AUTOMATIC MEDICINE DISPENSING SYSTEM

HIGHER DIPLOMA IN SOFTWARE ENGINEERING

IOT PROJECT REPORT

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ABSTRACT

Punctuality is very important in taking the medication and this is where the elderly people with chronic diseases are found wanting, they easily forget that they are supposed to take medication at a particular time. The following project is aimed at designing an AS system that would be responsible for releasing medicine to patients at several times in equal time slots. It is composed of a depository of the medicine which is regulated by a microcontroller, monitoring sensors and connectivity units for communication with the application on an android based mobile phone. Since the caregivers should know that the patient has taken the medicine, he or she gets notifications whenever the medicine is given to the patient.

Some of the notable aspects include; voice commands, large buttons for the elderly or anybody with a disability, or anybody who has a problem using technology in the usual way. It is also safe, implying that the patients' information that is received or issued out does not perform a switch with other patient information. In essence we shall fully stress the system and in accordance with the results we obtain, shall guarantee that the system has been evolved to its optimum.

It is in this method that we expect that more people will be observing that they take their prescribed medicine in the right way hence becoming healthier. This will also reduce cases that people took wrong dosage of the drugs, introduce more engagement with the caregivers, and lead to cheap and affordable medical bills. In conclusion, the mentioned system is proposed to facilitate the life and enhance the health state of patients who need to take doses every day.

ACKNOWLEDGEMENT

This note to acknowledge was created to express our gratitude and appreciation to everyone who supported us and advised us in various ways throughout the course of this project. First and foremost, we would like to express our gratitude to Mr. Supun Asanga for his invaluable advice and constant encouragement throughout the project. We would like to show gratitude to our friends and all those who directly and indirectly contributed to the successful completion of this project. Finally, we would like to express our gratitude to our classmates and those who assisted us in finishing this project.

INTRODUCTION

Ensuring people suffering from long duration illnesses has taken their mediation in time is utmost important. However, a majority of patients particularly old age women and men often forget to take their medication on time. Sometimes, it can even make their situation worse and end up in a severe health condition. Therefore, we are suggesting a new system which has intelligent functionality and helps in automatically dispensing the medicament at appropriate moment. It will alert patients in balancing they medication moments, minimizing them to make a drug error and keep the right time of taking their pills. Patients who receive the correct medication at the right time can become healthier, enabling their treatments and daily lives to be more effective.

OBJECTIVES

The goal of this project is to make the patients take their medicines on time using a smart system. This system aims to:

1. Automated Medicine Giving: Agents will serve patients timely their medicine doses without any human intervention.
2. Enhance Medication Adherence: Remind Your Patients, Especially Geriatrics on Time for Their Daily Doses Of Medicine
3. Here are the Best Advantages of Prescription Management Software, Reduction of Errors - Minimize missed doses or wrong dosages.
4. Notify Caregivers: Get alerts to the caregivers or your family members that you may wish to notify on medicine dosage.
5. User Friendly Technology: Offer a basic mobile app to program drug routine and adherence.

PROBLEM STATEMENT

Identify the problems:

Many patients or rather most of the patients in the population such as the Chronic Illness and the Older Adults often forget to take their medication on time. Failing the above results in health complications and slows down the rate of healings. Its function is to create a methodology for medication transfer that will guarantee the timely delivery of the medicine but without constant disturbing of caregivers.

Importance:

Why some patients adhere to the regimen while others do not remains an issue of interest, since timely and gladly taken medicines are central to success of the treatment and recovery. People do not always take their medicines as prescribed and this makes drugs to be less effective and times protract the illness, increase the cost of health care and likelihood of readmission. An example of an intelligent object is the smart medication reminder system which shows how automation can successfully set up in the sphere of the healthcare for behalf of healthy living. It depicts the reliability of robotics to ensure that patients get a good life through functional, reliable and accurate health care. When the system is put into practice, it also confirms the consumption of a certain medicine by a specific patient and thus save the patient's lives by eliminating dosing errors. Besides that, robots can be programmed on how to deal with pills at the right age and inform caregivers through sounds. Which may reduce the rate at which caregivers are pressed to focus on other aspects in patient treatment. Speaking of this project, it proves the great potential of the technologies, automation and robotics in healthcare for solving actual medicial problems and the development of assistive robotic technologies. This innovation once again proves the role that robotics system can play in support of healthcare, enhancing the quality of patient's life and possibly transforming the health sector into an even more effective tool for change.

LITERATURE REVIEWS

Reviews of Existing Solutions

1. Pill Dispensers: Pill dispensers remind patients to take their medicine at scheduled times. It may be a alarm.
2. Mobile Apps: This apps send reminders and track whether the medicine has been taken or not.
3. Smart Pill Bottles: Smart pill bottles can detect when a bottle is opened and can send notifications to the patient or carer.
4. Telemedicine Systems: This system connects patients with healthcare providers for remote monitoring and guidance about medicine.

Gap Identification

1. Manual Effort Required: Most of the pill dispensers still require manual system to take the medicine. Because older patients have memory issues.
2. Lack of Integration: Most of the solutions do not combine well with other health systems, which makes it difficult to get a complete view of patient health.
3.Limited carer Alerts: Do not provide real-time notifications to carer.
4.Complexity and Usability: Most of the systems and apps are too complicated for elderly patients.
5.No Real-Time Data: Most of the current solutions do not offer real-time monitoring and data analysis.

PROPOSED SOLUTION

We propose to create a automatic medicine dispensing system to help patients to get their medicine on time. Especially we focus on adults who often forget their medicine. Our system will automate the process of giving medicine and inform carer by including a mobile app. In this way mistakes are minimized, and patients are more likely to follow this.

METHODOLOGY

The following methodology will be employed to achieve the objectives of the proposed system.

Hardware components

- NodeMCU microcontroller to control the system.
- Motors and actuators for dispersing.
- Containers for holding doses.
- Stepper motors for precise control.
- load sensors to detect if medicine has been dispensed.
- ESP8266.
- AC to DC adapter

Software Components

- Arduino IDE
- Flutter
- Firebase
- Real Time Clock- DS3231

Planning

- Identify the user needs and requirements.
- Determine the types of medication to be dispensed.
- Evaluate the cost and time requirements.

Design

- Design the mechanical unit with containers for pills.
- Select and integrate sensors to detect medicine dispensing.
- Integrate Wi-Fi modules for communication.
- Select Arduino IDE to control all the components.
- Design mobile app for user simplicity and accessibility.
- Select firebase for control database.

Development

- Assemble the microcontroller, sensors and connectivity modules.
- Program the microcontroller to handle medicine dispensing, sensor data processing.
- Develop the app using Flutter.

Testing and Validation

Prototype Testing:

Construct an architecture of the smart medicine delivery system. It is useful to perform the first trials in a closed environment to subsequently eliminate as many technical problems as possible.

User Testing:

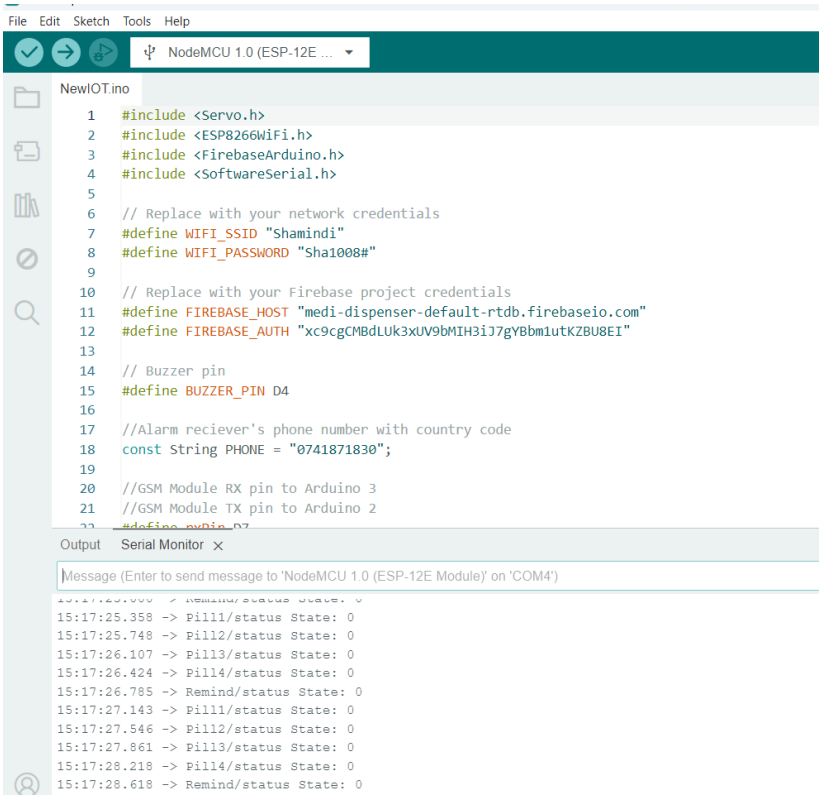
Get the system out to some patients and main caregivers for testing and evaluation on real patients. Gather information on the operation of the system and how effectively different users find it as well as how dependable it is. This should involve developing the design of the system with the feedback received from the users with an aim of enhancing the system.

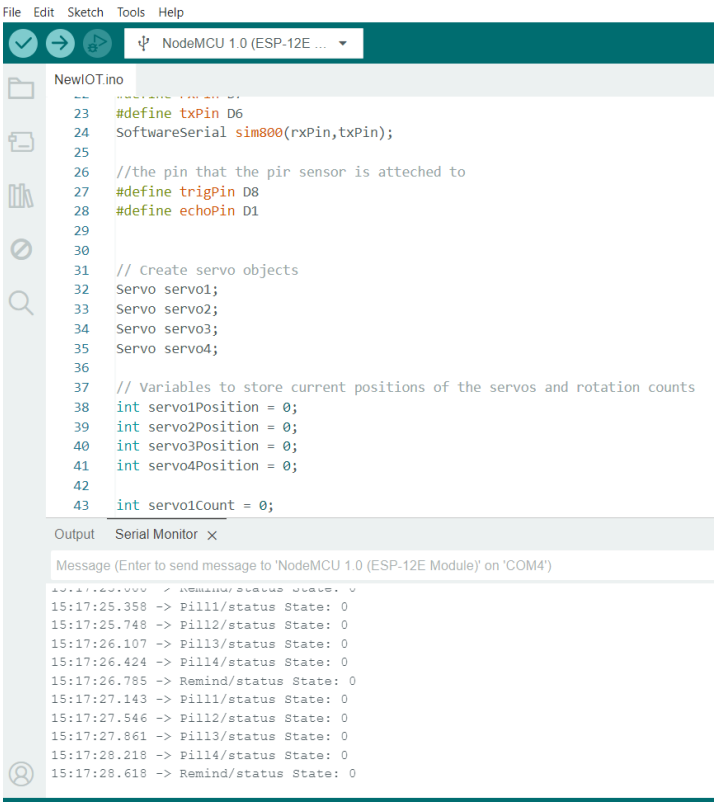
EXPECTED RESULT

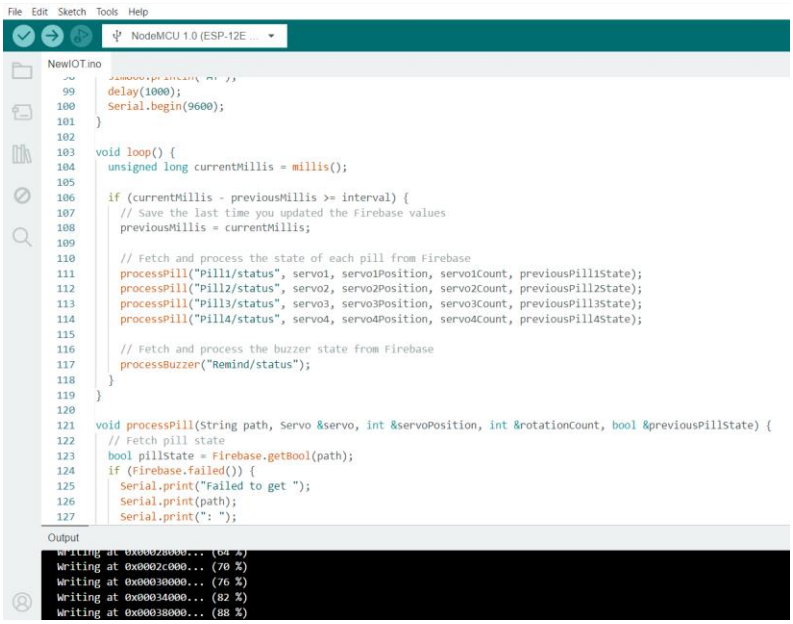
Implementing the proposed system is expected to success several outcomes. The main expected result from this system is patients and elderly persons will take their medication on time as prescribed. Also, caregivers and family members will receive timely notifications when medication is dispensed, helping them to stay informed. So, no need to worry about their parent medications. also automated reminders and dispensing will reduce instances of missed doses.

SYSTEM DEMOSTRATION

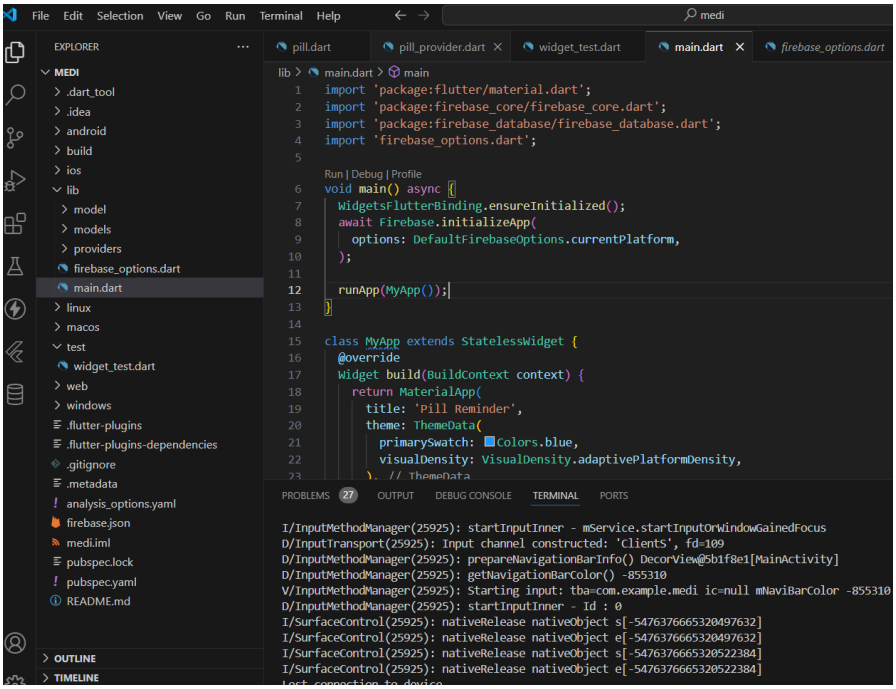
ARDUINO IDE



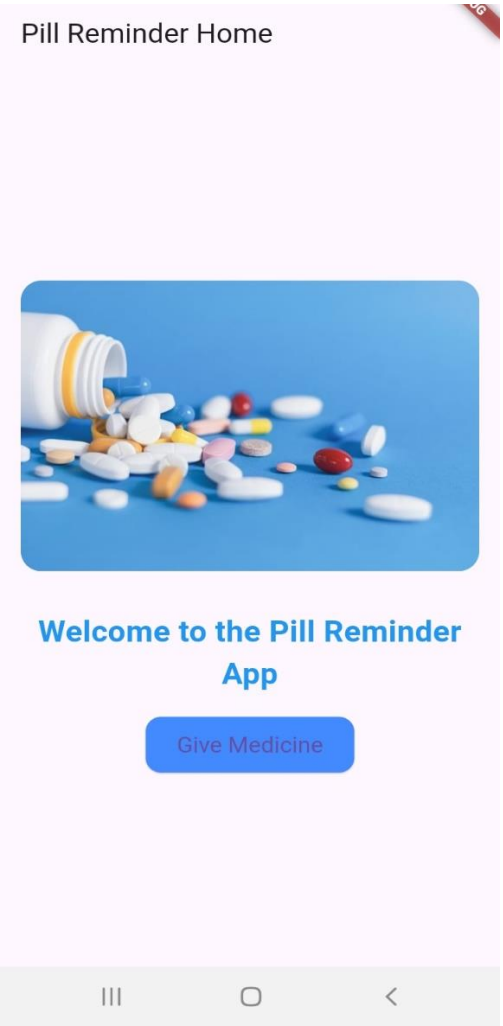

File Edit Sketch Tools Help
NodeMCU 1.0 (ESP-12E ...
NewIOT.ino
#define txPin D6
SoftwareSerial sim800(rxPin,txPin);
//the pin that the pir sensor is atteched to
#define trigPin D8
#define echoPin D1
// Create servo objects
Servo servo1;
Servo servo2;
Servo servo3;
Servo servo4;
// Variables to store current positions of the servos and rotation counts
int servo1Position = 0;
int servo2Position = 0;
int servo3Position = 0;
int servo4Position = 0;
int servo1Count = 0;
Output
Serial Monitor
Message (Enter to send message to 'NodeMCU 1.0 (ESP-12E Module)' on 'COM4')
15:17:25.358 -> Pill1/status State: 0
15:17:25.748 -> Pill2/status State: 0
15:17:26.107 -> Pill3/status State: 0
15:17:26.424 -> Pill4/status State: 0
15:17:26.785 -> Remind/status State: 0
15:17:27.143 -> Pill1/status State: 0
15:17:27.546 -> Pill2/status State: 0
15:17:27.861 -> Pill3/status State: 0
15:17:28.218 -> Pill4/status State: 0
15:17:28.618 -> Remind/status State: 0

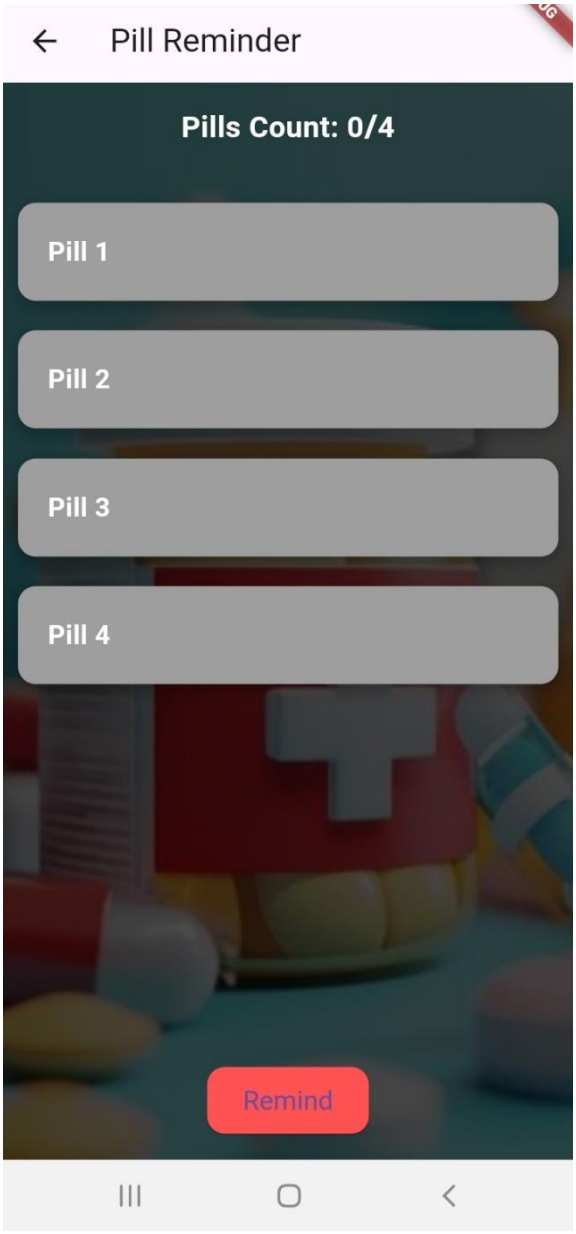

File Edit Sketch Tools Help
NodeMCU 1.0 (ESP-12E ...
NewIOT.ino
delay(1000);
Serial.begin(9600);
}
void loop() {
unsigned long currentMillis = millis();
if (currentMillis - previousMillis >= interval) {
// Save the last time you updated the Firebase values
previousMillis = currentMillis;
// Fetch and process the state of each pill from Firebase
processPill("Pill1/status", servo1, servo1Position, servo1Count, previousPill1State);
processPill("Pill2/status", servo2, servo2Position, servo2Count, previousPill2State);
processPill("Pill3/status", servo3, servo3Position, servo3Count, previousPill3State);
processPill("Pill4/status", servo4, servo4Position, servo4Count, previousPill4State);
// Fetch and process the buzzer state from Firebase
processBuzzer("Remind/status");
}
}
void processPill(String path, Servo &servo, int &servoPosition, int &rotationCount, bool &previousPillState) {
// Fetch pill state
bool pillState = Firebase.getBool(path);
if (Firebase.failed()) {
Serial.print("Failed to get ");
Serial.print(path);
Serial.print(": ");
Output
Writing at 0x0002c000... (70 %)
Writing at 0x00030000... (76 %)
Writing at 0x00034000... (82 %)
Writing at 0x00038000... (88 %)

FLUTTER

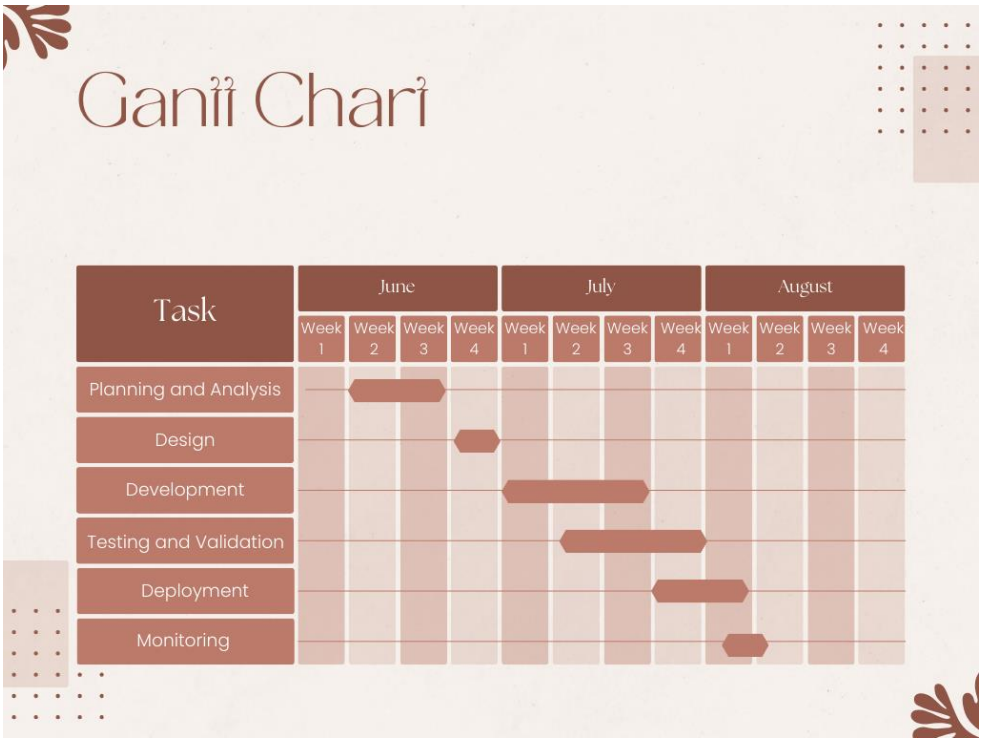

File Edit Selection View Go Run Terminal Help
medi
EXPLORER
MEDI
.dart_tool
.idea
android
build
ios
lib
model
models
providers
firebase_options.dart
main.dart
linux
macos
test
widget_test.dart
web
windows
.flutter-plugins
.flutter-plugins-dependencies
.gitignore
.metadata
analysis_options.yaml
firebase.json
medi.iml
pubspec.lock
pubspec.yaml
README.md
OUTLINE
TIMELINE
pill.dart
pill_provider.dart
widget_test.dart
main.dart
firebase_options.dart
lib > main.dart > main
import 'package:flutter/material.dart';
import 'package:firebase_core/firebase_core.dart';
import 'package:firebase_database/firebase_database.dart';
import 'firebase_options.dart';
Run | Debug | Profile
void main() async {
WidgetsFlutterBinding.ensureInitialized();
await Firebase.initializeApp(
options: DefaultFirebaseOptions.currentPlatform,
);
runApp(MyApp());
}
class MyApp extends StatelessWidget {
@override
Widget build(BuildContext context) {
return MaterialApp(
title: 'Pill Reminder',
theme: ThemeData(
primarySwatch: Colors.blue,
visualDensity: VisualDensity.adaptivePlatformDensity,
PROBLEMS 27
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
I/InputMethodManager(25925): startInputInner - mService.startInputOrWindowGainedFocus
D/InputTransport(25925): Input channel constructed: 'clientS', fd=109
D/InputMethodManager(25925): prepareNavigationBarInfo() DecorView@5b1f8e1[MainActivity]
D/InputMethodManager(25925): getNavigationBarColor() -855310
V/InputMethodManager(25925): Starting input: tba=com.example.medi ic=null mNaviBarColor -855310
D/InputMethodManager(25925): startInputInner - Id : 0
I/SurfaceControl(25925): nativeRelease nativeObject s[-547637666532049763 2]
I/SurfaceControl(25925): nativeRelease nativeObject e[-547637666532049763 2]
I/SurfaceControl(25925): nativeRelease nativeObject s[-547637666532052238 4]
I/SurfaceControl(25925): nativeRelease nativeObject e[-547637666532052238 4]

APPLICATION INTERFACES




Pill Reminder
Pills Count: 0/4
Pill 1
Pill 2
Pill 3
Pill 4
Remind

GANTT CHART



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https://journal.ijresm.com/index.php/ijresm/article/view/2918

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