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Customised Toolbox Using RFID Readers

[1] Ashwini K, [2] Manasa K C, [3] Channaveerana Gouda, [4] Anusha G, [5] Aishwarya J

[1] [2] [3] Asst. Prof. Dept. of E&CE, RYMEC, Ballari, Karnataka, India.
[4] [5] UG Student of RYMEC, Ballari, Karnataka, India.
Corresponding Author Email: [1] ashwinik@rymec.in, [2] manasakchigateri@rymec.in, [3] kchannaveeragouda@rymec.in, [4] anushag.ece.rymec@gmail.com, [5] aishwaryajecerymec@gmail.com

Abstract*— The manufacturing of automated machines is done by skilled engineers with the required tools in reach at time and place of easy reach. Tool misplacing is a phenomenon that is leading to efficiency loss of 20-25% working hours which is indirectly related to cost to company. Toolbox and tool chest have a definite position and slot for each size and type of tool. Due to day to day increasing non track-ability of tools, a RFID Arduino circuit which checks the employee details and grants access to the toolbox/tool chest. This methodology can be used for service engineer SPC tracking. This integrated system can reduce toolbox replacement from 3-4 months to once in a year. System can be installed and customised to industrial standards and other requirements.

Keywords - Tool misplacement, Toolbox, RFID, Arduino circuit.

I. INTRODUCTION

The emergence of RFID tool management applications has realized the efficiency and intelligence of tool management. Through the installation of special customized tool cabinets with UHF RFID readers and the installation of UHF passive anti-metal tags, the accuracy and efficiency of tool management can greatly improved. And the sharing of information across departments and departments. RFID-Enabled Smart toolbox has the capability of streamlining storage and inventory management services. The toolbox can be used for the storage and retrieval of equipments that require management of asset 24×7, and with such system, manpower can be significantly reduced and operations can proceed without being delayed.

Main concept behind RFID smart toolbox is to provide access to concerned employee. RFID{[1] cad/tool has to be scanned in front of FID readers, and then the attendance of the person and the tool is noted down in the memory. This system is one of the solutions to address the problem of tool being misplaced by increasing the system efficiency. It also helps the management to keep track of tool movements.

II. EXISTING SYSTEMS

[1] O. Shoewu, M. Sc. And O. Badejo, B. Sc. : Radio Frequency Identification Technology: Development, Application, and Security Issues:

Radio Frequency Identification (RFID) technologies provide a wireless means of communication between objects and readers. RFID involves the use of tags, or transponders, that collect data and manage it in a portable, changeable database.

[2] Matthias Lampe and Christian Flörkemeier1 : RFID-enabled automation in support of factory Integration : By taking advantages of data capacity stored in an RFID tag, critical manufacturing information on a product can be locally stored with the product. RFID technology provides a means for a product to rapidly retrieve its needed information as it advances though shop floors.

[3] Dadong Wan : Magic Machine Cabinet: A Situated Portal for Consumer Healthcare: It integrates technologies like smart labels, face recognition, health monitoring devices, flat panel display and the web to provide broad range of health needs including condition monitoring, medication reminders etc.

III. SYSTEM IMPLEMENTATION

In this system, a micro SD card is used and interfaced with Arduino. The main purpose of this SD card is to store the employee information such as employee name, employee code, tool ID etc. RFID card/tool has to be scanned in front of RFID readers. When the employee scans the RFID tag, it is read by the RFID reader. If the reader code matches the stored data base code then the access to the toolbox is granted. A similar system is used for registering the tool-in and tool-out details.

Power supply connected to the system is turned on. Firstly, the input is read from the user id by RFID reader. This information is then fed to Arduino circuit through UART wires. By referring the inbuilt information, Arduino sends signal to the stepper motor and LCD display. Opening and closing of the door of the toolbox is tracked using leaf switches. After the tool chest opens and tools are been removed, the status of the present tools and missing tools are detected by reed switches. After accessing the tools from the toolbox, the LCD displays the status of the tools and the toolbox gets locked until the next user entry. The information of status of the tools can be observed in the mobile using HC -05 Bluetooth connectivity using MIT application.

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3.1 System Architecture

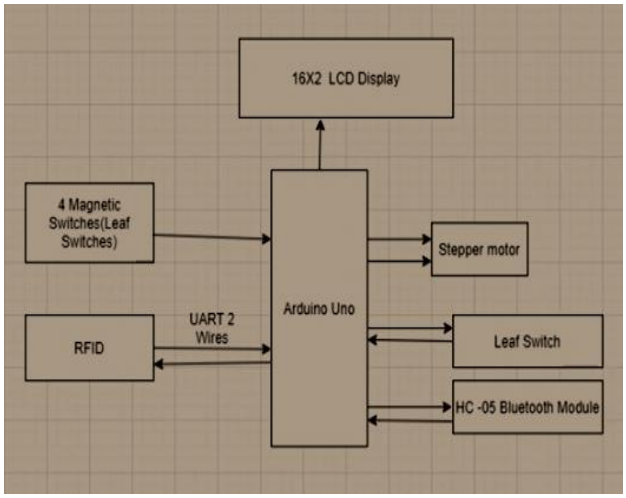


Fig 1: Block diagram

3.2 Hardware Description

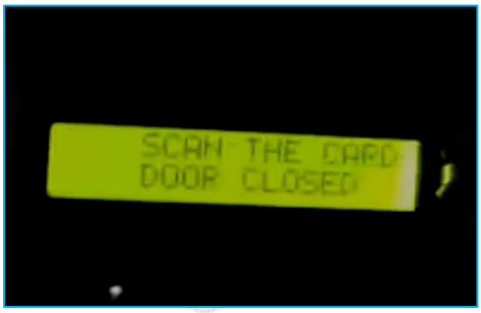
This system uses an Arduino Uno 3283 circuit, which is an open source electronic platform, easy to use hardware and software which reads input and turns it to an output. This system has user friendly features like large 2.54mm[2] pitched sockets for connecting external devices, on board LED, inbuilt power handling and a USB connector.

Fig 2: Arduino Uno Circuit

We use a 16*2 LCD display to display the information. The RFID reader is used to read/scan the user id. Leaf switches are basically used as proximity sensors used to detect the nearby objects. Here we are using Stepper motor to lock and unlock the door of the toolbox. Read switches detect teh opening and closing[3] of the door. RFID reader model is connected to the Arduino circuit by UART cables. Two UARTs communicate directly with each other. The transmitting UART converts parallel data from a controlling device (RFID) into serial form, transmits it in serial to the receiving UART, which then converts the serial data back into parallel data for the receiving device.

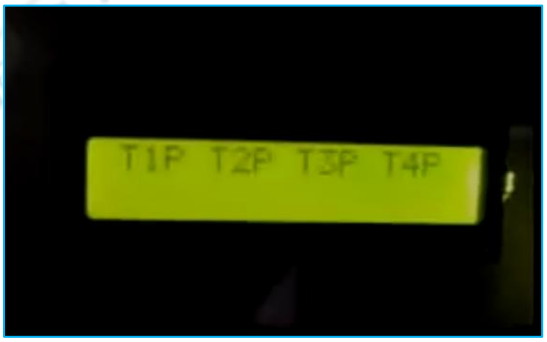
IV. RESULTS AND DISCUSSIONS

Step 1: The system need to be connected with the power supply. When the ower supply is turned on, the LCD display conveys the information as the user id/card need to be scanned , the door is closed.



Step 2: The Authorized user can scan his card in-front of the RFID reader to unlock the toolbox.

Step 3: After getting verified by the RFID reader, the stepper motor rotates 90 degrees and the door gets unlocked. At this time the LCD displays the information of the tools present inside the toolbox. Here T1 T2 T3 and T4 are name of the tools and P indicates that the tool is present and A indicates the tool is absent.



Step 4: Now the user can access the tools while the LCD displays the currently resent and missing tool details and the door status.

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Step 5: The last user name is displayed on the LCD then the stepper motor turns 180 degree and locks the door of the toolbox until the next user entry.

Step 4: All the tool and user information gathered by toolbox can be notified in the connected mobile screen by HC -05 Bluetooth module with the help of MIT app.

V. APPLICATIONS

- Through the installation of this system, the accuracy and efficiency of tool management can be greatly improved.
- It has capability of streamlining storage and inventory management services.
- Mao Industries can be highly profited over time management and human power due to the system's effortless operation.
- The toolbox can be used in the fields that require management assets of 24*7.
- Time can be saved and the operations can proceed without any delay.
- This system can work with a minimum power supply of any power bank.

VI. SYSTEM OUTCOMES

Automated self-service tool check-in/check-out: by using employee card to access the toolbox. User Authentication: The system memory has the data of permitted employee details and authorizes each scanning of the RFID tag with the database. Loan and Return records: Major[4] tools which are taken on-site can be assigned to an employ and return of the tool in the designated time can be checked and recorded. Transaction logs: The system keeps record of each tool that is being used in a specified area/department. Bluetooth connectivity: All the tool movement information can be tacked through mobile.

VII. CONCLUSION

By this system, the management of tools gets easier to a manager to keep track of the tool movements. Tools can be accessed only by authorized uses which helps the manage to avoid inter-department usages of tools. Getting information through mobile phones makes the management process more simple.

VIII. FUTURE SCOPE

- Rechargeable battery for toolbox mobility: The system is generally powered by main supply. But for smaller/mobile and non-stationary toolboxes, rechargeable batteries can be used. Example: Power banks.
- Customizable on existing toolbox: This system can be installed on new as well as already functioning toolboxes. To accomplish this customizability is an important feature which allows this system to be integrated into any type of toolbox/tool chest o similar industrial equipments.
- Option of making Stationary toolbox: As our toolbox consists of smaller and limited number of tools, it can be moved to anywhere. For larger number of tools and users, a stationary toolbox can be created fo tool management.

REFERENCES

[1]. International Journal of Research in Engineering, Science and Management Volume-1, Issue-12, Decembe-2018 : Employee Tracking and Attendance Manageent Syste Using RFID : Krishnendu Nair1, Priya Rajput2, Sofiya Rao3, Laxmi Tanavarappu4.

[2]. Gregory Alan Raven, Granite Falls, WA (US); Jason Harrigan, Sultan, WA(US); Rene Martinez, Seattle, WA (US); Pavel Nikitin, Seattle, WA (US); Shashidhar Ramamurthy, Seattle, WA (US); David William Gilpin, Everett, WA (US); Stephen Kelly, Marion, IA (US), "An Introduction to RFID Technology", INTERMEC, INC., Lynnwood, WA (US), Patent No: US 10,062,026B2, Aug. 28, 2018.

[3]. O. Shoewu, O. Badejo, "Radio frequency identification technology: development application and security issues", The pacific journal of science and technology, vol. 7, no. 2, 2006.

[4]. R. G. Qiu, "RFID-enabled automation in support of factory integration", Robotics and Computer-Integrated Manufacturing, vol. 23, no. 6, pp. 677-683, 2007.