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A Review Paper on Automated Fuel Pump Security System

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Abstract – The paper proposes an automated system for fuel pumps which aims at safe and secure fuel delivery, ensuring that the customer gets the equivalent amount of fuel for what he or she has paid, hence successfully eliminating any sorts of fraud or malpractices that mightoccur at a fuel pump station. The existing system involves resetting the transaction when the nozzle has been placed back on the dispenser, which, subsequently leads to misconducts as the operator may or may not reset the same and fuel the vehicle with inappropriate or lesser amount of fuel. The proposed system makes use of a RaspberryPi for resetting the fuel vending machine. It will automatically reset the dispenserwhen the vehicle passes the unit, this will prevent the possibility of fuel theft. The system will also use Bluetooth smart for communication between the RaspberryPi and the reset logic.A RaspberryPi camera will monitor the fueling area which will be displayed to the customer on a screen.

Keywords:-*RaspberryPi, RaspberryPi camera, IR Sensor, Bluetooth Smart.*
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I. INTRODUCTION

The 21st century is known as the automation era because of the increasing use of automated system in the day to day activities. Examples of these applications are robotic arms in automobile industries, automated mining, home automation, etc. As far as automation in fuel pump is concerned, a lot has been done in this field, but as far as safety is concerned, some improvisation is required. The aim of the system is to control the operation of fuelling and give out the customer the amount he demands. We will use RaspberryPi for this purpose. Screen provided at the fuel station will help the fuel company to create authentication for user by making live visuals of fuelling available to him or her. The advancement of this project can help the industry financially as well. The proposed system will consist of three units, two of which will be placed at fuel station which will take care of customers' needs & also, will continuously monitor reset signal ensuring the end customer receives appropriate amount of fuel, and the other is the camera surveillance at the fuel station. The third unit is the data base regarding backup of data on cloud storage. The RaspberryPi B+ module will act as a link between the reset logic and the fuel dispenser. The use ofRaspberryPi B+ will provide complete security & automation in distribution of fuel. The software part of this project will help to keep record of all the transactions which might be required for further reference.

II. EXISTING SYSTEM

Presently, the fuel pumps are distributing fuel using manpower to respective customer vehicles and are immensely dependent upon the loyalty of the person doing this job. This distribution system has a lot of disadvantages such as theft of the fuel, illegitimate fuel selling & wastage of manpower. Most of the fuel stations today work simultaneously as conventional stores which raises security concerns exponentially.Constant monitoring of the fuel pumps is required that involves recording all the activities and providing concrete evidence in the event of a crime.[1]

III. PROPOSED SYSTEM

Nowadays, industries have become highly vigilant about malpractices and are trying to centrally control all the production and distribution of products. For the secure distribution of products, industries are trying to develop advanced security systems to achieve these goals. Our project offers an encompassing security to protect the existing system. Small and medium sized fuel pump stations usually have limited security budgets and it is difficult for them to invest in pricey electronic systems for their security. Combination of various physical measures and careful selection of electronicequipment, will help the smaller retailers to cost-effectively increase the safety of stock, staff and customers. This security system can help small fuel stations to reduce blind spots with careful positioning of video cameras; restrict access to the fuel dispenser in absence of a vehicle, and clamp down on theft by live streaming of all activities, gather high quality video evidence for prosecution.

A. Architecture of proposed system

The system comprises of a RaspberryPi B+ module, which will be the control element of the system. The presence of vehicle will be sensed by an array of IR sensors, which will provide a signal to the RaspberryPi to reset the fuel dispenser when no vehicle is present. The RaspberryPi camera present near the dispenser will provide with live streaming and will click images of the transaction, whose output will be provided on a monitor screen present in front of the customer, the clicked images will be uploaded on a cloud server for further reference. The system also has a facility to automatically reset the dispenser when there is no fueling for fewseconds, which will be the threshold time limit, where the flow of fuel will be sensed by the flow

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sensors connected to the nozzle andtheywill provide the reset signal to the RaspberryPi using a Bluetooth Smart so as to reset the dispenser.

The RaspberryPi B+ model has the following signals at its input:
a) Output of webcam
b) Output of sensor array
c) Output of Bluetooth Smart

Following output signals:
a) Data output to Ethernet cable
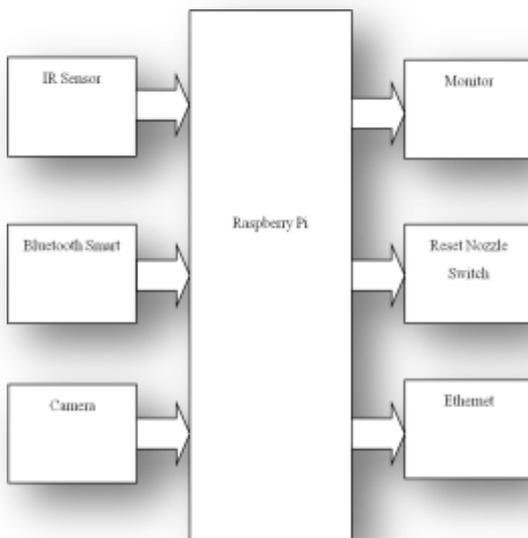b) Video out through HDMI to screen
c) Reset command to microcontroller

Fig.1: Block Diagram of AutomatedFuel Pump Security System

B. RaspberryPi B+ model for central processing

The central processing unit of the system is Raspberry Pi B+ module. The RaspberryPi popularly known as the credit cardsized computer is developed in the UK by the RaspberryPi Foundation. The foundation provides users with Debian and Arch Linux ARM distributions for download and development. Python is available as the main programming language, with support for BBC BASICand it also supports C, C++, Java, Perl and Ruby. [2]

Fig.2:RaspberryPi B+ model[3]

C. IR sensor for vehicle detection

An array of IR sensors connected near the vending machine will be used to sense the presence of the vehicle. When no vehicle is present near the dispenser the IR sensor sends a trigger to RaspberryPi which will send the reset signal to the dispenser. The IR sensor used in the system isSharp GP2Y0A02YK0F. The sensors have a range from 15cm to 150cm and its output voltage varies between 4.5V and 5.5V. [4]

Fig.3: Sharp GP2Y0A02YK0F IR sensor [4]

D. RaspberryPi camera for monitoring

The RaspberryPi camera mounted near the vending machine will monitor the entire fuelling process. It will provide continuous live streaming and also click still images on receiving the trigger pulse. The module used in the systemwill be a 5 megapixel fixed focus camerawhich can also be used for recording high definition videos at 1080p30, 720p60 and also low resolution VGA90 videos. It can be used for time-lapse, slow-motion and other video cleverness. The user can also use the libraries bundled with the camera to create effects. It can be accessed through the MMAL and V4L APIs, and there are various third-party libraries available for it, including the Pi-camera Python library.[5]
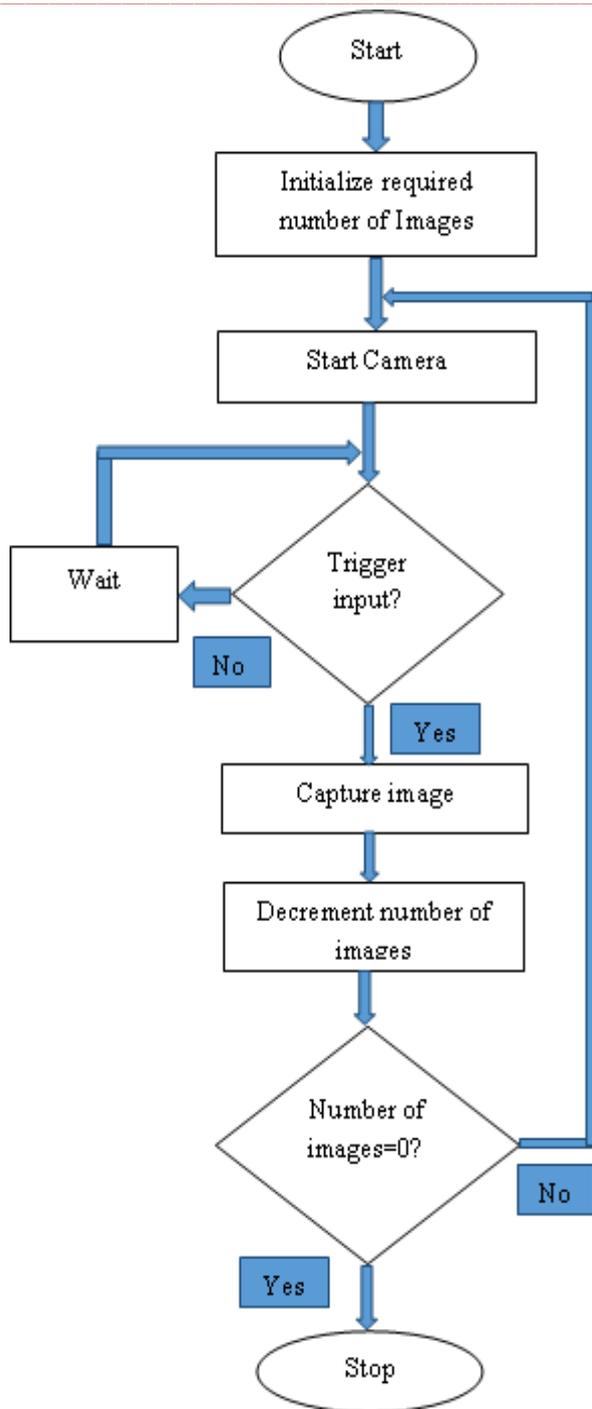

Fig.4:RaspberryPi-camera[6]

Fig.6: Bluetooth Low Energy Chip[7]

CONCLUSION

In the world of electronics it is important to develop the new technology to secure the distribution of fuel & keep record of the same with authorization of user. Our project is one idea that can change today's face of manual fuel distribution & data keeping. The total central access of these activities provide correct approach towards security & economical need of industries since industry itself can control the distribution and keep record of the transactions while sitting in the office. This project can be implemented for tasks other than fuel distribution, on large scale to achieve various goals of industries

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Fig.5: Flow Chart for capturing Image

E. Bluetooth Smart (Bluetooth Low Energy)

Bluetooth low energy chip used in the system will act as a communication medium between the nozzle and Raspberry Pi, when there is no flow of fuel or the trigger of the nozzle is not pressed, the BLE will send a signal to Raspberry Pi informing it to reset the transaction after a threshold time limit.