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MODELLING AND ANALYSIS OF WAREHOUSE AUTOMATION USING ARDUINO DEVELOPMENT BOARD

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Abstract - *Arduino Uno is the first choice of every electronics hobbyist or student. It is a pretty simple piece of hardware with an easy to-understand programming construct. This is a review paper detailing the extensive Literature review undertaken surveying 30 research papers. This yielded in a thorough understanding of this embedded platform facilitating the authors to build a model of an automated warehouse.*

Key Words: **Arduino, integrated development environment, internet of things, automation, pre processor directive, infrared and ultrasonic sensors.**

1. INTRODUCTION

Arduino is an embedded platform. It's an evaluation board sporting an Atmel 8 AVR Microprocessor. It is sought out most for DIY projects benefitting individuals and communities. It is basically a controller well-known for all kinds of Automation projects [1]. It has a good IDE supporting a version of both C and C++ programming. The board used for this entire pursuit is an Arduino Uno. It has digital, analog as well as PWM GPIO pins. Arduino can be used to operate both hardware and software easily. It is capable of reading inputs-light on a sensor, a finger on a button or a twitter message [2].

It can be converted into an output. There are many components inside the arduino UNO board and some of the components are USB connector, power port, microcontroller, analog input pins, digital pins, reset switch, crystal oscillator, and USB interface chip. This USB connector can be used to fuse the program into the arduino board from arduino IDE. In an arduino AC to DC adapter or a battery is used for power supply [3-5]. An extensive literature survey conducted studying an over all of 15 research papers. All the 15 research papers are referenced below. 2.1mm center positive plug can be plugged into the power jacket of the board. Usually Arduino UNO board can be operated with a voltage regulator is present in order to present the board from burning out due to heavy voltage. It is a rectangular chip which consists of 28pins.The Arduino UNO board has at mega 328p microcontroller, this At mega 328p consists of 32 KB of flash memory,2KB RAM,A CPU which helps in fetching the instructions from flash memory and then runs with the help of RAM,EPROM of 1 KB (electrically erasable programmable read only memory).

2. LITERATURE SURVEY

In this section, we recent review the analysis of warehouse automation based research works are discussed.

Sengupta A *et al*. [6] have presented the communication between human being is not only through speech or voice however such differently abled people who try to communicate to the normal world find it difficult. Hence they use sign language to communicate .without using voice or speech as communication medium with one another there are several process of communication like hand shape, body and arm movements and facial expression this modes of communication is termed as sign language. Around million of the entire population belongs to the mute community as per the new global estimates of WHO. Vision approach is one of the approaches taken by the researchers to recognize and apply sign languages or finger spelling.

In this current work a significant amount of accuracy has been achieved for finger spelling recognition using smart gloves, the smart gloves approach proposal is meant to be prototype to heck the feasibilty of recognizing sign language. The output found was very satisfying. We have used free ware software for design of the application and the design of the system code in Arduino platform, and the former in MIT application inventor platform. The

future proposal for the communication protocol that can be used is Wi-Fi or GSM for long distant communication.

Garda YR *et al.* [7] Hands are one of the crucial parts of the human body in carrying out daily activities. accidents on the hands decreasing in motor skills of the hand so that therapy is necessary to restore motor function of the hand. In addition to accidents, hand disabilities can be caused by certain diseases , e.g. stroke . biofeedback is an alternative method of treatment that involves measuring body functions measured subjects such as skin temperature, sweat activity ,blood pressure, heart rate and hand paralysis due to stroke. Flex sensor converts the magnitude of the bend into electrical resistance, the greater the bend the greater the resistance value. The monitoring used in this biofeedback monitoring tool uses graphical user interface (GUI) in C# programming language.

Arrizabalaga, Julien H *et al.* [8] The mechanical properties of soft materials are critically important for a range of applications ranging from packing to biomedical purposes. They have constructed a simple mechanical testing apparatus using off-the –shelf materials and open-source software for a total cost of less than $100. The device consists of a wooden frame supporting a central loading apparatus attached via drawer slides. The load cell and ultrasonic sensor are linked to an Arduino microcontroller connected to a laptop through a USB port for data acquisition and analysis. This instrument was easy to assemble and enabled students to better grasp the meaning of tensile testing while promoting experimentation with electronics, computer programming and mechanical design. The experiments detailed herein, which can be applied to a wide variety of disciplines, were preformed with household and common laboratory items as samples. These revealed the accuracy of the system (as compared with an industrial mechanical tester) and allowed for reliable determination of material properties. Though not intended as a replacement for truly quantitative experimentation, this device serves as an ideal platform for hands-on learning, as its construction and use encompasses several disciplines and it lends itself to numerous potential modifications for expansion to further applications.

Ahmed MA *et al.* [9] According to the statistics of the world Federation of the deaf and the world health organization, approximately 70 million people in the world are deaf and mute. A total of 360 million people are deaf and 32 million of these individuals are children. The majority of speech and hearing impaired people cannot read or write in regular languages. Sign language in the native language used by the deaf and mute to communicate with others. SL relies primarily on gestures rather than voice to convey meaning and it combines the use of finger shapes, and moments, and facial expressions.

Plant L et al. [10] presented main motion this project is that this smart E-textile gloves is for people who has been diagnosed for Parkinson's disease. The affected individual will be unable to perform fine motor movements and also can experience the inability to maintain balance as the disease progresses. This gloves can track the effectiveness of the medications that relieve motor symptoms. These gloves are embedded with sensing technology that respond to the environments. The gloves are aimed to monitor tremors and other motor symptoms of Parkinson's disease. These experiments demonstrate the feasibility of smart gloves, which could detect angular movements of the fingers during various tasks such as finger tapping and make a fist open and close.

Flores MB *et al.* [11] have considered the performance of the makeshift flex sensors was compared to that of commercially available ones. A system using Arduino, Bluetooth, and Processing was developed to allow the user to specify desired finger gestures for controlling a variety of robotic devices. A low-cost wireless glove controller that detects finger gestures was developed using makeshift flex sensors and a digital accelerometer. The performance of the makeshift flex sensors was compared to that of commercially available ones.

Galeriu C *et al.* [12] have established the Arduino board has helped countless people in their science, electronics, robotics, or engineering projects, allowing them to build things that we have not even dreamed of. Physics instructors have also realized the advantages of using Arduino boards for lab experiments. The schools are saving money because the homemade experimental equipment is much cheaper than the commercial alternatives. We cannot hope for a new generation of scientists and engineers if we don't let our young students take ownership of their scientific and engineering explorations, if we don't let them enjoy the hands-on cycle of design and production, and if we don't let them implant their creativity into a technologically friendly
nvironment.

Asokan A *et al.* [13] In this paper we present the design and development of a hand-motion recognition system as an interface between human

and mechatronic systems such as UAVs and other rescue robots. Here, this will be converted to suitable control signals in the controller and will be used as the command signals to activate the gadget. The proposed system is expected to enable easy interfacing of humans. Suitable sensors on the AR Matron will sense the linear and rotary motions of the hand. A data acquisition system (DAQ) will acquire the data from the sensors and will be processed by a suitable controller to identify the intended gesture of the user

Developing an automatic machine-based SL translation system that transform Sl into speech and test or vice versa is particularly helpful in improving intercommunication. Progress in pattern recognition offers the promise of automatic translation system, but many difficult problems need to be solved before they become a reality. Several aspects related to SLR technology, particularly SLR that uses a glove sensor approach, have been explored investigated. The last set of included articles sensors 2018,18,2208 39 of 44 in the literature as been taxonomies into four main categories framework, review, survey, development, and other hand gestures based on the type of study. Finally, reliable segmentation methods should be developed to assist in continuous gestures recognition.

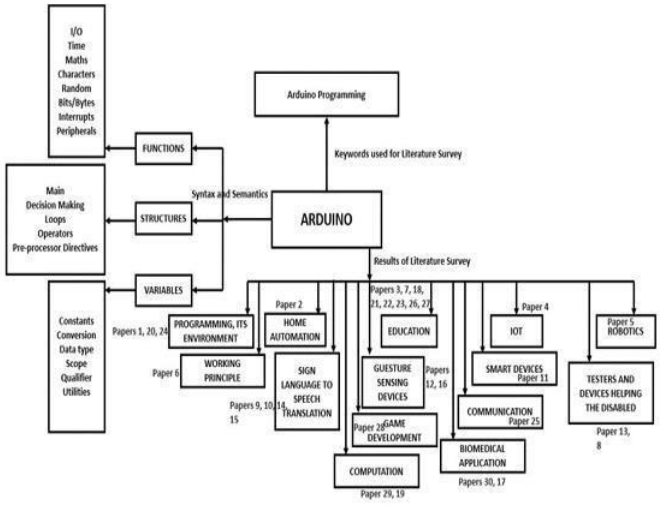

Fig 2: Mind-map displaying the work done

3. METHODOLOGY OF PROPOSED MODEL

Automation is the process of reducing manual interference by employing technologies like sensors, actuators, controllers etc. It is one of the fast-growing domains right now owing to an increase in the need for security and reliability. In warehouses, automation is used to keep track of the products stashed, know the exact location they are arranged in, have remote access to these details, make sure they are safe etc. Existing practices employ drones or automated vehicles to achieve this. This makes it costly and quite complex. Maintenance depending on a reliable power source too is not easy when it comes to vehicles. This project "modelling and analysis of warehouse automation using arduino development board", displays an alternative approach, bridging few of the above mentioned gaps. The objective is to model a modified vending machine and conveyor belt arrangement using arduino undo development boards. A small scale model of an automated warehouse is aimed to be built. A simple model using automated vending machines, conveyor belts, msn (multiple sensor networks) arrangements, Drive-in type infrastructure (for both customers and workers), light/ sound based indicators etc to track, dispatch products. This can be extended to accommodate remote access, a few security arrangements too in the future auto stacking can be arranged by modifying the vending machine design, which also falls under the future scope of the project.

A. FUNCTIONAL PROCEDURE OF PROPOSED MODEL

The model explained in this subsection. In the left most corner will be the input console. So here the customers should enter the products required after the products are entered a control word is generated. It's a 6bit control word is entered word the first 2bits are variable xx. There values can be 01,10,00,11. There are four vending machines and each one represents each vending machines for eg . 00 is for one vending machine 01 for the next vending machine,10 is for the third vending machine and 11 is for is for the last vending machine. There are totally 6bits the first 2 variable denotes in which vending machine the product is and the next 4bits can be represented as 8421

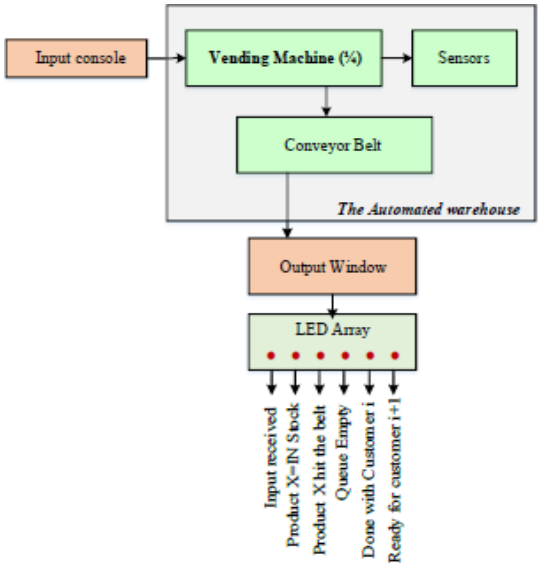

Fig 3: block diagram

Totally 15 products can be hosted. So, in each vending machine 15 different products can be hosted, then the sensors are usually deployed in the ends of the rakes infrared and ultrasonic sensors are used.

The sensors are used to check whether the products are available in the racks.

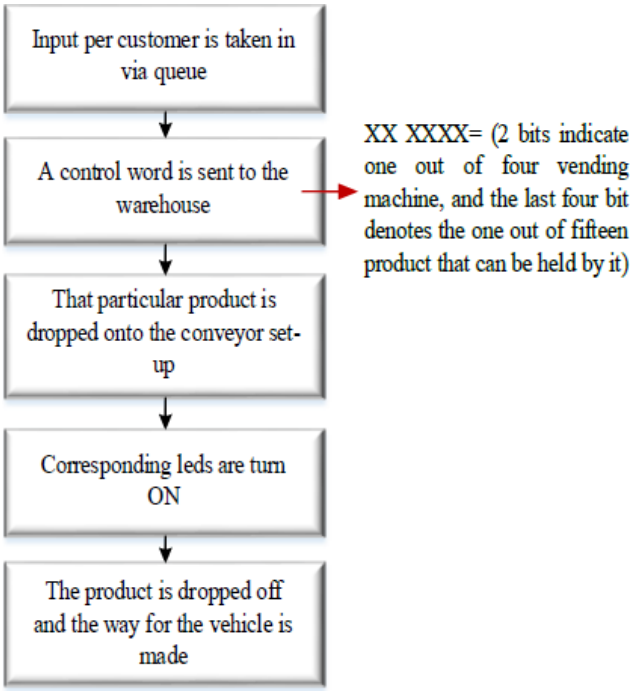

Fig 4: Flow chart of our proposed method

In the right most corner comes the LED arrangement first bulb denotes whether the customer had entered the products(input) ,so after the inputs are entered the first LED bulb glows , then the second bulb glows after checking whether the entered product is in stalk. Then the third LED glows when they Entered product hits the conveyer belt .Then the fourth LED Glows after the queue is empty then the fifth LED glows when it is

ALGORITHM

Step 1: Start

Step 2: Input per customer is taken in via a queue

Step 3: A control word is sent to the warehouse

Step 4: That particular product is dropped onto the conveyer belt set-up

Step 5: Corresponding leds are turned on

Step 6: Stop

Done with the customer, the last LED glows when it is ready for the next customer, so first the customer enters the product then, a control word is generated in the vending machine and the product falls on the conveyer belt and moves out through the output window [4].

4. EXPERIMENTAL RESULT

In this section, we describe the result analysis of proposed model. Instead of parsing into value through the serial monitor, an array of switches can be arranged. The multiplexed systems of those switches can be wired to the analog AOA touch interference is an option too.

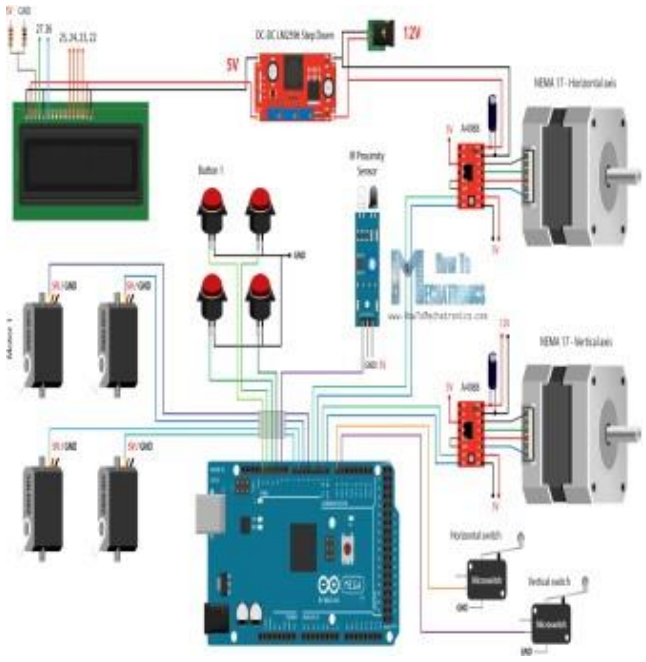

Fig 5: Simulation analysis of arduino development board

5. CONCLUSIONS

In this paper, we have done survey on warehouse automation**.** Moreover, we study many research papers from existing research works were identified to be the most suitable research papers of Automation process. Also, we considered our proposed work using arduino development board for warehouse automation to reduce the manual interference by employing technologies like sensors, actuators, and controllers.

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