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# Execution of Digitalized Wall Clock with Speakers using IoT

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**Abstract:** Nowadays, with the development of the wide utilization of the Internet, clocks would now have the option to synchronize with central servers and long-range remote advances, making it achievable for remote devices to synchronize their time with the standard versatile co-operation on the go. In nutshell, the definition of smartness has changed to a whole new level. How about turning a boring wall clock into a marvelous invention which not only shows time but works wonders when operated carefully! With the advancement in technology and the increasing needs of better and smart devices, we have proposed an idea that applies the Internet of Things (IoT) which includes a wall clock with an electric eye. The wall clock is designed in such a way that it consumes very low power for its operation and connects to the Internet using theWi-Fi module, which enables the user to get assured of their houses' security. The slightest movement of an unauthenticated person can be detected by the watch. This paper provides the execution of Digitalized wall clock with speakers using IoT.

**KEYWORDS:** IoT, wall clock, speaker

## I. LITERATURE SURVEY

Before the evolution of smart watches, digital watches were the most cutting edge timepieces you couldpurchase. We explore the evolution of the digital watch from 1972 to the present day [3]. Beginning from Hamilton Pulsar P1 (1972) to Apple Watch Series 5 (2019), watches have always undergone dramatic changes. For a smart watch to work at its best it needs Wi-Fi connection (Internet) which has its penetration rate in Asia of about 54.2%, Africa with 39.6%, Europe with 87.7%and North America with 89.4%being highest, while 58.8%of the world as a whole [4]. According to one of the popular blogs, with the rising Internet connections, nearly a quarter of US households own a smart speaker, wherein 40% of those households already owning multiple speakers [5]. From2016 to 2017 there was a growth of 14% in smart watches and is expected to have a growth of 31% till the year 2021[6], but these watches being super expensive; normal users cannot afford to buy it. Seeing the users upgrading their devices if users buy these smart speakers or smart watch for just one or the other functionality then why not provide them a device with a fistful of functionalities and that too at low-cost?

## II. PROPOSED SCHEME

Overcoming those mentioned limitations was of utmost importance, so it all started with just an idea and whenwe searched about "small projects on esp32", results were analog clocks and then our minds struck upon combining digital with analog using programmable LEDs too with ESP32. We got our hands on some of the preliminary pieces of equipment like cardboard, LEDs, translucent glass, ESP32, and our brains! The proposed scheme is implemented at the campus premises of Sacred Heart University, Connecticut. For a kick start, we made a prototype of the wall clock on cardboard and concurrently we started programming LEDs for the functionality of minute and hour hands. As mentioned earlier about ESP32, they are low-cost, low-power system on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth.x.

Alongwiththis,wehaveinsertedanElectricEye–animportantpartoftheproposedsystem,asshowninFig.1. This mini Doppler radar sensor module is equipped with RCWL-0516 chip based on the Doppler microwave induction technology with a minimum detection distance of 5-9 meters [7]. Fig. 2 shows the capture of the slightest movement in front of this electric eye using the above-mentioned technology by a waveform.

With the help of built-in Wi-Fi and app connectivity of the ESP-32, we can configure the time autonomouslyfrom the NTP server. After configuration, the user can witness the animation schemes of LEDs which signals user for

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successful Wi-Fi connectivity and time configuration.

The Fig. 2 illustrates the working of the proposed scheme through a flowchart in nutshell and makes the whole process in a more understandable format. After a successful setup, motion sensors get activated and in background the timer similar to that found in the mobile phones (timer for inactivity) also starts. If the sensor does not sense any motion, then watch goes on stand-by mode after the timer of five minutes have been completed and turn off LEDs, while in standby mode, motion sensor keeps working and if the motion is sensed, then the LED sareset back to their previous face. With the help of app connectivity, user can change the face of wall clock according to their wish, where currently user can change the colors of hour, minute, second hands which are programmed using LEDs that form part of analog watch whereas changing the color of digits on screen can also be done which forms a part of digital watch. Moreover, after every five minutes, the temperature is extracted from the server which is possible due to Wi-Fi connectivity and thus reduces the extra cost temperature sensor. With built-in speakers of the watch, wecan play songs via the mobile app.

## III. REPEAT MODE

When the clock is in the countdown mode, pressing the “REPEAT MODE” button changes the countdown function so that the clock strikes only once when the countdown timer reaches zero seconds and then automatically begins counting down again at the programmed countdown time. When in the repeat mode the clock will continuously countdown to zero seconds, strike once, and repeat the programmed countdown.

As in the regular countdown mode, pressing the “ALARM ON/OFF” button once pauses the the count- down, pressed a second time this large button resumes the repeating countdown.

### Chime on the Hour Function

Holding down the “SET” button for three seconds (when the alarm is not set) will activate the hour chime function. This causes the chime to strike once on the hour, every hour. When the hour chime function is activated, a small “grandfather clock” icon appears in the upper left of the display. Holding down the “SET” button again for three seconds turns off the hour chime function and its icon (when the “SET button is held down, the digits will flash, this is normal). When the alarm is activated, the hour chime function is automatically turned off until the alarm is turned off (so you can sleep!).

### Programming Times

In any mode, pressing the “SET” or “ALARM SET” button once will cause the display to flash. The hour, minute, and second button will cause those digits to be advanced forward. If the hour, minute or second but- tons are held down, the digits will change at a gradually increasing speed. Other buttons will do nothing until the “SET” button is pressed once again, which then causes the programmed time, countdown interval, or alarm time to be entered into memory.

### Alarm Terminal Cycle

When the alarm function is triggered in the clock or countdown modes, the alarm progresses over ten min- utes until it is striking about every 6.5 seconds. Once the progression reaches the “terminal cycle” it continues to chime every 6.5 seconds until it is shut off by press- ing the large “ALARM ON/OFF” button once. The terminal cycle automatically ends after five minutes.

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## IV. RESULT

From the above proposed scheme, we prepared a prototype on wood

**Fig 1: Demonstration before successful setup**


**Fig 2: Demonstration after successful setup**

For the prototype, we were able to program different colours on the hour, minute and second-hand functionalities using LEDs. The outer ring in Fig demonstrates the programmable red LEDs for hour functionality, while the inner ring has two different colours of LED: one for minute functionality viz yellow in colour and another one for second functionality *viz* blue in colour. For creating the amalgamation of digital with an analog side of the clock, we integrated a screen to the prototype where we used Raspberry pie instead of programming many LEDs thus making it cost-effective and less cumbersome for the developers. With the help of data received from the clock's electric eye; the app was able to check whether the wall clock is working state or not.

## V. CONCLUSION

Due to the alarming rate of the spread of smart technologies, particularly in developing countries, programmers are implementing new strategies for bringing out the budding ideas from their mind and compete for the rat race of trending technologies. In developed countries, the rate of these kinds of technologies is soaring, where economic growth is by far better than developing countries. Henceforth, low-cost but effective appliances should be brought to market which can generate enough revenue for the country itself; Smart Wall Clock with an Electric Eye is one such invention which enables users to buy a wall clock for themselves within their budget which provides functionalities same as or more than the normal wall clock. This paper provided the execution of Digitalized wall clock with speakers using IoT.

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