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IOT-Driven Digital Circular Systems: A Smart Approach to Automation

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A B S T R A C T

The circulation of notices in any organization or institution was never been a short-term procedure. It consists of lots of paper work duly signed with higher authorities and human labor for its circulation throughout the campus and to the employees, students, etc. Sometimes, the notice that is to be circulated might not reach where it was expected to. Many companies are manufacturing audio or video systems like public announcement system, programmable sign boards and CCTV for the purpose of circular system. But all these systems are generally hardwired, complex in nature and difficult to expand it.

To overcome such problems and to reduce the expenditure of time and money involved, the development of simple and low-cost circular system with audio system is presented. Advanced circular system with audio system is a real time-based notice board which can be controlled by mobile application using personal computer, mobile-phones or laptop. The main function of the proposed system is to develop a smart circular system that display message sent from the user through telegram application and to design a simple, user-friendly system, which can receive the message and deliver the message via audio system. System consists of two sections called as sender and receiver. The connection between mobile application and audio system uses Li-Fi connection. Mobile application is used to send notices. This circular system with audio system is completely based on real time usage. The proposed system wirelessly transmits short notices using Li-Fi to reach students quickly in the classrooms.

Keywords: Audio System, Li-Fi, OCR, Telegram BOT, Text-to-Speech

1.INTRODUCTION

In the era of growth of digital technology, people are becoming habitual to easy access to information. Usually, innovation has come as a key factor to help to make administrative work much easier, field executives are using new and improved versions of existing technologies to get better control of administrative activities. Circulars and Notification template is normally used to circulate the important information to all students/employees in each class/department. Circulation of notices in any working areas and even in colleges was never been a short-term procedure. In the current scenario the circulars in a variety of institutions are managed manually and are required to update the information day-to-day. This process is tedious to pass the information at all the time where it wastes a lot of resources like paper, printer ink, man power and also brings about loss of time. The importance of circulars in every academic is well known to us, every time the information changes iteratively which have to be done manually. Sometimes, the notice e that is to be circulated might, apt reach where it was expected to [1].

In the last couple of de communication technology has developed by leaps and bounds. The use of "Embedded System in Communication has given rise to many interesting applications. Everything around us is becoming smart such as smart phones. smart laptops, and smart refrigerators, so why not smart circular system. To overcome such problems and to reduce the expenditure of time and money involved, the development of simple and low-cost circular system with audio system is presented [2].

The main aim of the project is to design a Digital circular system, which can replace the current method of using printed paper method. No doubt it was a good System with some glimpse of evolving technology. Our proposed methodology is to overcome these drawbacks and to develop a wireless transmission of the information via a simple audio toolkit, which is easy to install and a user-friendly system [3]. The text is converted to audio format and transmitted via wireless medium. Some features like acknowledgement message to sender's phone, alert signal like buzzer were further added to make our system more reliable. User can send messages to a selected group of classes or to a single department/classroom or the whole organization/institution [4].

2. LITERATURE SURVEY

In the present generation, circulation of messages is being managed manually. This process is difficult in order to put notices on the notice board. It consists of lots of paperwork duly signed with higher authorities and human labor for its circulation throughout the campus. Sometimes, the notice that is to be circulated might not reach where it was expected to. A lot of resources such as paper, printer ink is wasted [5]. In addition it takes lot of time to transmit the messages.In our institution information are passed in the way of text which are need to be carried out by a person and there is a need of verification sign from respective authorities to ensure that the information has been passed [6].

3. PROPOSED METHODOLOGY

The main function of the proposed system is to develop a smart circular system that display message sent from the user through telegram application and to design a simple, user-friendly system, which can receive the message and deliver the message via audio system. System consists of two sections called as sender and receiver, where sender and receiver are responsible for sending and receiving valuable information through the wireless network. Telegram is a cloud based instant messaging and voice over IP service telegram client apps are available for Android, iOS, Windows Phone, Windows Network, mac OS and Linux. Users can send messages and exchange photos, videos, stickers, audio and files of any type. Telegram's client-side code is open-source software but the source code for recent versions is not always immediately published, whereas its server-side code is closed source and proprietary. The service also provides APIs to independent developers.

Hardware Requirements

Raspberry Pi

Pin Configuration

Relay Module

Audio Amplifier

PIR Sensor

BC547 Transistor

Software Requirements

Raspbian Wheezy

Python

VNC viewer

3.1 Telegram BOT

A Telegram bot is a program that behaves like a normal chat partner with additional functions. It performs predefined tasks independently and without the user’s involvement. The term bot is derived from the term for robot or “robot”. A Telegram bot can basically do everything that a human chat partner does. It can send information such as text messages, images, videos or other files of any kind automatically or on request. An important function of a Telegram bot is the ability to execute commands in a Telegram chat, which then directly trigger actions or request information.

Bots are third-party applications that run inside telegram. Users can interact with bots by sending messages, commands and inline requests. The bots are controlled using HTTPS requests to the bot API. A bot can act as a smart newspaper, sending relevant content as soon as it's published. A bot can enrich telegram chats with content from external services. Bot Father is the one bot to rule them all. It is used to create new bot accounts and manage the existing bots.

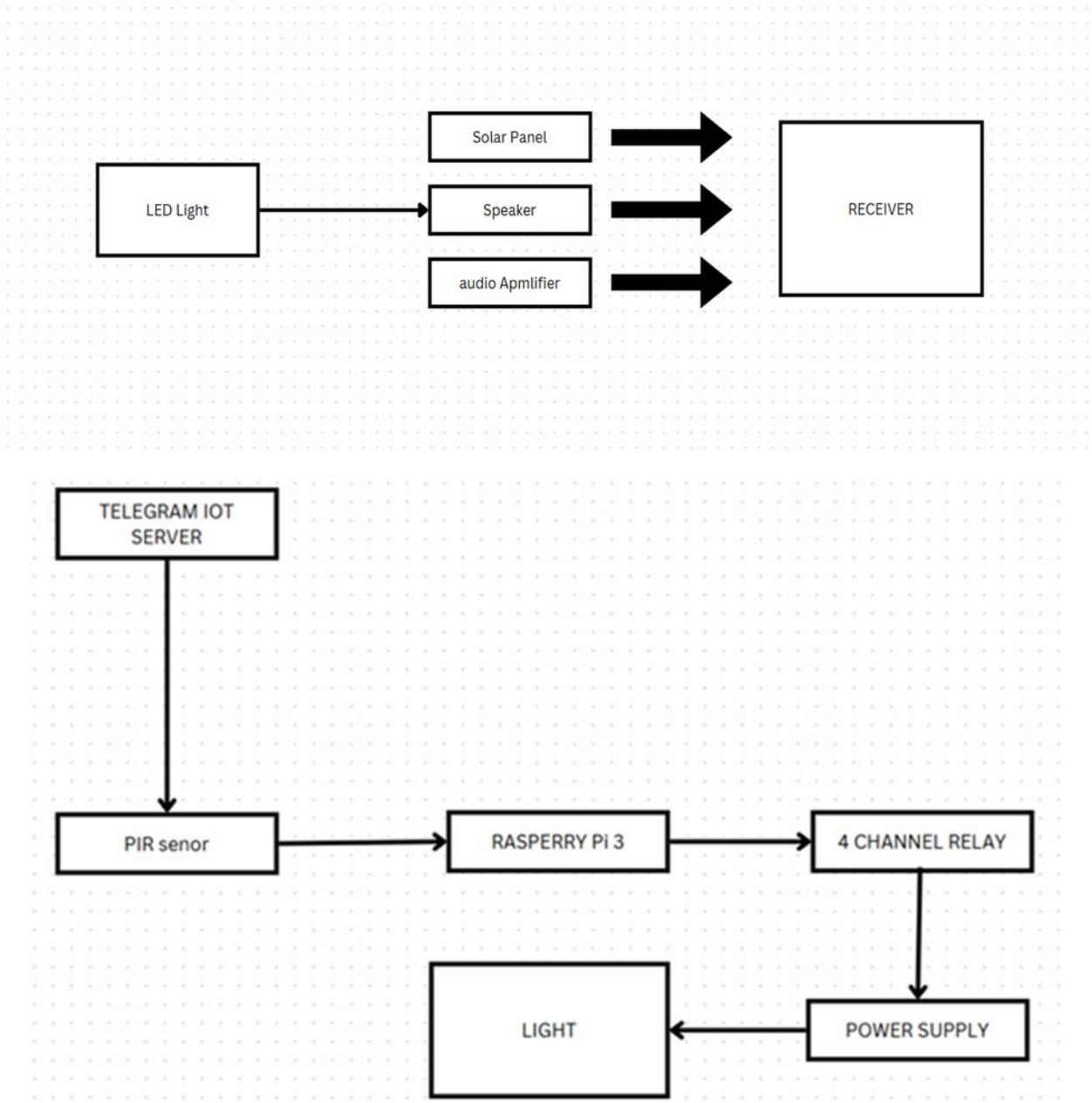

Fig 1: Flow diagram of circular system methodology based on audio

3.2 Text to Speech Conversion

TTS stands for Text-to-Speech (also written as Text to Speech) - a form of speech synthesis that converts text into voice output. Text-To-Speech software basically takes the text you write and turns it into speech files that you can use. Text-to-speech (TTS) is a type of speech synthesis application that is used to create a spoken sound version of the text in a computer document, such as a help file or a Web page. TTS can enable the reading of computer display information to be audible in speaker which is fixed in class room. Speech synthesis is an artificial or computer-generated human speech.

Current TTS applications include voice-enabled e-mail and spoken prompts in voice response systems. TTS is often used with voice recognition programs. Like other modules the process has got its own relevance on being interfaced with, where Raspberry Pi finds its own operations based on image processing schemes. So once image gets converted to text and thereby it could be converted from text to speech. Character recognition process ends with the conversion of text to speech and it could be applied anywhere.

3.3 Mechanism Behind Text to Speech Converter

TTS device consists of two main modules, the image processing module and voice processing module. Image processing module captures image using camera, converting image into text. Voice processing module changes the text into sound and processes it with special physical characteristics so that the sound can be understood. OCR is a technology that automatically recognizes the character through optical mechanism

This technology imitates the ability of the human senses of sight, where the camera becomes a replacement for eye and image processing is done in the computer engine as a substitute for the human brain. Tesseract OCR is a type of OCR engine with matrix matching. E-selection of Tesseract engine is because of its flexibility and extensibility of machines and the fact that many communities are active researchers to develop this OCR engine and also because Tesseract OCR can support 149 languages.

This project is for identifying English alphabets. Before feeding the image to the OCR, it is converted to a binary image to increase the recognition accuracy. Image binary conversion is done by using Image-magic software, which is another open-source tool for image manipulation. The output of OCR is the text, which is stored in a file. Figure 6.1 shows the process and block diagram of text to speech conversion.

4. CONCLUSION AND FUTURE SCOPE

In this project, the advanced technology of the circular system has been implemented by using Li-Fi. It helps in updating reliable information by saving time and resources and making information available in an instant manner. The circular system with audio system is a low cost and simple module which allows users to update information in a reliable manner through Android application (Telegram). Android application provides an easy interface between user and the smart audio system, making it user friendly. Using android application, the user can easily send the messages to the classes immediately without delay.

In future, this project can be implemented in banks, schools, restaurants, colleges, hospital, railway stations etc. In addition to this, images and buzzer can be included in the circular system for an enhanced system. Alert messages can also be added in case of any emergency

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