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AUTOMATED PAY AND USE BROWSING AND PRINTING MACHINE USING IOT

S.Thangavel*, E.B.Priyanka
Department of Mechatronics Engineering, Kongu Engineering College, Perundurai, India.
Email id: thangavel.mts@kongu.ac.in, priyankabhaskaran1993@gmail.com

Abstract
The existing system function as a multiple unit like computer setup and printing unit is fixed at different location and an intermediate person will be there to do the printing process. The existing system faces some difficulties like structure is not compact, all the units are installed at a different location, Customer needs 24*7 service, but the service is not available in all the times. The service timing is limited up to the availability of the labor. The Automated pay and use browsing, and printing machine is a type of vending machine which performs 24*7 browsing and printing service. The system can be implemented in the public places, educational institutions etc. The setup works on the time-based control system based on the amount paid as the input for browsing and printing separately. The main controller is the Raspberry Pi which controls and monitors the complete browsing and printing process. The separate coin collector device is interfaced with it to collect the amount for browsing and printing service. A continuous monitoring is done through IoT which helps to monitor the machine 24*7 which provides data like number of printout taken, browsing time. This makes the performance monitoring process easy.
Keywords: Automated Pay; IoT; Printing Machine

1. INTRODUCTION

When the world is running hastily with advancement, time is the undisputedly the most valuable resource of all. It becomes inevitable to save the time by all possible means. In places such as shopping malls, wholesale and retail outlets, automation is incorporated for the automatic delivery of the products to the customers. A vending machine is a machine that dispenses items such as snacks, beverages, alcohol, lottery tickets, cologne, consumer products, and even gold and gems to customers automatically, after the customer inserts currency or credit into the machine. For instance, the automatic Cool drink vending machine, ice-cream vending machine, chocolate vending machine, water/tea/coffee vending machines, etc. can be increasingly found to encroach the shops nowadays, which reduces the time and reduce the human effort required to recognize, search, count and deliver the product along with the cash handling. The Automatic Teller Machine (ATM) is the best example of all, for the application of engineering principles to reduce time and human effort. Automatic pay and use browsing and printing machine is such a vending machine. This machine is automated for providing 24 hours service for the customers.

Ben Ammar Hatem, et.al (2014) the paper titled as "Bus Ticket Vending Using RFID" describes a novel approach to integrate RFID (Radio Frequency Identification) in WSN (Wireless sensor network). Besides, using the WSN we can monitor the environment of an object and optimize RFID reader's performance and energy. Feisal Mahdi Hasan et. Al (2014) the paper titled as" RFID-based Ticketing for Public Transport System: Perspective Mega city Dhaka", portrays about the public transport ticketing system, prevailing in the south of megacity Dhaka (Bangladesh), introduces severe malfunction in the system, malicious argument among public, corruption and most of all traffic jam. Ana Monga et.al (2014) this paper titled as "Finite State Machine based Vending Machine Controller with Auto-Billing Features" portrays about Vending Machines are well known among Japan, Malaysia and Singapore. The quantity of machines in these countries is on the top worldwide. Hence the objective is to design an automated browsing and printing machine and to fabricate the machine for providing 24x7 service for the customers by interfacing with IoT for providing continuous monitoring.

1.2EXISTING & PROPOSED BROWSING & PRINTING SYSTEM-DEMERITS/MERITS

The existing system demands manual work and the components are not functioned as a single unit. Labor is required for maintaining the browsing time and cost for printing. Customer needs 24x7 service, but the service is not available in all the times and the service timing is limited up to the availability of the labor. But the merit of the proposed is that the whole process is automated such that one can be able to use it when the transaction is done in the correct way. The machine can always be moved to other areas if need arises and it will continue delivering the services as usual. One can browse and print for his or her intended on a 24 hour, throughout the year.

2.PROPOSE AUTOMATED PAY & USE BROWSING AND PRINTING SYSTEM

The design of an automated browsing and printing machine starts with preparation of 2D CAD model as shown in the below figure. The Mechanical structure of the machine model is fabricated using plywood and the components are placed in the mechanical setup. The entire process is controlled using a Raspberry pi controller. The programming is done using python software; a LCD monitor interface is used for browsing and a printer is used for printing. A coin acceptor is interfaced for providing the money based on the required output. The entire process can be monitored using IoT.

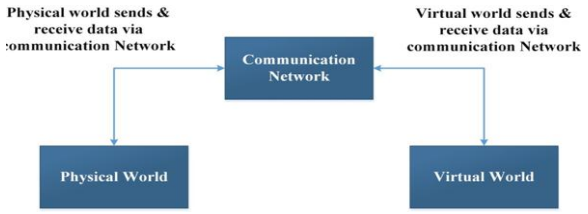

Fig.1 Block diagram representation of internet of things.

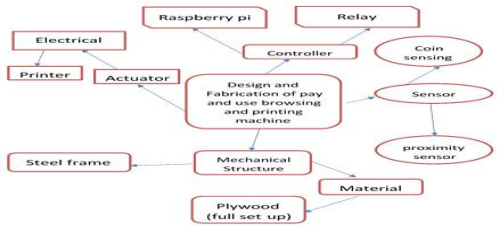

Fig. 2 Conceptual design of proposed automated system

3.EXECUTING METHODOLOGY OF AUTOMATED BROWSING &PRINTING SYSTEM

The automated browsing and printing machine is provided with a coin acceptor, which accepts the coins of the customer and provides the service in **Figure 2**. The time for browsing is based on the amount provided by the customer. The printing process separately requires the customer to provide the coin. The response will be closed within the time provided. If the user wants to continue browsing, another coin is to be inserted. The user interface screen is user friendly. Sample coin is placed in the coin acceptor. It only accepts coins as that the of sample coin. If other coin is inserted, the coin will be rejected by it. The user interface scree will be available only after the coin is inserted into the coin acceptor. The entire process is controlled using a Raspberry pi controller. The programming is done using python software; a LCD monitor interface is used for browsing and a printer is used for printing the entire process can be monitored through IoT. It works with continuous monitoring of operation, hence within the given operating conditions, the chances of failure in the machine will be less. There is no need of man power to operate the system. Lifetime depends on usage and maintenance. The mechanical setup of the proposed system is simple and easy to fabricate. The machine contains coin acceptor and an additionally bar code scanning which makes user friendly operation to the customer. The

IOT allows things in the physical world (IOT devices/objects) to interact with the virtual world (cloud services, platforms and applications) through a communication network enabling exchange and sharing of context aware information with each other. So, any IOT system is built from the physical world, virtual world and a communication network. These three are broadly the basic blocks of an IOT system. So, an IOT system can be precisely represented by the following block diagram of **Figure 1.**

mechanical and electrical components utilized are given in **Table 1.**

Table 1 Components implemented in automated browsing & printing system

Materials	Specifications
Raspberry Pi	Pi3, model B ARMv8 64bit
Coin acceptor	COM-11719 (3-coin type)
Monitor	14-inch, LCD monitor
Printer	HP, desk jet color printer 2135
Plywood	5mm

The Automated pay and use browsing, and printing machine is a type of vending machine which performs 24x7 browsing and printing services. The main controller is the Raspberry Pi which controls and monitors the complete browsing and printing process. The corresponding work flow is given in **Figure 3**.

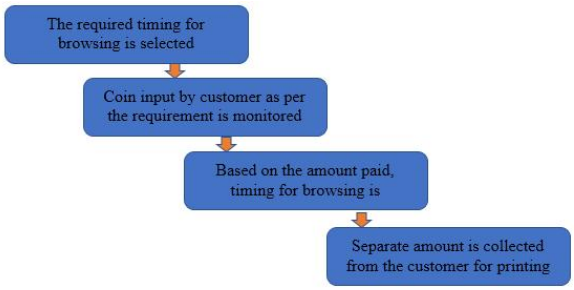

Fig. 3 Block diagram of work flow in the automated process

The power supply is fed to the input, output devices and the controller. All the components are interfaced with each other using the wire. At first, the proximity sensor feeds the input to the controller depending on which the controller produces the respective output signals to the output devices.

RASPBERRY PI 3 MODEL B with processor Broadcom BCM2387 chipset, 1.2GHz Quad-Core ARM Cortex-A53802.11 b/g/n Wireless LAN and Bluetooth 4.1 (Bluetooth Classic and LE). The CPU holds Dual Core Video Core IV® Multimedia Co-Processor. Provides Open GL ES 2.0, hardware-accelerated Open CV, and 1080p30 H.264 high-profile decode. Capable of 1Gpixel/s, 1.5Gtexel/s or 24GFLOPs with texture filtering DMA infrastructure with memory of 1GB LPDDR2 and the operating system which Boots from Micro SD card, running a

version of the Linux operating system or Windows 10 IoT. The coin acceptor will take the coin which is same as the sample coin provided. The sensors in this coin acceptor use the thickness, diameter and fall time of the coins to identify them and it's fully programmable so you're not limited to any currency. Simply use the buttons and 7-segment display on the side of the unit to select a coin profile, based on the programmed the coin profiles, the coin acceptor will recognize them and report when each type is inserted, rejecting other coins. A computer monitor is an output device which displays information in pictorial form. A monitor usually comprises the display device, circuitry, casing, and power supply. The display device in modern monitors is typically a thin film transistor liquid crystal display (TFTLCD) with LED backlighting having replaced cold-cathode fluorescent lamp (CCFL) backlighting. The common aspect ratio of televisions, and computer monitors, has changed from 4:3 to 16:10, to 16:9. In this project HP desk jet printer is used because Raspberry Pi can be interfaced only with these printer and to implement IoT. Plywood is a sheet material manufacture from thin layers or "Plies" of wood veneer that are glued together with adjacent layers having their wood grain rotated up to 90 degrees to one another. Proximity sensor receives input signal detect the presence of nearby objects without any physical contact. It often emits an electromagnetic field or a beam of electromagnetic radiation and looks for changes in the field. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. **Figure 4** shows the operation of embedded system programmed by incorporating with IoT.

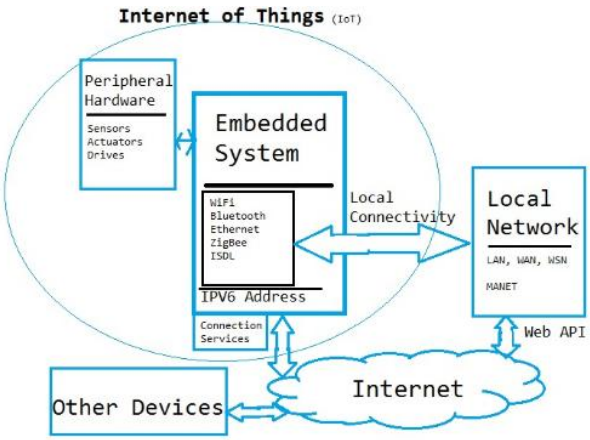

Fig. 4 Proposed system with IoT architecture.

Sensing and Actuating Devices - The sensing and actuating devices are equipped with sensors and actuators that enable them to interact and impact the real world. The sensors collect information pertaining to real physical quantities like temperature, humidity, light intensity, force, density etc and pass it to the on-board controller/processor. The controller or processor store the information (temporarily) and pass it on to the communication network. Through various layers of communication network, it is received at the cloud or server. The cloud process information and send back useful insights to operate actuators.

Gateway Requirements: The IOT device may setup communication with other devices through a gateway or without a gateway. The gateways are basically required for protocol conversion. Suppose, an IOT device can send and receive data through Zigbee interface and so will communicate through Zigbee protocol. The communication network may be able to receive and send data through TCP-IP protocol. In such case, there will require a gateway which could convert data coming through the device using Zigbee protocol to data transmission through TCP-IP protocol and data coming from cloud or server through TCP-IP protocol to Zigbee protocol for reception by the IOT device. Since the communication network and the on-board network of the IOT device are different, the gateway act as a two-way bridge between the two networks.

The gateway collects and extract the (sensor) data as per the device protocol, wrap and format it according to the protocol the communication network be operating at and push data to the communication network for transmission to the cloud or server. Same way, it receives and extract data, insights or information from the cloud or server, wrap and format it according to the network protocol utilized by the on-device network and push the cloud processed data to the IOT device. The **Figure 5** shows the real time implementation of IoT based automated browsing and printing system setup.

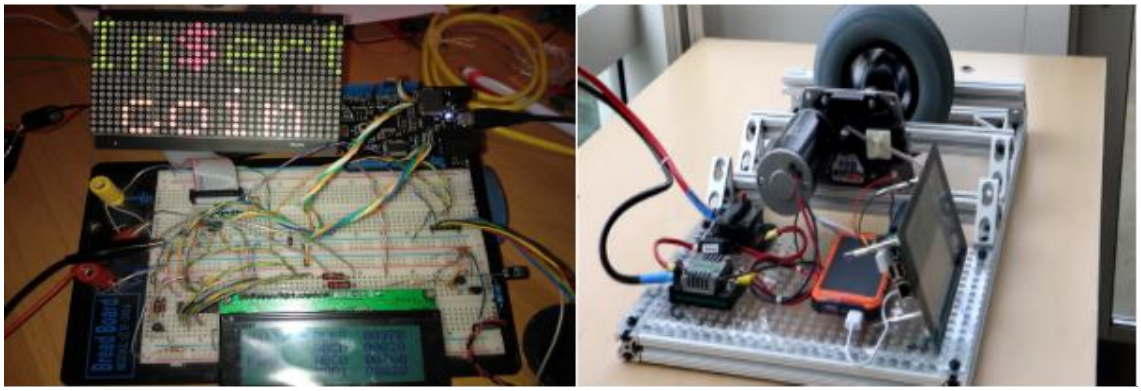

Fig. 5 Configuration of coin setting and interfacing with printing motor from PC.

The IOT devices (IOT boards) may have a firmware, operating system or real time operating system to process data, perform messaging and communication, manage data storage and manage actuator operations. Some of the popular IOT operating systems are Embedded Linux, TinyOS, Snappy Ubuntu Core, Contiki, FreeRTOS, Mantis, ARM's mbedOS, RIOT OS, Windows 10.

Communication Network - The communication network is generally the typical internet network having different layers (Physical, Link, Network, Transport and Application) and communication protocols operating at different layers.

Cloud/Server - The cloud or server is the edge of the IOT system. A cloud stores data collected from different and myriad of IOT devices and perform data mining and analytics to derive useful insights from it. It is also responsible for managing the connected devices and networks, manage device to device communications and implement IOT applications by operating and synchronizing different IOT devices and communication between together. The cloud may also communicate with other private and public cloud services to enable an IOT application.

IOT Application - The processing, mining and analysis of the data at the cloud is done by the IOT application. The IOT application is the piece of software at the cloud server which extracts data, manipulate it to derive useful insights and manage to securely push insights to the target IOT devices. An IOT application designed for browsing and printing automation might process data from sensors and send commands from the cloud to operate printer and computer for browsing and keep records of sufficient system.

4.CONCLUSION & FUTURE SCOPE

Thus, automatic system for browsing and printing is fabricated and experimentally validated in real-time by interfacing all the mechanical, electrical and electronics system to provide 24x7 service for the customers using IoT. The machine opens the user interface screen, after inserting the coin and the response will be closed within the provided time. Number of print taken is send to the corresponding mobile phone. The future scope is to make the availability of this automated machine in all public places, educational institutions and offices.

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