Optical Character Recognition Robot

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Abstract

In this paper presents optical character recognition robot (OCR) which is capable of converting image into the computer process able format, in the form of plain text using Raspberry pi and a webcam server where we can live stream video over a local network. Our ultimate goal is to find and solve the different requirements in making a web controlled robot that recognizes and converts textual messages placed in real world to the computer readable text files. Our objective is to integrate the appropriate techniques to explain and prove that such capability, using limited hardware and software capabilities. The objective of our work is to provide an internet controlled mobile robot with the capability of reading characters in the image and gives out strings of characters. In the project we will use MOTION software, which is open source software with a number of configuration options which can be changed according to our needs. Here configurations are to be made so that it allows you to view from any computer on the local network for the control of robot in non-line of sight areas.

1 INTRODUCTION

The aim of our project is to make a robot which is capable of converting image into the computer processable format, in the form of plain text using raspberry pi and a webcam server where we can live stream video over a local network and based this we control remotely located robot. In this we will develop a system in which we wll interface a camera to raspberry pi by which will give the data of location through which we can control robot [5].

2 LITERATURE SURVEY

We have studied so many research papers on optical character reorganization. There are several ongoing researches on camera based document analysis which include text detection, extraction, recognition, enhancement and its uses few images to text and text reading systems models for assistive text reading for visually impaired and blind people is also present.

In one research paper in design of optical character recognition says that, at the present time, keyboarding remains the most common the subject of intensive research for more than three decades in design of way of inputting data into computers. This is probably the most time consuming and labor intensive operation. OCR is the machine replication of human reading and has been character recognition in natural images says that tackles the problem of recognizing characters in images of natural scenes. In particular, he focuses on In [2] design of Embedded optical character recognition on Tamil text image using raspberry pi says that, optical character recognition is used to digitize and reproduce texts that have been produced with non-computerized system. Digitizing texts also helps reduce storage space.

3   DESIGN METHODOLOGY

System Design: Consider the whole system consists of two parts one is server and other is client, here the server is web interface which include the button and various tab for controlling something. The server is the web interface consisting of buttons and UI (User Interface) that will allow you to turn ON/OFF a device or See the temperature reading. It consists of PHP files, Html files and a .txt file (to store data).The server usually stores information regarding the button press on the page. Recognizing characters in situations that would traditionally not be handled well by OCR techniques [4].
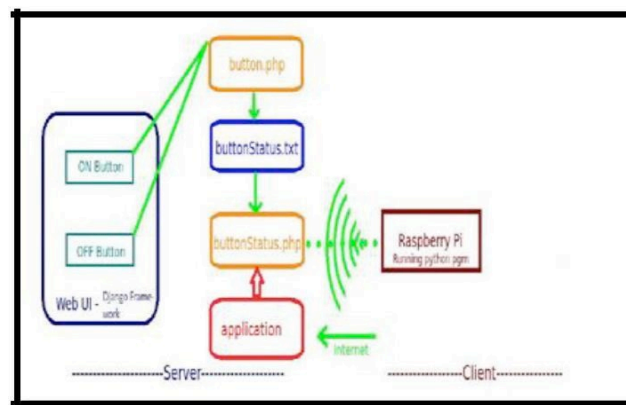

Figure 1: Controlling through IoT

The heart of our project is Raspberry Pi. OCR engine (TESSARACT Engine) is installing in Raspberry pi. Output of the camera module is the image that is given to Raspberry Pi that converts it into text using OCR engine. Output of the OCR engine is display on the webpage. a webcam server where we can live stream video over a local network. And based on this video we control remotely located robot.

On webpage there is one controlling block, through this block we change the direction of robot. From the laptop WI-FI send the controlling signal over long distance. These signals are captured by USB WI-FI adapter and given to the Raspberry pi. Base on these signals Raspberry pi change the direction of robot.
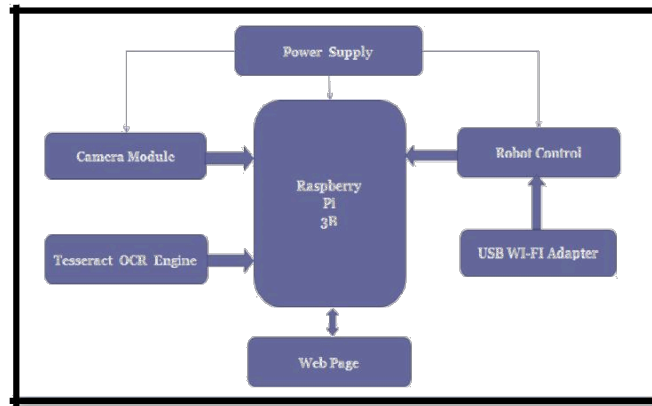
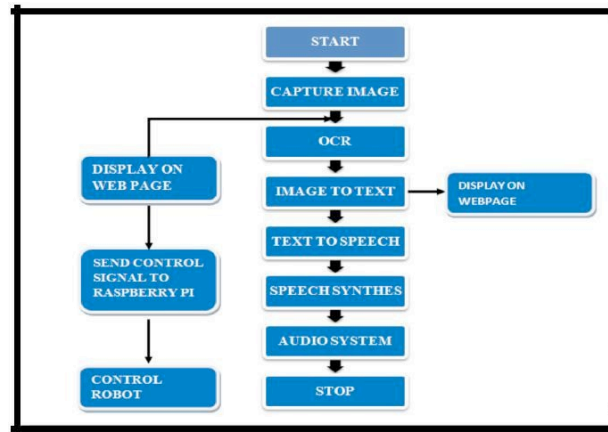Figure 2: Basic block diagram of OCR Robot

DESIGN ALGORITHM

Figure 3: Design algorithm

1st camera module capture the image. Then OCR engine extract the text from this image and display on webpage. Then this image is further convert into speech using festival engine and given to audio system. Parallel captured image is also shown on the webpage, based on this image control the robot at non line of sight areas.

Raspberry pi: In this project, the key component is Raspberry Pi board. Raspberry Pi operates on Linux based open source operating system which is known as Raspbian operating system. There are two types of models of Raspberry Pi viz. Wi-Fi operated and Ethernet operated. In this project, we are using Wi-Fi operated model. Initially introduced Raspberry Pi version had a broad com BCM2835 SoC comprising of an advanced RISC Machine 76JZFS 700 MHz processor with only 256 megabytes of RAM but newly introduced version has 512megabytes of RAM. It also contains 40 pin GPIO header, quad USB ports, one HDMI port,10/100 Base T Ethernet socket,5V micro USB port, CSI camera connector, DSI display connector and 3.5mm jack. As Raspberry Pi does not contain any storage facility, it contains a micro SD card slot.

L293D chip: This chip takes input Raspberry pi and drives DC motor. Raspberry pi output current is not enough to drive DC motor directly. The chip has quad Half H Bridge drivers. It will provide up to 600 mA current to motor that is enough to drive it.

Web UI/ Web Framework: Web Framework or Web UI is the interface which is used to control the Robot buttons from web. In our project this framework is created using Django Rest Framework. Framework is coded in CSS. Here we are using file manager service of 000webhost.com. It is free hosting site where we can register our self or use sub domain. We are using "000WEBHOST" as our database to store the data.

4   IMPLEMENTATION

The project is divided into two parts, hardware part and software part. The hardware part consists of controlling Robot circuit using raspberry pi while the software part is programming for web browser.
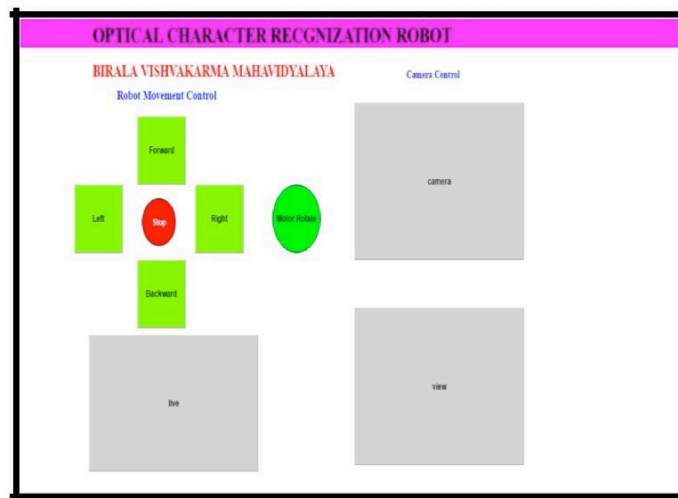

Figure 4: OCR Webframe

In software Implementation we have focused on our GUI (Graphical User Interface). The GUI of the web control interface, it has 4 blocks which are Control block, live stream block, text output block and captured image block. Control block includes four direction switches and a stop switch. The live stream block is used to drive the robot in the non-line of sight areas. The last captured image is shown in the next block. And finally the text output, which can be used digitally is given in the last block.

Software processes the input image and converted into text format. The software implementation is showed in Fig 5.
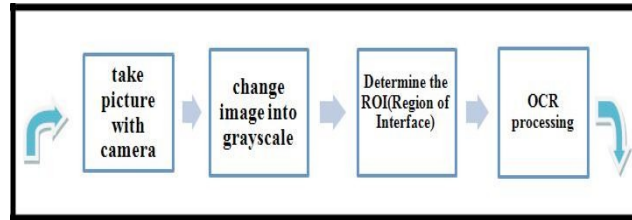
Figure 5: Software Design of Image Processing Module [7]

The image is taken by the user via GPIO pin (23) that is connected to the button, using interrupt function. Furthermore, the picture is taken by using pi module is till program with sharpness mode to sharpen the image. The resulting image has a .jpg format with a resolution of 720 x 340 pixels[7].

Hardware Implementation

In hardware implement we make a wireless robot which is controlled using WIFI adapter using IOT. And interface USB camera module and L293D IC with raspberry pi. Also in our hardware we have also design GPP & Motor Drive PCB Layout show in Fig.7.
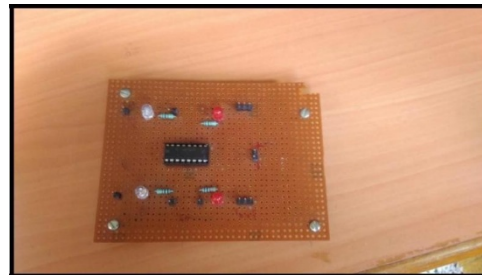

Figure 6: USB camera Interface with pi

Figure 7: Robot Motor Driver PCB

5   RESULTS

Below fig.8 is output of image to text conversation in pi default form.
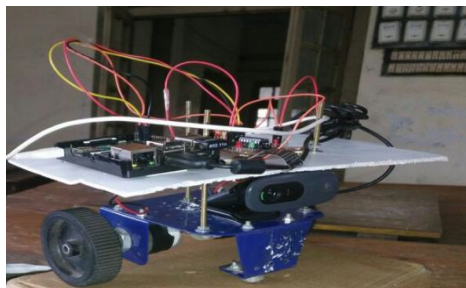

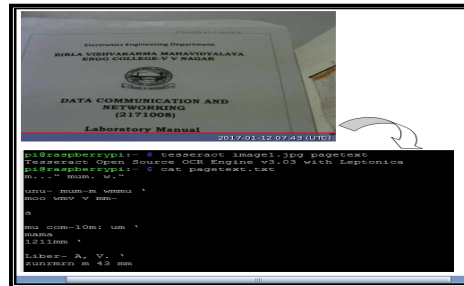Figure 8: Image into text conversation

Figure 9: Actual Robot Design

APPLICATIONS [2]
- In remote located robot controlling
- Passport ,Travel Documents / book reader
- Automatic License Plate / Number plate Recognition
- Assistive technology for blind and visually impaired users.

FUTURE OBJECTIVE

We have done Web came interface with pi & Our OCR Web frame. We will add new feature of this robot is that text to speech converter then convert text into speech. This feature is very useful for those people who are not able to read text. [5].

CONCLUSION

Hence we can able to understand how to obtain text from image using OCR software using raspberry pi and also controlled the remote located robot using IoT concept.

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