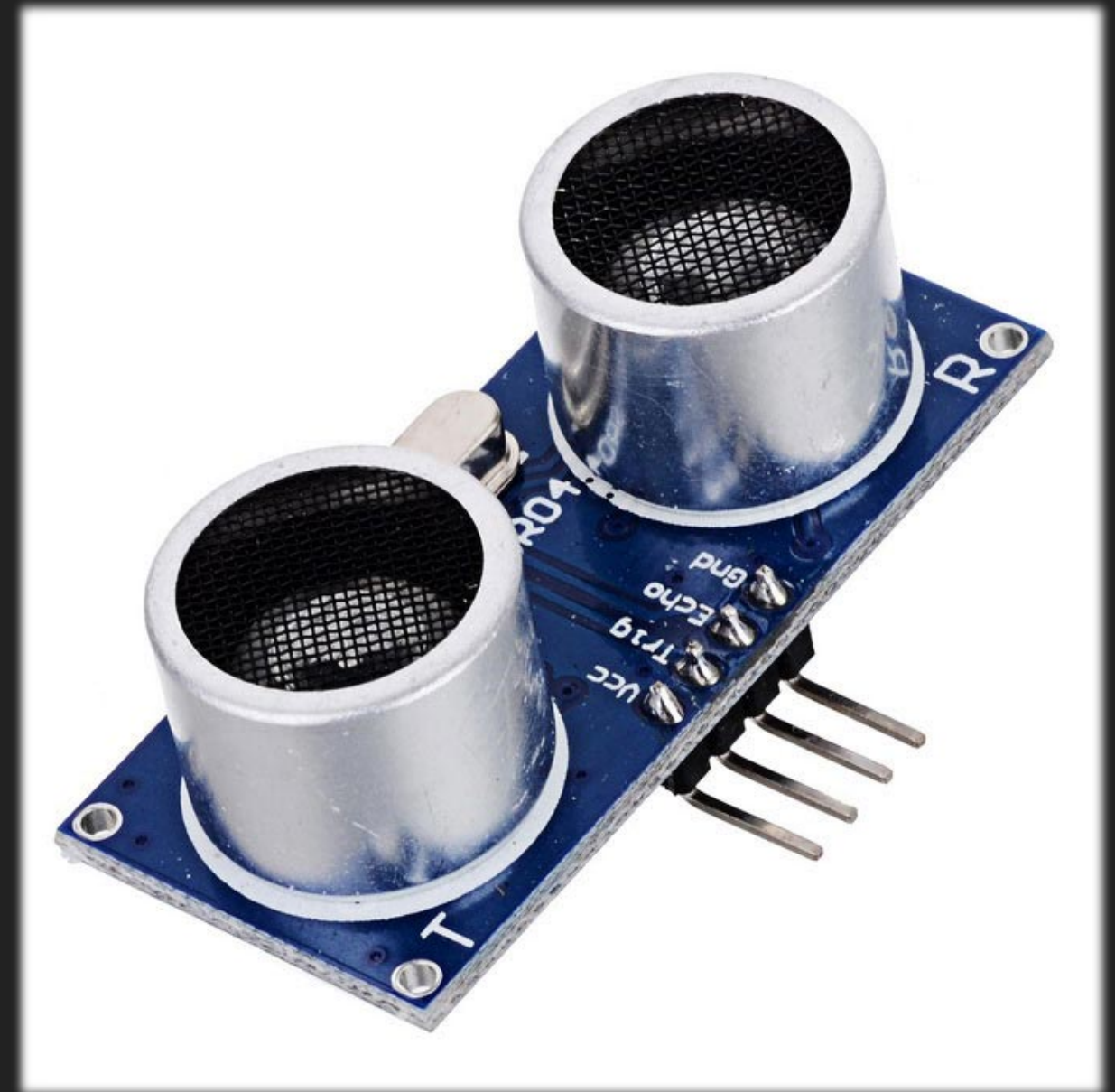
ARDUINO UNO WITH ATMEGA 328P

- ▶ IT IS USED TO CONTROL THE RPM OF THE MOTORS.
- ▶ THE CONNECTS TO THE SENSORS TO CONTROL THE WORK FLOW PRESETS.
- ▶ USING IOT, REMOTE ACCESS/MONITORING FUNCTIONALITY CAN BE ADDED TO THE SYSTEM.



ULTRA SONIC SENSORS(MOTION DETECTION)

- ▶ THE SENSORS ARE USED TO DETECT ANY MOTION OF VEGETABLES IN THE FEED.
- ▶ MOTORS CAN BE POWERED ON OR OFF AUTOMATICALLY THUS REDUCING POWER CONSUMPTION.



INDUCTION MOTOR & VACUUM MOTOR

- ▶ A VACUUM MOTOR(SINGLE PHASE) OF 230V, 1.5HP IS USED TO REMOVE THE RESIDUE .
- ▶ IT WILL ALSO BE USED TO DRAIN THE WATER FROM THE WASHING CHAMBER.
- ▶ A TWO-POLE INDUCTION MOTOR OF 1.5HP(SINGLE PHASE) POWER THE OPERATIONAL UNIT.

PRICE ESTIMATION & MARKET PRICE. (APPROX)

- ▶ VACUUM MOTOR(1.5 HP, SINGLE PHASE). | 2500
- ▶ SILICON CARBIDE. | 1500
- ▶ INDUCTION MOTOR(2NOS. X 1.5HP). | 8000
- ▶ MICROCONTROLLER & SENSORS & MISC. | 500
- ▶ MANUFACTURE & MATERIAL COST. | 25,000 - 27,000

▶ ***ROUGH ESTIMATION: RS. 39,500***

▶ ***MARKET PRICE: RS. 29,995***

**THANK YOU FOR
THE EXPERIENCE.**

– STUDENTS OF POLYTECHNIC COLLEGE