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Demo: Automated Line Following, Collision Avoiding Material Object Transporter with Facial Recognition and Audio Interface - Vision and Blueprint

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ABSTRACT: A wheeled robot that can be controlled over a wireless network using an Android application, built from low cost off-the-shelf components. The android application is used to start the robot once the circular is attached to it., and the circular is delivered to the designated classrooms. The robot follows a black line to get to classrooms to deliver the circular. Adio interface intimates the faculty inside that there is a circular to be read out. The robot then uses face recognition to verify that only the concerned faculty can access the circular. Once the flyer has been removed from the holder, the robot waits for it to be read out and then be placed back on the robot. It then proceeds to its next destination. Once the circular is delivered to all the classes, a message pops up on the application indicating the completion of the assigned work and the robot returns to the source.

KEYWORDS: Automated, line following, face recognition, Android application, Audio interface, Authentication, Collision Avoidance

I. INTRODUCTION

The recent years have seen enormous spike in technological advancements and automation, helping reduce a lot of manpower. The advent of networking and its capabilities has opend new doors to cheap and efficient means of communication between user and the hardware allowing on-the-fly modifications and alterations to adapt to the real time circumstances. It takes great effort to distribute the circulars to every class manually. So, our project aims at distributing the circulars automatically with the help of unmanned robot which will do the job of circular distribution with just a click on an android app. Facial scanning is used as a level of security to avoid foreign interactions. IR sensors sense and redirect the robot into the pre defined path and also allow obstacle detection and collision avoidance

II. LITERATURE SURVEY

It takes much effort to distribute the circulars to every class manually using up lots of manpower that can be used somewhere else where it is actually necessary. The idea is to create a robot that can be used to deliver material things to designated classes or administrative offices without actually going there. From extensive research it occurs that a robot going through people would be rather difficult as it need to avoid on coming humans and obstacles which takes a lot of processing to do. As our aim is to create a simple robot that can be built by anyone, we decided to use a black line

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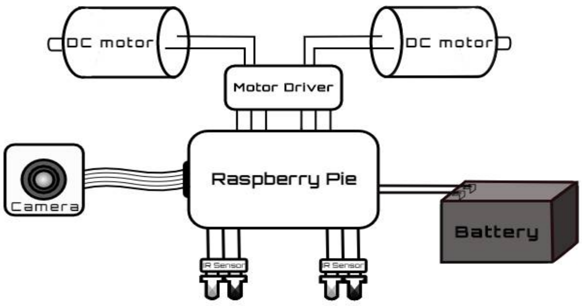
following robot. Since there is a pre defined line on the floor, everyone will know that its a path and will be careful. Also to add security we add object avoidance and a buzzer to stop the robot if there is anything in its path and a buzzer sounds intimating anyone to move away from the path.



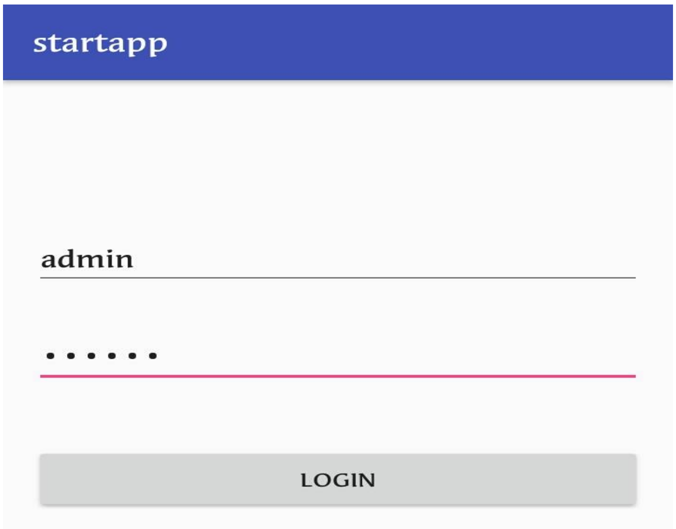
Vector representation of Circuit Diagram

III. PROPOSED METHODOLOGY AND DISCUSSION

will present a four-wheeled, mobile mini-robot we have built assembling low-cost, off-the-shelf components including a Raspberry Pi, DC drive motors, DC battery, Motor Driver, and IR sensor. The behavior of the mini-robot will be reprogrammable on the fly from the cloud. For local control the mini-robot will run raspberrian, an open source real-time operating system which fits resource constrained and low-cost micro-controller platforms. For communication with the cloud, the mini-robot will use wireless protocols, providing end-to-end communication between user and robot.

The Model A, A+ and Pi Zero have no Ethernet circuitry and are commonly connected to a network using an external user-supplied USB Ethernet or Wi-Fi adapter. On the Model B and B+ the Ethernet port is provided by a built-in USB Ethernet adapter using the SMSC LAN9514 chip. The Raspberry Pi 3 and Pi Zero W (wireless) are equipped with 2.4 GHz WiFi 802.11n (150 Mbit/s) and Bluetooth 4.1 (24 Mbit/s) based on Broadcom BCM43438 FullMAC chip with no official support for Monitor mode but implemented through unofficial firmware patching and the Pi 3 also has a 10/100 Ethernet port. The Raspberry Pi 3B+ features dual-band IEEE 802.11b/g/n/ac WiFi, Bluetooth 4.2, and Gigabit Ethernet.

Experimental diagrams and figures:



Android application login

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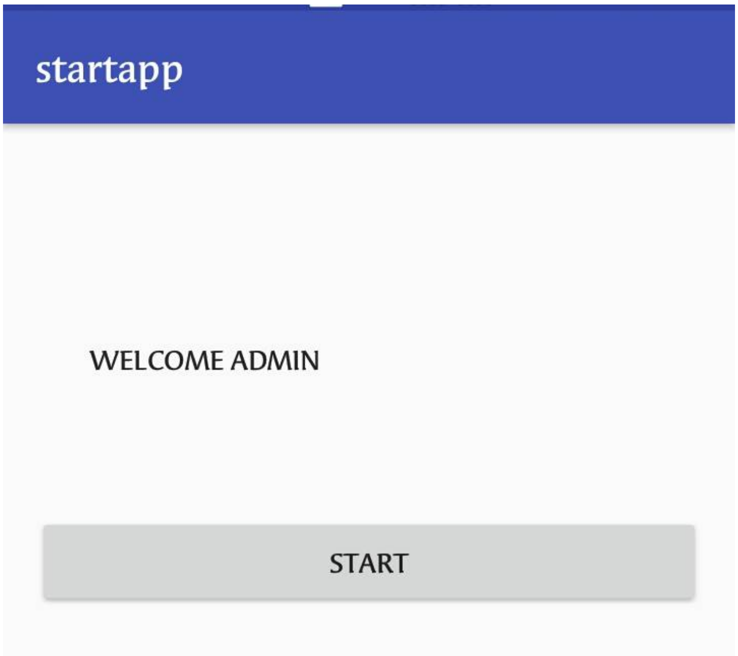

Robot Initialisation screen

Initialising black line following robot

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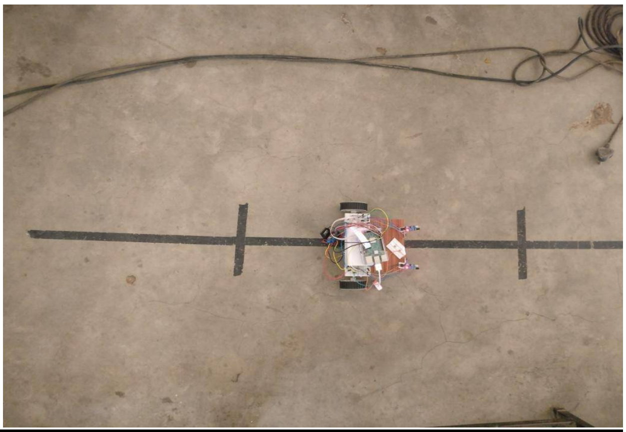

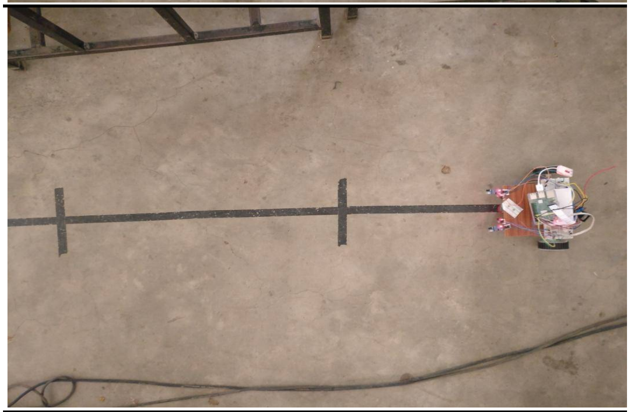

The robot starts moving once it is sa activated using the application. It starts moving on the black line untill the completion of the job.

IV. CONCLUSIONS

The demo we present decomposes into cleanly separated building blocks, using open-source software and off-the-shelf hardware. In particular, care was taken to make it straightforward to (i) substitute the local real-time control loop on the mini-robot with more advanced motor control, local sensor data fusion and short-term decision making, (ii) relocate and/or enhance the cloud-based control loop with more advanced computational offloading for sensor data processing, remote decision making, and mid- to long-term planning, or (iii) add/substitute sensors and actuators on the mini-robot. Thus, this work can be easily reused and extended for a wide range of emerging applications mixing IoT and robotics.

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