GROUP 15-B

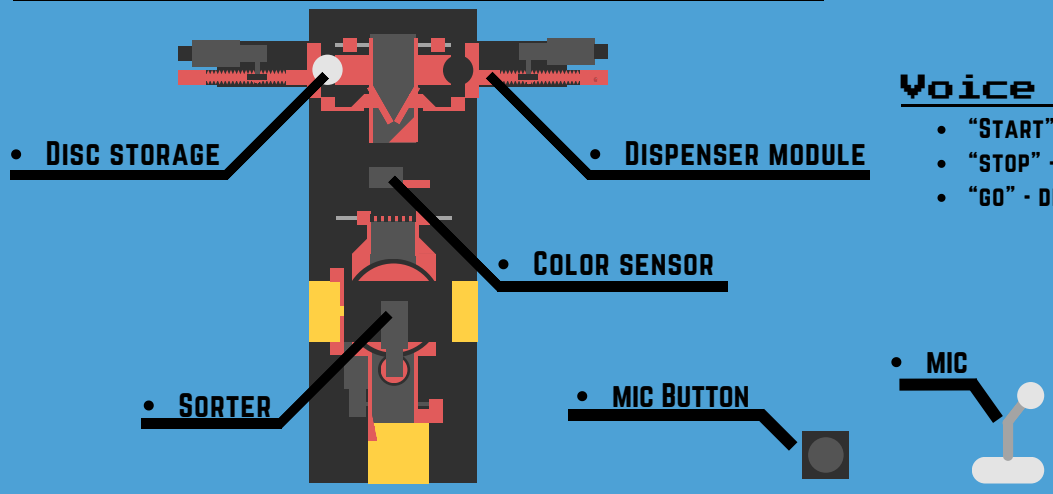
Main Idea

SORTING BETWEEN INTERNATIONAL (BLACK) AND DOMESTIC (WHITE) BAGGAGE TO SIMULATE A REAL-LIFE AIRPORT CONVEYOR BELT AND DISCARDING FOREIGN OBJECTS (OTHER COLORS).

Decision timeline

- SPRINT 1: FINALIZE SORTING IDEA AND BEGIN BUILDING FIRST PROTOTYPE
- SPRINT 2: FIRST PROTOTYPE BUILT AND BEGIN WORKING ON SOFTWARE
- SPRINT 2-3: OPTIMIZE ROBOT AND BEGIN IMPLEMENTING SOFTWARE SPECIFICATION IN STAGES (SECOND/THIRD PROTOTYPES)
- SPRINT 3: DELIVER FOURTH PROTOTYPE AND BEGIN TESTING SOFTWARE AND IMPLEMENTING VOICE RECOGNITION EXTENSION
- SPRINT 4: WRAP UP TESTING, FINAL OPTIMIZATIONS, AND BE READY TO PRESENT ROBOT

Hardware diagram



Voice Instructions

- "START" - STARTS THE ROBOT
- "STOP" - STOPS THE ROBOT
- "GO" - DISPENSES A DISK

Main Process

1. DISC DISPENSER (WITH VOICE REC.)
   - 2 DIFFERENT DISPENSERS DISPENSING BLACK AND WHITE DISCS ACCORDINGLY (ADDITIONALLY HAVING OTHER COLORED DISCS IN THE DISC DISPENSERS)
2. CONVEYER
   - THE MOTOR POWERS THE CONVEYER SO THAT THE DISCS CAN BE TRANSPORTED
3. MOTION SENSOR
   - DETECTS BLACK DISCS SINCE CONVEYOR HAS THE SAME COLOR BASED ON INFRA-RED REFLECTION
4. COLOR SENSOR
   - EMITS VISIBLE LIGHT AND BASED ON REFLECTION, DETECTS IF IT IS WHITE, BLACK OR OTHER
5. DISC ROTATING SORTER
   - SORTER ROTATES CERTAIN AMOUNT TO DISPENSE RESPECTIVE BLOCK TO CORRECT BOX, RETURNING TO ITS ORIGINAL POSITION AFTER A CERTAIN AMOUNT OF TIME

Requirements

- SORTS BLACK AND WHITE DISCS FROM EACH OTHER
- DETECTS UNEXPECTED OBJECTS AND SORTS THEM INTO A SEPARATE CONTAINER
- DETECTS IF THE CONVEYOR HAS STOPPED
- DETECTS IF THE DIVIDER HAS STOPPED WORKING
- DETECTS IF A DISC HAS BEEN REMOVED

Software

WE USED PYTHON 3.9 FOR ROBOT SOFTWARE. TO WORK WITH RASPBERRY PI PINS LIBRARY RPI.GPIO WAS USED.

SOFTWARE CONTAINS THE CLASSES:

- ROBOT: MANAGE THE WHOLE SYSTEM,
- CONVEYER: MOVE CONVEYER BELT,
- PUSHER: PUSH DISK IN RIGHT DIRECTION,
- DISPENSER: PUT OBJECTS ON CONVEYER BELT,
- COLOR SENSOR: DETECT COLOR OF OBJECTS ON CONVEYER BELT,
- MOTION SENSOR: DETECT PRESENCE OF OBJECTS ON CONVEYER BELT.

Potential Error

- INCONSISTENT MOTOR SPEED: THIS MAINLY AFFECTS THE SORTER SO IT MAKES IT UNRELIABLE
- DISC POTENTIALLY ORGANIZED TO WRONG BOX: COLOR DETECTED WRONG OR THE SORTER ROTATES TOO SLOW

Potential Solutions

- SERVO MOTOR FOR A PRECISE AND CONSISTENT MOTOR WORKS
- BETTER CALIBRATION OF COLOR SENSOR RESULTS ON THE SOFTWARE SIDE