Attendance Monitoring Systems for an Organization

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Abstract **-** *Image processing based student attendance System is the easiest way to keep track of attendance for organizations such as Educational Institutions, Business organizations. Among the person identification methods, face recognition is known to be the most natural ones; since the face modality is the modality that uses to identify people in everyday lives. Although other methods, such as fingerprint identification can provide better performance, but they are not appropriate for natural smart interactions due to their intrusive nature. This face detection differentiates faces from non faces and is therefore essential for accurate attendance. Our Proposed strategy involves face recognition for marking the student attendance. Arduino microcontroller is used for face detection and face recognition. The camera will be connected to the Arduino module. The student database is collected. The database includes name of the students with their registered numbers and their face images. Camera will be placed in front of the class in such a way that it can capture the entire class, which is connected to the Arduino. Thus with the help of this system time will be saved and it is so convenient to record the attendance at any time throughout the day.*

Keywords- Arduino, microcontroller, camera, Image, Face.

I. INTRODUCTION

Maintenance of student attendance is that the for most tough task in various institutions. Each institutions has its own method of taking human face like biometric methods group action sheet or by some biometric strategies. Mostly student attendance is infatuated with the help of attendance sheet given to the college staffs. This consumes a lot of work and time. We don't know whether the student is responding or not. Calculation of consolidated student attendance is another major task which may cause manual errors. In another cases the human

work sheet might become lost or stolen by some of the students. To overcome such problems we've got a bent to stand measure of another method of attendance management system. There are several biometric strategies offered in which the basic idea is same. One of them told that is the finger print identification is the best concept. During this system the finger prints of the people are collected and hold on within the data of finger print sensor. For this first we've to assemble the finger print of each individual. This is often done only one time or once a replacement entry must be within the knowledge. Then the obtained finger prints are measured and compared with the images that stored in our database. If the two finger prints are same the attendance is marked as present. However this technique has some other disadvantages. They are unbroken properly or if the finger print isn't recognized properly then the act are visiting be marked as absent. There fore this system isn't best. These disadvantages can be overcome with the help of machine-controlled attendance management which does not consumes time and also the data isn't lost till we've got an inclination to erase the data. This technique is best in these day. Our project is going to solve these issues by using face recognition technology. For wireless data transmission and networking between sensor nodes, the project uses IOT modules. The project is supposed straight away on the instance basis with simply few profiles however we'll add even additional once required. Identity verification or face recognition because it's usually spoken as, analyze the characteristics of an individual's face image input through a camera. It measures overall facial structure, distances between eyes, nose, mouth, and jaw edges. These measurements are measured and maintained in an exceedingly information and used as comparison

for a user stands before the camera. One of the strongest positive aspects of face recognition is that it's non-intrusive. Verification or identification are accomplished from 2 feet away or more, while not requiring the user to wait for some time or do something over the camera. Face recognition technique can't be reverse-engineered to recreate personal data and they will not be stolen and to access personal data.

II. OBJECTIVE

Instead of using conventional methods, this proposed program aims to develop an automated system that records the presence of a student using face recognition technology. The main purpose of this project is to make the attendance and management system more efficient, time-saving, simple and easy. Here faces will be detected using face recognition algorithms. The processed image will then be compared to the existing record and the presence will be marked on the website accordingly. Compared with the existing traditional marking system, this system reduces people's workload. The proposed program will be implemented in 4 phases such as photography, group photo classification and face detection, face comparisons and recognition, site review reviews.

III. PROPOSED SYSTEM

A. Face Recognition

A facial recognition system is a computer application capable of identifying an individual from a digital image frame from a image source. one of the ways to try to this can be comparing selected face expression from the image and a face database. It is typically utilized in security systems and might be compared to other biometrics like fingerprint or eye iris recognition systems. Recently, it's also become famous as a commercial identification and marketing tool.

B. Traditional

Some face recognition algorithms identify faces by extracting local symbols, features, image from the title image. for example, the algorithm may analyze the relative shape, size, and / or shape of the eyes, nose, cheekbones, and jaw. These features often require other images with similar characteristics. Some algorithms make the photo gallery more

custom so compress face data, saving only the inside information of the image which is useful for identifying faces. the demand image then compared to the face data. one of the first successful programs was predicted for modeling techniques used in the glowing facial group, which provides a kind of representation of the pressed face. Recognition algorithms are often subdivided into two main methods, geometric, looking at differentiating features, or photometric, which can be a mathematical method that converts an image into numbers and compares values with templates to eliminate variability.

C. 3-Dimensional Recognition

Three-dimensional face recognition technique uses 3D sensors to capture information about the form of a face. This information is then accustomed identify distinctive features on the surface of a face, like the contour of the attention sockets, nose, and chin. One advantage of 3D face recognition is that it's not stricken by changes in lighting like other techniques. It may identify a face from a spread of viewing angles, including a profile view. Three-dimensional data points from a face vastly improve the precision of face recognition. 3D research is enhanced by the event of sophisticated sensors that do a far better job of capturing 3D face imagery. The sensors work by projecting structured light onto the face. Up to a dozen or more of those image sensors is placed on the identical CMOS chip each sensor captures a distinct a part of the spectrum.

D. Skin Texture Analysis

Another emerging trend uses the visual details of the skin, as captured in standard digital or scanned images. this method, called skin texture analysis, turns the unique lines, patterns, and spots apparent during a person's skin into a topological space. Tests have shown that with the addition of skin texture analysis, performance in recognizing faces can increase 20 to 25 percent.

E. Thermal Cameras

A different style of taking a file included for face recognition is the use of web cameras, in which case the cameras will only see the top type and will ignore the topic accessories such as glasses, hats, or makeup. The debate over using hot images for face recognition is that face recognition information sites

limited. Diego Socolinsky, and Andrea Selinger (2004) studied the use of global warming recognition, and workplaces, and at the same time built a brand new website for face photography. The study uses low-aging ferro-electric sensors, which can detect radio wave thermal infrared (LWIR). The results show that the integration of LWIR with conventional visual cameras has major implications for external probes. Indoor results show that visuals include 97.05% accuracy, while LWIR is 93.93%, and Fusion is 98.40%, however externally proves that visuals are 67.06%, LWIR 83.03%, and integration than 89.02%. The study used 240 studies over a 10-week period to create a new database. information was collected on sunny, rainy, and cloudy days.

IV. BLOCK DIAGRAM
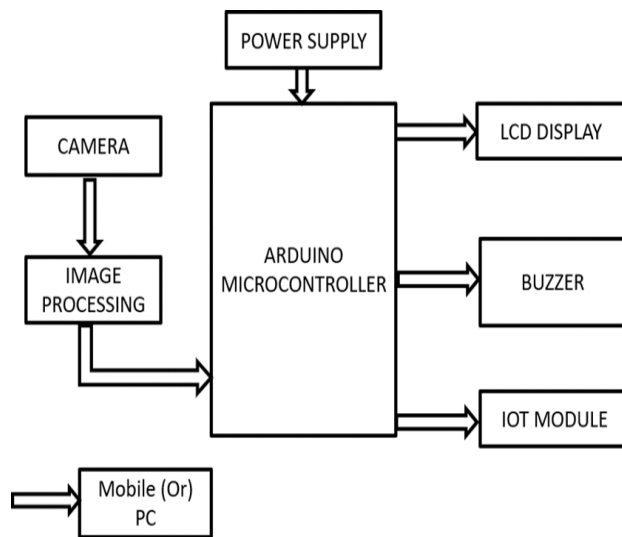
## V. HARDWARD REQUREMENTS

A. Power Supply

AC-DC adapter (wall-wart) or battery. The adapter may be related with the aid of using plugging a 2.1mm center-fantastic plug into the board's energy jack. Leads from a battery may be inserted withinside the GND and Vin pin headers of the POWER connector. The board can perform on an outside deliver from 6 to twenty volts. If provided with much less than 7V, however, the 5V pin might also additionally deliver much less than 5 volts and the board might also additionally come to be unstable. If the use of extra than 12V, the voltage regulator might also additionally overheat and harm the board. The encouraged variety is 7 to twelve volts. Vin. The enter voltage to the Arduino/Genuino board whilst it

is the use of an outside energy supply (in preference to five volts from the USB connection or different regulated energy supply). You can deliver voltage thru this pin, or, if imparting voltage through the energy jack, get admission to it thru this pin. 5V.This pin outputs a regulated 5V from the regulator at the board. The board may be provided with energy both from the DC energy jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage through the 5V or three.3V pins bypasses the regulator, and might harm your board. We do not endorse it. 3V. A three volt deliver generated with the aid of using the on-board regulator. Maximum present day draw is 50 mA. GND. Ground pins. IOREF. This pin at the Arduino/Genuino board presents the voltage reference with which the microcontroller operates. A well configured protect can study the CH pin voltage and pick the correct energy supply or permit voltage translators at the outputs to paintings with the 5V or 3V.

B. Arduino Microcontroller

Arduino Uno is a microcontroller board based on ATmega328. It has 14 input / output pixels (six can be used as PWM outputs), six analog inputs, 16 MHz crystal oscillator, USB connection, power supply, ICSP header, and reset button. It contains everything needed to help the little controller; humbly connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Arduino Uno is different from all previous boards as it no longer uses the FTDI USB-to-serial motive driver chip. instead, it enables ATmega8U2 configured as a USB-to-serial converter. Arduino Uno Board 2 update has a resistance that pulls the 8U2 HWB line down, making it easy to set up in DFU mode. "Uno" means one in Italian and was selected to mark the release of Arduino software (IDE) 1.0 software. The Uno Board and the 1-1.zero model of the Arduino software (IDE) software were the reference versions of Arduino, now converted to new releases. The Uno Board is the first in a series of USB Arduino boards, as well as the reference version of the Arduino platform; for an in-depth list of current, past or older boards see the Arduino index of the board. This is the Arduino Uno R3. As with all previous board functions, Uno now uses ATmega16U2 by selecting the 8U2 obtained from Uno (or FTDI available from previous generations).This allows for faster transfer costs and greater memory. No drivers wish for Linux

or Mac (home windows file is required and covered inside Arduino IDE), as well as the ability to display Uno like keyboard, mouse and many others. The Uno R3 also adds SDA and SCL pins near AREF. in addition, there are new pins near the RESET pin. Another IOREF that allows the shields to match the electricity supplied to the board. some are no longer connected and are set for future purposes. The Uno R3 works with all existing shields but is able to adapt to new shields that use these additional pin. Arduino Uno is a microcontroller board based entirely on ATmega328. Arduino is an open source , prototyping and its simplicity makes it ready for people who love to use it more than professionals. Arduino Uno has 14 digital input / output pins (6 of which can be used as PWM output), 6 analog inputs, 16 MHz crystal oscillator, USB connection, power jack, header of ICSP, and reset button. Contains all the lots needed to help the microcontroller; explicitly connect to a portable computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. Liquid crystal display is used to show the results of machine operation including reasonable values, vehicle image and more…. A liquid-crystal display (lcd) is a flat panel display, a digital visual display, or a video display using simple modular housing of liquid crystals. Liquid crystals no longer give off direct cooling. The liquid level display costs three deceptive lines and 8 I / O types of reality bus. The most widely used character based LCDs are based on Hitachi HD44780 controller or alternatively well-suited HD44580. In this tutorial, we are able to talk about human-based LCDs, their interactions with various microcontrollers, multitasking (8-bit / 4-bit), editing, special features and tips on these easy-to-use LCDs that can give a new look to use.
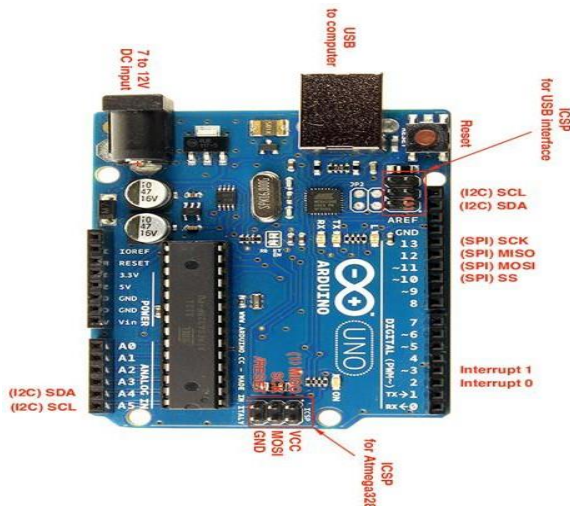
C. Liquid Crystal Display

Liquid Crystal Display is used to display machine performance results that include reasonable values, vehicle image and more…. A liquid-crystal display (lcd) is a flat panel display, a digital visual display using simple modular housing of liquid crystals. Liquid crystals no longer give off direct mild. The liquid level display costs three deceptive lines and 8 I / O types of reality bus. The most widely used character based LCDs are based on Hitachi HD44780 controller or alternatively well-suited HD44580. In this tutorial, we are able to talk about human-based LCDs, their interactions with various microcontrollers, multi-touch (8-bit / 4-bit), editing, special features and tips on these easy-to-use LCDs that can give a new look to your use.
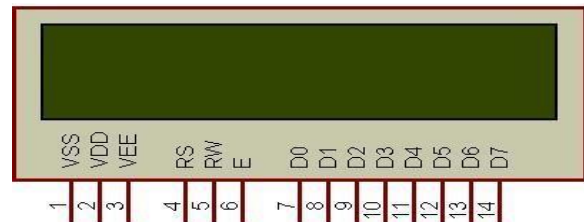

D. Internet of Things

The Internet of things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure. Experts estimate that the IoT will consist of about 30 billion objects by 2020. It is also estimated that the global market value of IoT will reach $7.1 trillion by 2020.The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber- physical systems, which also encompasses

technologies such as smart grids, virtual power plants, smart homes, intelligent transportation and smart cities. Things in the IoT sense, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, cameras streaming live feeds of wild animals in coastal waters, automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring, or field operation devices that assist fire fighters in search and rescue operations. Legal scholars suggest regarding "things" as an "inextricable mixture of hardware, software, data and service".

The applications for internet connected devices are extensive. Multiple categorizations have been suggested, most of which agree on a separation between consumer, enterprise (business), and infrastructure applications. George Osborne, the former British Chancellor of the Exchequer, posited that the Internet of things is the next stage of the information revolution and referenced the inter-connectivity of everything from urban transport to medical devices to household appliances.
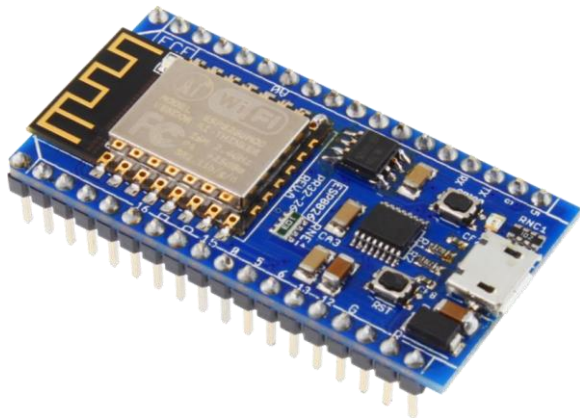
The ability to network embedded devices with limited CPU, memory and power resources means that IoT finds applications in nearly every field. Such systems could be in charge of collecting information in settings ranging from natural ecosystems to buildings and factories, thereby finding applications in fields of environmental sensing and urban planning. Intelligent shopping systems, for example, could monitor specific users' purchasing habits in a store by tracking their specific mobile phones. These users could then be provided with

special offers on their favorite products, or even location of items that they need, which their fridge has automatically conveyed to the phone. Additional examples of sensing and actuating are reflected in applications that deal with heat, water, electricity and energy management, as well as cruise-assisting transportation systems. Other applications that the Internet of things can provide is enabling extended home security features and home automation. The concept of an "Internet of living things" has been proposed to describe networks of biological sensors that could use cloud-based analyses to allow users to study DNA or other molecules.

Network control and management of manufacturing equipment, asset and situation management, or manufacturing process control bring the IoT within the realm of industrial applications and smart manufacturing as well. The IoT intelligent systems enable rapid manufacturing of new products, dynamic response to product demands, and real-time optimization of manufacturing production and supply chain networks, by networking machinery, sensors and control systems together.

E. Buzzer

It's simple, tone(buzzer, 1000) sends a 1KHz sound signal to pin 9, delay(1000) pause the program for one second and no Tone(buzzer) stops the signal sound. The loop() routine will make this run again and again making a short beeping sound. (you can also use tone(pin, frequency, duration) function) Play with the project now by changing the code. For example, try to change sound signal "1000" (1KHz) to "500" (500Hz) or delay time and see how it changes the program.

VI. SOFTWARE REQUIREMENTS

A. Lab VIEW

LabVIEW (short for Laboratory Virtual Instrument Engineering Workbench) is a system-design platform and development environment for a visual programming language from National Instruments. The graphical language is named "G" (not to be confused with G-code). Originally released for the Apple Macintosh in 1986, LabVIEW is commonly used for data acquisition, instrument control, and industrial automation on a variety of platforms including Microsoft Windows, various versions of UNIX, Linux, and OS X. The latest version of LabVIEW is LabVIEW 2015, released in August 2015.
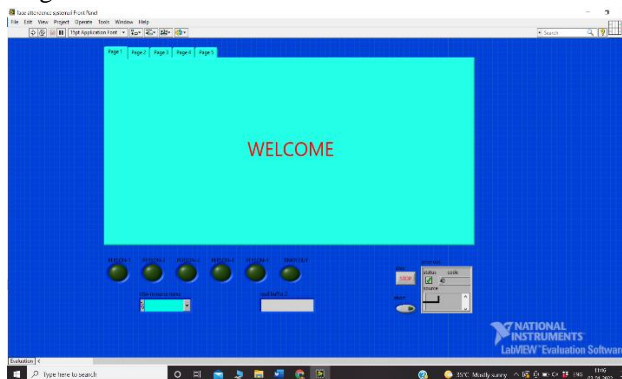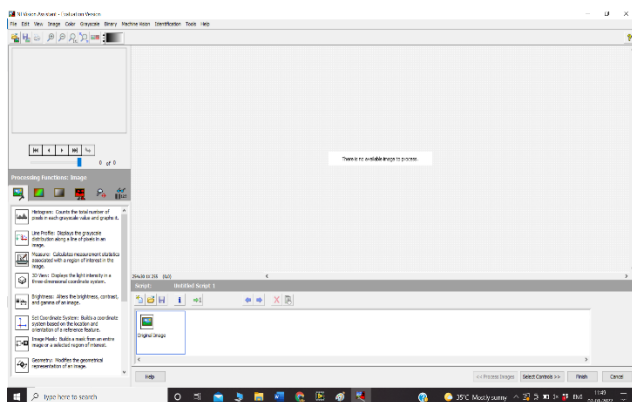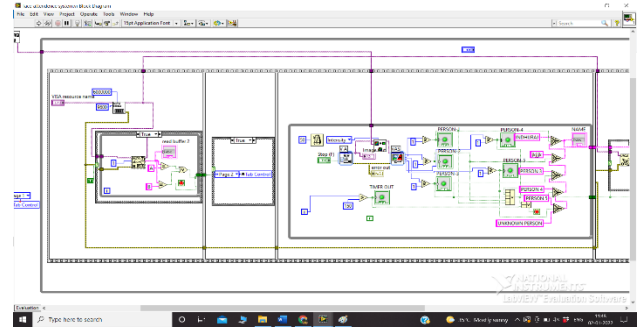
Final Output Screen in LabVIEW

Image processing in LabVIEW Software

Block Diagram of Image Processing

Dataflow Programming

The programming language used in LabVIEW, also referred to as G, is a dataflow programming language. Execution is determined by the structure of a graphical block diagram (the LabVIEW-source code) on which the programmer connects different function-nodes by drawing wires. These wires propagate variables and any node can execute as soon as all its input data become available. Since this might be the case for multiple nodes simultaneously, G is inherently capable of parallel execution. Multi-processing and multi-threading hardware is automatically exploited by the built-in scheduler, which multiplexes multiple OS threads over thenodes ready for execution.

Graphical Programming

LabVIEW ties the creation of user interfaces (called front panels) into the development cycle. LabVIEW programs/subroutines are called virtual instruments (VIs). Each VI has three components: a block diagram, a front panel and a connectorpanel. The last is used to represent the VI in the block diagrams of other, calling VIs.The front panel is built using controls and indicators. Controls are inputs – they allowa user to supply information to the VI. Indicators are outputs – they indicate, or display, the results based on the inputs given to the VI. The back panel, which is a block diagram, contains the graphical source code. All of the objects placed on the front panel will appear on the back panel as terminals. The back panel also contains structures and functions which perform operations on controls and supply data to indicators. The structures and functions are found on the Functions palette and can be placed on the back

panel. Collectively controls, indicators, structures and functions will be referred to as nodes. Nodes are connected to one another using wires – e.g. two controls and an indicator can be wired to the addition function so that the indicator displays the sum of the two controls.

B. MQTT Client

Welcome to the third edition of MQTT Essentials - a ten-part blog series on the core features and concepts of the MQTT protocol. In this post, we will discuss the roles of the MQTT client and broker, the parameters and options that are available when you connect to a MQTT broker, and explain MQTT server and connection establishment. At the end of this blog post, we have a video that complements this blog post. We recommend you to read the blog post and watch the video for further information. Hive MQ is now open source. Hive MQ Community Edition implements the MQTT broker specification and is compatible with MQTT 3.1, 3.1.1 and MQTT 5. Hive MQ MQTT Client is a Java-based MQTT client implementation compatible with MQTT 3.1.1 and MQTT 5. Both projects are available under the Apache open source license on GitHub. MQTT uses the topic (subject) of the message to determine which message goes to which client (subscriber). A topic is a hierarchically-structured string that can be used to filter and route messages (more details). Our last post gave you a high-level view of the publish/subscribe model and how it differs from a traditional message queue. This post takes a practical approach and is stuffed with basic knowledge about MQTT: definitions for the terms MQTT client and broker, the basics of an MQTT connection, the Connect message with its parameters, and establishing a connection through the acknowledgement of the broker.

VII. TOOLS IMPLEMENTATION

ARDUINO IDE

IDE stands for "Integrated Development Environment" :it is an official software introduced by Arduino.cc, that is mainly used for editing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are compatible with this software that is an open source and is readily available to install and start compiling the code on the go. In this article, we will introduce the

Software, how we can install it, and make it ready for developing applications using Arduino modules. Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module. It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process. It is easily available for operating systems like MAC, Windows, Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment. A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more. Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code. The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board. The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module.

VII. CONCLUSION

Face recognition based attendance system has been visualized for the aim of reducing the errors that occur inside the normal (manual) attendance taking system. The aim is to form a system that's helpful to the organization like an educational institute. The economical and correct technique of attendance systems within the institution which will replace the previous manual strategies. This technique is secure enough, reliable and obtainable to be used for attendance monitoring system. No need for specialized hardware for putting in the system for an educational institute.

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