INTERMEDIATE PROGRESS REPORT – MITSUBISHI ELECTRIC CUP 2020

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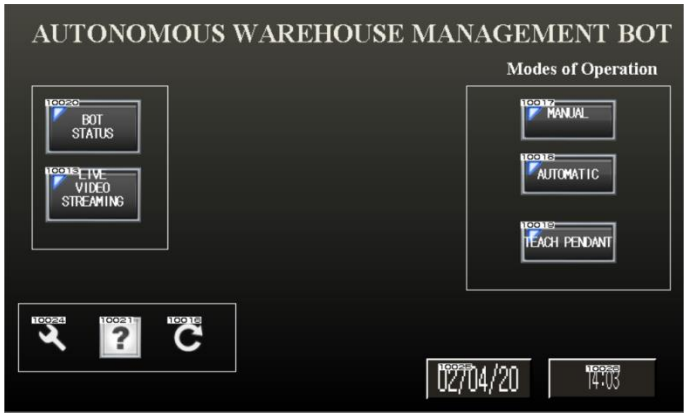
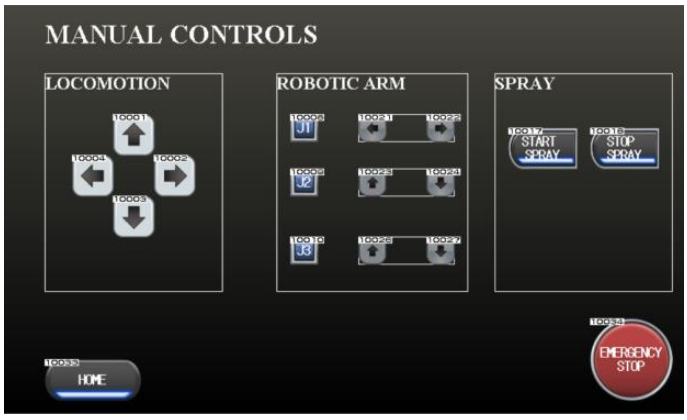
Project Name : AWM (Autonomous Warehouse Management Bot)

PROGRESS OF PROJECT:

PLC AND HMI:

The Mitsubishi PLC FX-5U-32 MT/ES is the main unit which controls the operations of the bot. It is programmed using GXWORKS3 by ladder logic. The various operations of the bot such as warehouse management, sorting, path detection, pick and place are controlled by the PLC. The Human Machine Interface [HMI] is connected to PLC via Ethernet. The design of HMI screens is done using GT DESIGNER for the respective operations of the bot. The screens are designed based on the PLC program to control the bot by establishing connection between PLC and HMI. The user can easily control operations of bot using single button touch on the HMI screen. The design for the HMI screens is completed and is shown below.





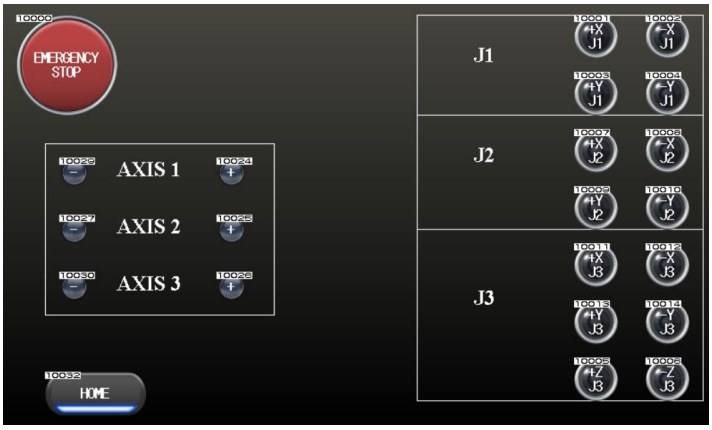


Fig. HMI screen Design

ROBOTIC ARM:

The robotic arm is used in our bot for executing pick and place operations, managing stock in the warehouse, sorting the products, monitoring the factory floor and also to carry out additional operations such as spray painting. The arm is connected to a camera that can capture images and processes them further for path identification, sorting the products and live video streaming. Image processing techniques such as edge detection, image enhancement and segmentation are used for is used for path identification and for sorting.

WAREHOUSE MANAGEMENT:

The bot when working in the production side would gather all the information of the products by scanning its bar code and stores this data in cloud. The customer side data is also stored in cloud and is accessible to both the user and manufacturer. Customer data relates to the demand for certain product and the dates of delivery. Depending on the customer data the production rate can be increased or decreased suitably to deliver the products on time.

PATH IDENTIFICATION:

The robotic arm has a camera which is used for capturing images and recording video. The captured image is processed by edge detection techniques for identifying the path and avoids obstacles. The bot can identify the path by storing a set of images of the factory floor and avoid obstacles once it is aware there is an object in its path.

Fig. Edge Detection

ANDROID APPLICATION:

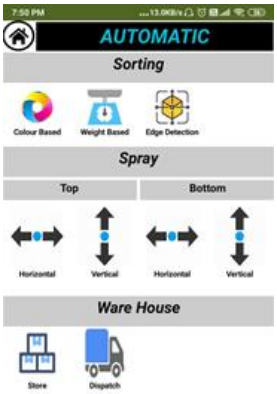


Fig 3. Home screen

Fig4.Automatic control

CONTROL PANEL:

We have completed around 85% of work in the AWM bot. We are currently arranging funds to proceed with the work. The work will be completed by 08-02-2020. We will present the working model to the management on 10-02-2020.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