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Occupancy Monitoring and Recognition System Using Internet of Things and Raspberry Pi

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Abstract: ***People observation and counting is of interest in many commercial and non-commercial scenarios. The number of people entering and leaving shops, the occupancy of office buildings or the passenger count of commuter trains provide useful information to shop merchants and marketers, security officials or train operators. The work in this proposed system focuses on an implementation of Open CV in an embedded system like raspberry Pi to create a standalone system for counting peoples. The key feature of proposed system is to count number of peoples on targeted pre-defined area along with simple face identification to avoid counting duplicates. The system includes the face recognition algorithm to differentiate the visitors and staff of the particular organization. The proposed system also providing the feature of updating the counting information on server through IoT concept, from there we can access the count information through mobile application.***
Keywords: Raspberry pi, Internet of Things, open CV, people count, mobile application.

I. INTRODUCTION

Individuals including device might be connected different space names, for example, libraries, resources, air terminals, office shops. In school and open libraries, a people tallying framework can streamline the accompanying abilities.

A. Keep in compliance

Library representatives can document each year records to the state as needed. They can remain inside accounts limitations by utilizing keeping work potential outcomes or restricting innovation utilization.

B. Make cases to administration

With individuals checking information, libraries can impart top notch numbers to selected authorities or board people to illustrate their requirement for increased or diminished hours of operation and extra staffing, innovation or administrations. They can demonstrate that utilization has improved, irrespective of the opportunity that dissemination is down. By introducing an entryway counter over the PC lab, libraries can utilize motion numbers to gage their constructing innovation use. They can increment or decline the measure of innovation available in view of precise records.

C. Make informed business decisions

Entryway counters allow libraries to explore which doorways are utilized most extreme and which rooms and times are the busiest. With this data, they can manual the position and timing of bistros, refreshments, booths, uncovers, guest speakers, take a gander at organizations, et cetera. Precise people checks additionally are a way for libraries to development their acknowledgment of what number of people is the utilization of offerings however now not discovering fabric.

Here are some of the benefits of counting people: At the point when interest is fluctuating, enterprise is fluctuating. Be that as it could, do you usually understand the factors which might be influencing movement? You might imagine deals reports and a walk around the strip mall or gallery divulge to all of you approximately your guests and customers. Be that as it is able to, a human beings checking framework resembles having a multitude of individuals taking a gander at your building, continuously, each day of the 12 months. We can permit you to peer styles. We can enable you "to zoom out" and reach beyond the existing offers or guest figures. Here are a few factors that may be surveyed when you.

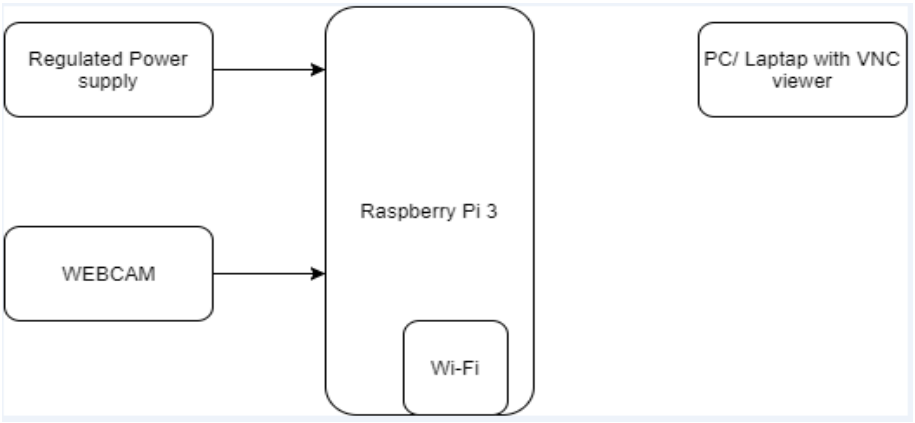
II. PROPOSED SYSTEM

The system implemented is targeted at using Raspberry Pi due to being low-cost and self-contained. An only accessory required for this proposed system is webcam and Wi-Fi for updating to IoT. The model used in this project is Raspberry Pi 3 model B with 8 GB

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class 10 micro SD card, which is powered by 700Mhz single-core ARM11 microprocessor and 512MB RAM analog side 4 USB ports, HDMI connector.

A. Block diagram



B. Hardware details



Fig. 1 Raspberry Pi

C. Raspberry PI

The Raspberry Pi 2 makes utilization of a 32-bit 900 MHz quad-center ARM Cortex-A7processor.The Broadcom BCM2835 SoC applied as a part of the unique Raspberry Pi in all fairness unbiased to the chip applied as part of first modern age cell phones (its CPU is a extra hooked up ARMv6 engineering), which incorporate a 700 MHz ARM1176JZF-S processor, Video Core IV illustrations making ready unit (GPU), and RAM. It has a stage 1 (L1) reserve of 16 KB and a stage 2 (L2) shop of 128 KB. The degree 2 shop is applied mainly by means of the GPU. The SoC is stacked below the RAM chip, so simply its facet is plain.in advance fashions of Raspberry Pi 2 use a Broadcom BCM2836 SoC with a 900 MHz 32-bit quad-core ARM Cortex-A7 processor, with 256 KB shared L2 cache. The Raspberry Pi 2 V1.2 altered into improvement to a Broadcom BCM2837 SoC with a 1.2 GHz 64-bit quad-core ARM Cortex-A53 processor, the equal SoC which is used on the Raspberry Pi 3.The Raspberry Pi 3 utilize a Broadcom BCM2837 SoC with a 1.2 GHz sixty four-piece quad-center ARM Cortex-A53 processor, with 512 KB shared L2 store.

D. Power supply

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1) *Transformers:*Transformers are instruments which wander down a for the most part higher AC statistics Voltage into a lower AC yield voltage. To discover the statistics and yield terminals of a transformer is exceptionally crude. Fundamentally transformers are two sorts. Those are venture down and advance up transformer. Here we utilize venture down transformer.



Fig. 2 Transformer

2) *Rectifier:* Rectifier is a device that's applied to change over AC voltage to DC voltage. It is for the maximum element separated into Full wave and Half wave rectifiers. At the point whilst ahead one-sided there might be voltage drop in diodes of round 0.7v.

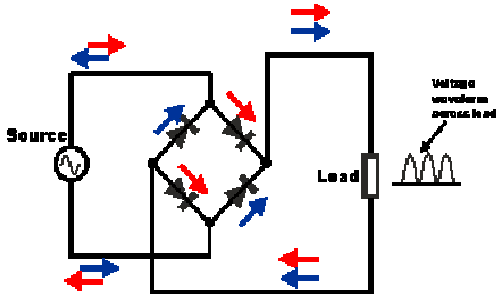


Fig. 3 Bridge rectifier circuit



Fig. 4 Bridge rectifier

3) *Capacitors:*Capacitors are utilized to get the perfect and smoothest DC voltage in which the rectifier is utilized to get throbbing DC voltage which is utilized as a part of the light of the present destiny, from the connector. Capacitors are utilized to get square DC from AC current experience of the present channels so they are used as a touch of parallel to the yield. Moreover, if there is a swell in the data or yield, a capacitor changes it by discharging the charge set away in it.

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Fig. 6 Capacitor

4) Voltage regulators: he 78XX voltage controller is mainly overall utilized controller for voltage controllers. The XX speaks to the voltage of which the voltage controller delivers as the give up to the specific gadget. 7805 will deliver and control the give in voltage of 5v and 7812 will create the give in voltage of 12v. The voltage controllers are that they need no under 2 volts more than their yield voltage as information. For instance, 7805 will require no under 7V, and 7812, no under 14 volts as information sources. This voltage which ought to be given to voltage controllers is called Dropout Voltage.

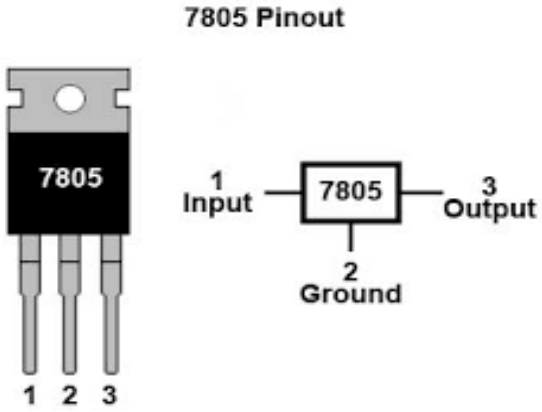


Fig. 5 Voltage Regulator

5) Webcam: A webcam is a video camera that feeder streams its image in real time to or through a computer to a computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other network via systems such as the internet, and emailed as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there. Unrelated an IP camera (which connects using Ethernet or Wi-Fi), a webcam is normally connected by a USB cable or built into computer hardware, such as laptops.



Fig. 7 Web cam

Webcams are known for their low manufacturing cost and their high flexibility, making them the lowest-cost form of video telephony. Despite the low cost, the resolution offered at present is rather impressive, with low-end webcams offering resolutions of

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320×240, medium webcams offering 640×480 resolution, and high-end webcams offering 1280×720 (aka 720p) or even 1920×1080 (aka 1080p) resolution. They have also become a source of security and privacy issues, as some built-in webcams can be remotely activated by spyware.

E. Software details

1) Raspberry Pi Os

a) Introduction: Raspbian is a free working frame in light of Debian streamlined for the Raspberry Pi equipment. A working structure is the agreement of essential projects and utilities that influence your Raspberry Pi to run. Be that as it may, Raspbian gives more than an unadulterated OS: it accompanies more than 35,000 bundles pre-assembled programming packaged in a decent arrangement for simple establishment on your Raspberry Pi. The basic form of more than 35,000 Raspbian bundles, enhanced for best execution on the Raspberry Pi, was finished in June of 2012. Be that as it may, Raspbian is still under dynamic enhancement with an accentuation on enhancing the security and execution of whatever number Debian bundles as could be expected under the circumstances.

III. CONCLUSION AND FUTURE SCOPE

This proposed system present an approach to count people passing through a virtual gate using a fixed web camera mounting vertically on the raspberry Pi board and Python programming tool linked to the application. The results show that using a camera to count people is good alternative to other sensors for big entrance because more accurate. Providing the remote monitoring through IoT concept is a one of the great feature of the proposed system.

Further the system also implemented to get the paperless and time saving attendance system for staff members.

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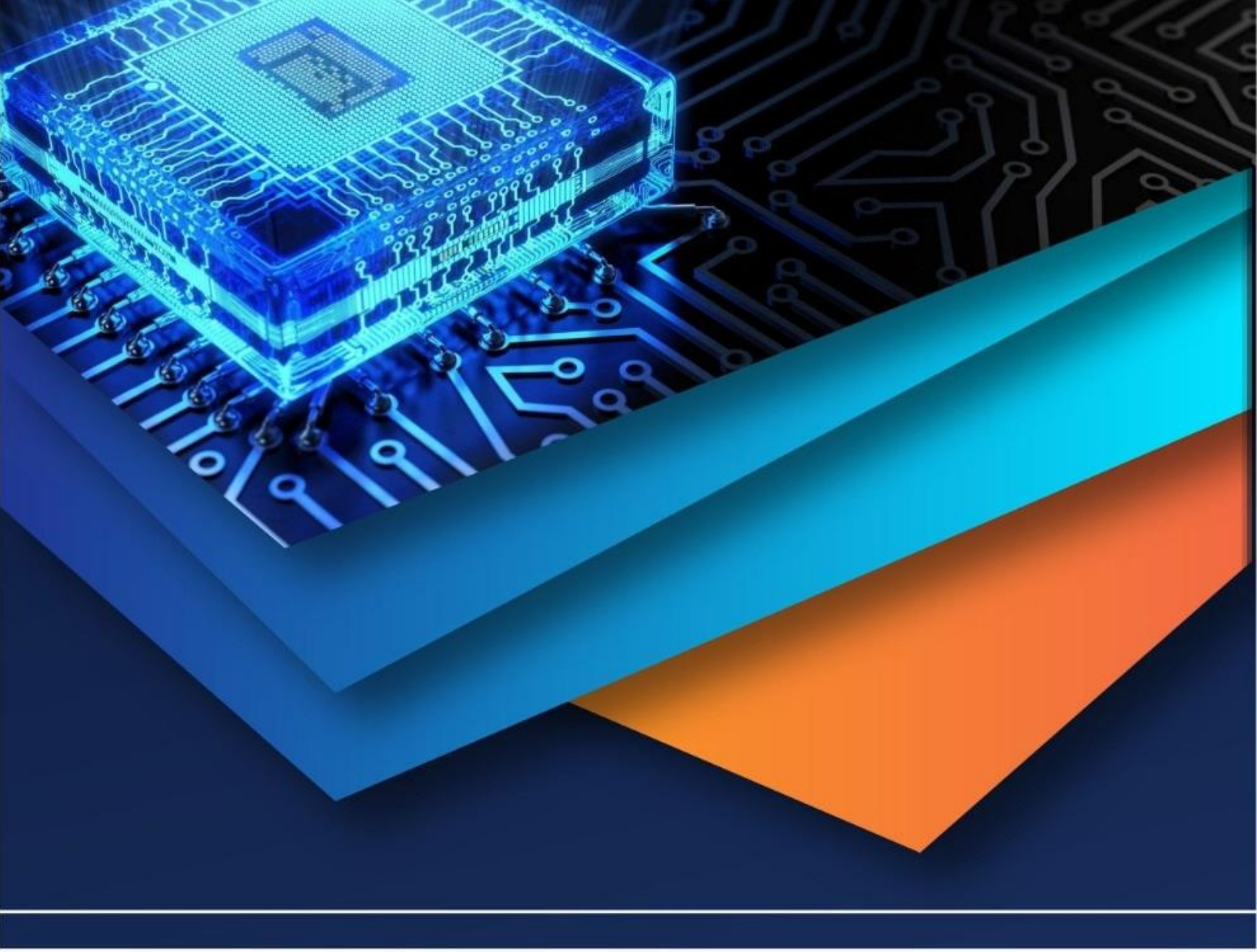
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