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Design and Implementation of Vehicle Theft Detection Using IoT

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ABSTRACT: With an increase in technology and the manufacturing of new items in the market can easily improve the quality of human lives. One of the important sectors is the automobile sector. With an increase in the population and usage of the vehicle has also increased in demands. With the increase in these sectors the vehicle theft cases and the number of accidents, rash driving cases are increasing by day-to-day life. Our paper deals with a solution for vehicle theft cases and a decrease in accident or rash driving cases. The main feature which makes it preferable is its low cost and can be implemented and used by many leading manufacturing companies.

This system uses a GPS system, a buzzer, and a rash driving (mems) sensor for detecting rash driving. If anyone tries to start the vehicle without the permission of the owner, the vibration sensor will know the irregularity of the vehicle and send it to the microcontroller which will inform the owner via IOT and the buzzer will turn on. GPS tells us about the position like latitude, longitude, and height of an object. The mems sensor which is used in the system is used for finding the rash driving like if the vehicle falls then it will send to the owner that the vehicle might be fallen accidentally or met with an accident. Thus, this research work conclude that this system can be used in any vehicle like a car or bike and the system to intimate the owner about the theft of the vehicle and the owner can turn off the engine remotely by using a mobile phone.

KEYWORDS: Raspberry pi, GPS module, IOT, FLAME sensor, MEMS ADXL345.

I. LITERATURE SERVEY

Nag raja, B.G.; Ramapo, R.; Mahesh, M.; Patil, C.M. (2009) states that, the design & development of a theft control system for an automobile, which is being used to prevent/control the theft of a vehicle. The developed system makes use of an embedded system based on GSM technology. The designed & developed system is installed in the vehicle.

D. Narendar Singh, K. Tejaswi (M.Tech), (2013) states that the proposed security system for smart cars used to prevent them from loss or theft using Advanced RISC Machine (ARM) processor. It performs the real time user authentication (driver, who starts the car engine) using face recognition, using the Principle Component Analysis (PCA) algorithm. According to the comparison result (authentic or not), ARM processor triggers certain actions. If the result is not authentic means ARM produces the signal to block the car access (i.e. Produce the interrupt signal to car engine to stop its action) and inform the car owner about the unauthorized access via Multimedia Message Services (MMS) with the help of GSM/GPRS modem. Also it can be extends to send the current location of the vehicle using the GPS modem as a Short Message Services (SMS).



R.Ramani, S.Valarmathy, Dr.N.SuthanthiraVanitha, S.Selvaraju, R .Thangam, M.Thirupathi, (2013) states that the Currently almost of the public having an own vehicle, theft is happening on parking and sometimes driving insecurity places. The safe of vehicles is extremely essential for public vehicles. Vehicle tracking and locking system installed in the vehicle, to track the place and locking engine motor. The place of the vehicle identified using Global Positioning system (GPS) and Global system mobile communication (GSM). These systems constantly watch a moving Vehicle and report the status on demand. When the theft identified, the responsible person send SMS to the microcontroller, then microcontroller issue the control signals to stop the engine motor. Authorized person need to send the password to controller to restart the vehicle and open the door. This is more secured, reliable and low cost .

Champak Bhagavathi.R, Gowri.B. , Kasturi.R, Pooja.C, (2016) states that, In this system simple and cheaper vehicle tracking is implemented with the help of Global Positioning System (GPS), and Global System for Mobile Communication (GSM) technologies. The main components in the system are GPS module, GSM modem, IR sensor, RFID reader and microcontroller. The use of GPS system is to track the current location of the vehicle. As GPS system can only receive the vehicle location information from the satellites, GSM system is also installed in the vehicle for sending information to vehicle owner. In case of towing and break open of vehicle this system automatically sends the SMS to own.

K.Kanimozhi, D. Mukesh, M. Ashok, (2017) states that the Property crimes is said to hover around 10 million annually. Of this vehicle theft tops the list and often occurs in all parts of the world. There are so many recent technologies evolving and new methods are being upgraded in overcoming this issue. Internet of Things has paved way to provide interaction between things. Internet of things with intelligence is a new era for the technology developments. The existing methods have various shortcomings like the logics used cannot be implied in all the situations. The methods involved in vehicle theft detection have become aware to everyone including the burglars and they try to break the system and steal the vehicle.

II. METHODOLOGY

2.1.Block Diagram

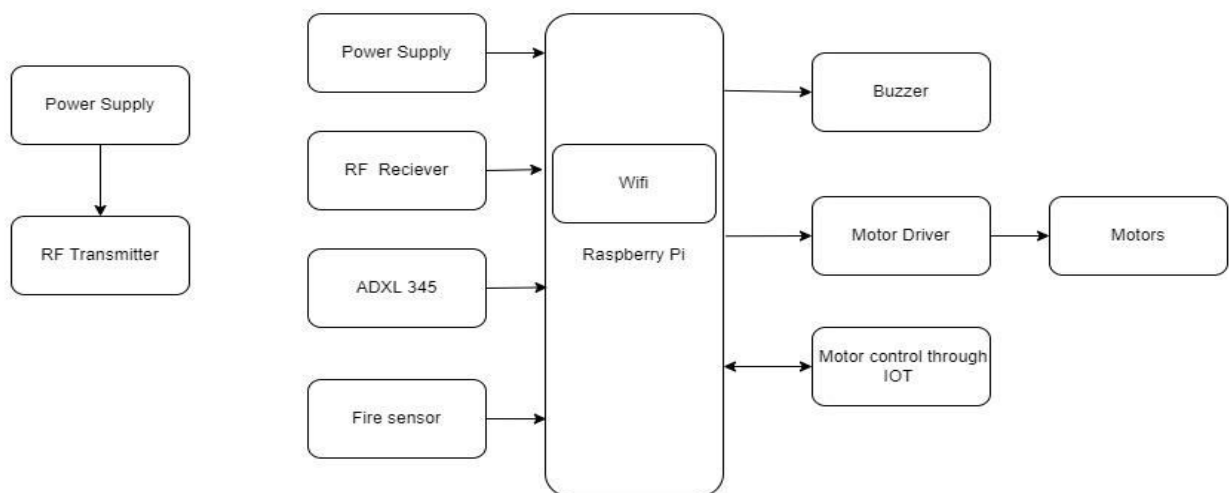


Fig.1.Block Diagram of proposed System

2.2 Working:

In this proposed system continuous monitoring of personal vehicles and school vehicles at real time is possible and if the unauthorized person tries to access the vehicle then this system helps to gather the information such as key detection, engine started or not and rash driving detection and it will give the alert message to the owner's Smartphone. The proposed system uses Raspberry pi board which is placed inside the vehicle. In this system there should be two modes: user mode and theft mode. In the user mode there will be normal operation that means the owner or authorized person is driving the vehicle. When the user is not driving the vehicle then it will be in theft mode, which is done by switching the modes by sending messages to the system by using the Internet of Things (IOT), and whenever the system is in theft mode and if an unauthorized person accesses the vehicle then it will send the alert message to the owner. The owner can switch the two modes, that are user mode and theft mode, by using IOT. The modes can be switched by sending the message to the system. For user mode the message will be User mode and for theft mode the message will be Theft mode. The system is operating in user mode, when the key is detected and the engine will be started, no message will be sent to the owner. Hence, we can avoid unnecessary data in user mode. The IOT would get communicated to the Raspberry Pi board. Key detection is provided by an IR sensor. If an unauthorized person tries to insert a key then the IR sensor will detect it and a message will be sent to the owner. Also, if the engine gets started then also it will send the message to the owner. If the engine gets started then again a message will be sent to the owner's mobile number. By using IOT this message will be delivered to the owner. That input will be given to the Raspberry Pi. The MEMS ADXL 345 is an accelerometer sensor which will detect the condition of rash driving. The IR sensor will detect if fire is detected then it is displayed on the screen.

2.3. Schematic diagram:

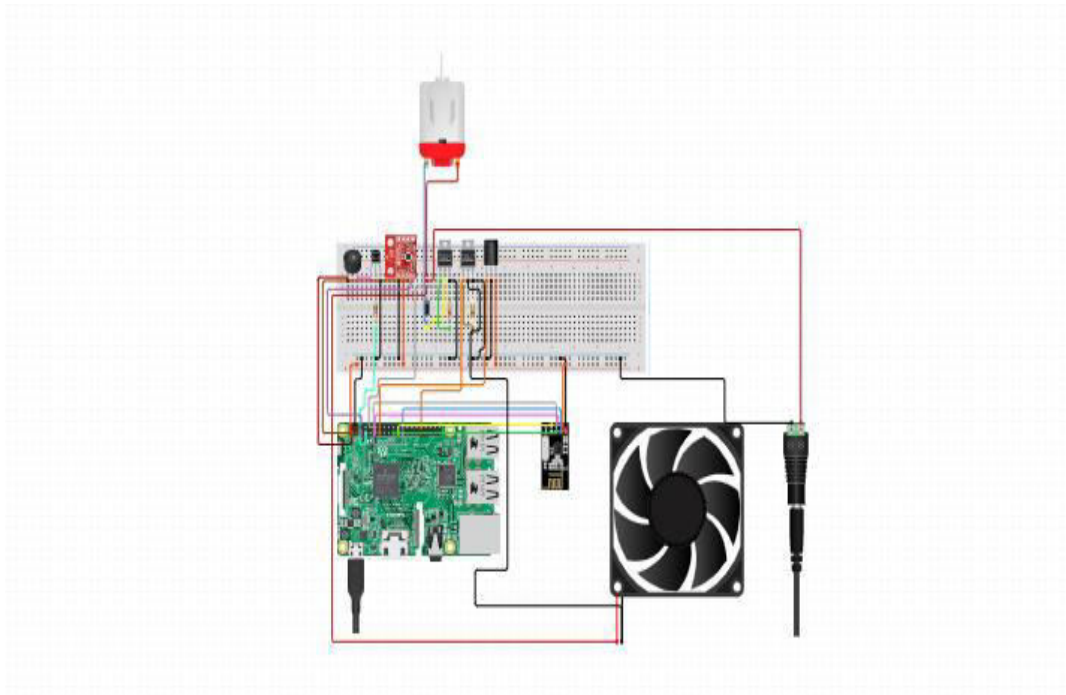


Fig.2. Schematic of Proposed system

2.4. Flow Chart:

In this algorithm there are two modes: USER Mode and THEFT Mode. If an authorized person is not driving the vehicle then by sending the message using GSM to the system, the authorized person switches the system into the theft mode. If the owner or authorized person accesses the vehicle then normal operation will take place. But if the system is in theft mode and if an unauthorized person tries to access the vehicle, it will send an alert message to the owner's mobile, and if the

unauthorized person inserts a key and engine is started then message will get sent to the owner otherwise no message sends to owner. If there is a situation of rash driving then message will get sent to owner.

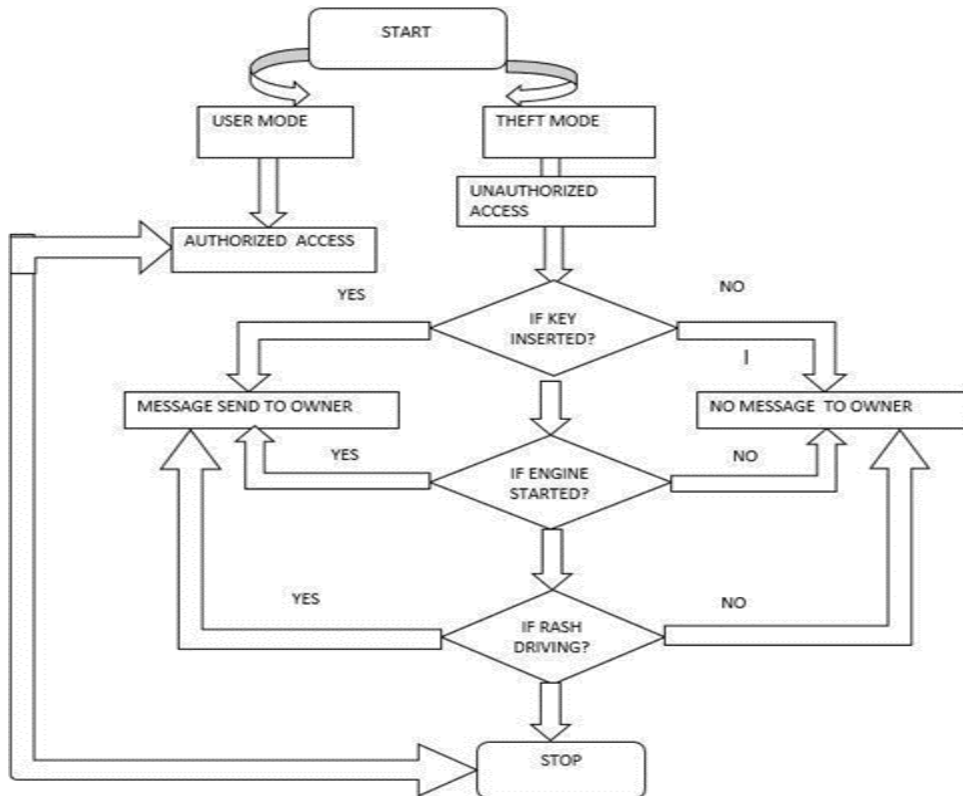


Fig.3..Flow Chart for Proposed System

2.5.RASPBERRY PI:

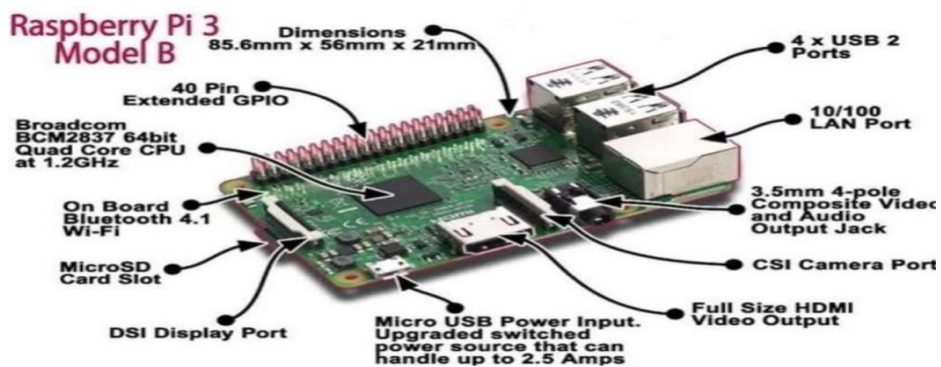


Fig.4.Raspberry Pi

These boards use an Atmel ATmega644 microcontroller clocked at 22.1MHz, and a 512K SRAM for data and

frame buffer storage. By 2008, processors designed for mobile devices were becoming more affordable, and powerful enough to provide excellent multimedia, a feature which would make the board desirable to kids who wouldn't initially be interested in a purely programming-oriented device. The project started to look very realisable and feasible. Eben (now a chip architect at Broadcom), Rob, Jack and Alan, teamed up with Pete Lomas, MD of hardware design and manufacture company Norcott Technologies, and David Braben, co-author of the BBC Micro game Elite, to form the Raspberry Pi Foundation to make it a reality. Three years later, the Raspberry Pi Model B entered mass production through licensed manufacture deals with Element 14/Premier Farnell and RS Electronics, and within two years it had sold over two million units.

The Raspberry Pi has a Broadcom BCM2835 System on Chip module. It has a ARM1176JZF-S processor. The Broadcom SOC used in the Raspberry Pi is equivalent to a chip used in an old Smartphone (Android or iPhone). While operating at 700 MHz by default, the Raspberry Pi provides a real-world performance roughly equivalent to the 0.041 GFLOPS. On the CPU level the performance is similar to a 300 MHz Pentium II of 1997-1999, but the GPU, however, provides 1Gpixel/s, 1.5Gtexel/s or 24 GFLOPS of general-purpose compute and the graphics capabilities of the Raspberry Pi are roughly equivalent to the level of performance of the Xbox of 2001. The Raspberry Pi chip operating at 700 MHz by default, will not become hot enough to need a heatsink or special cooling.

2.6. FS1000A 433 MHz RF Transmitter Module



Fig.5. 433 MHz RF Transmitter Module

2.7 433 MHz RF Receiver Module:

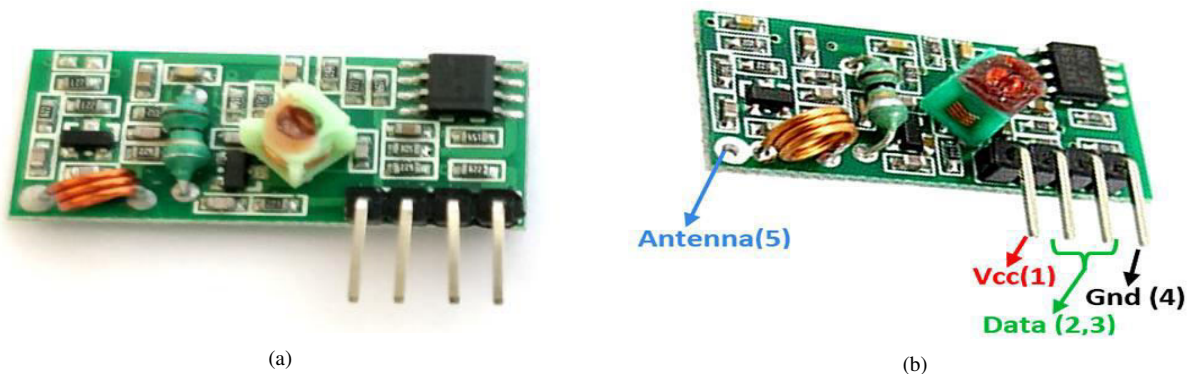


Fig .6.(a) 433 MHz RF Receiver Module. (b) 433 MHz RF Receiver Modules

2.8. Adxl345:

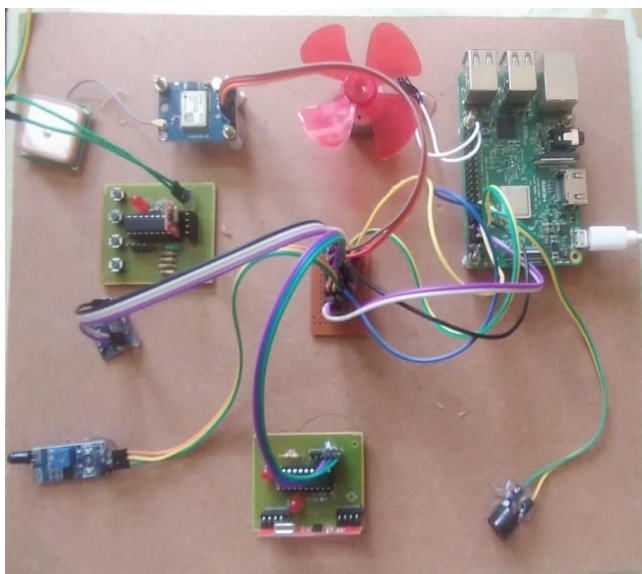


Fig. 7: Adxl345

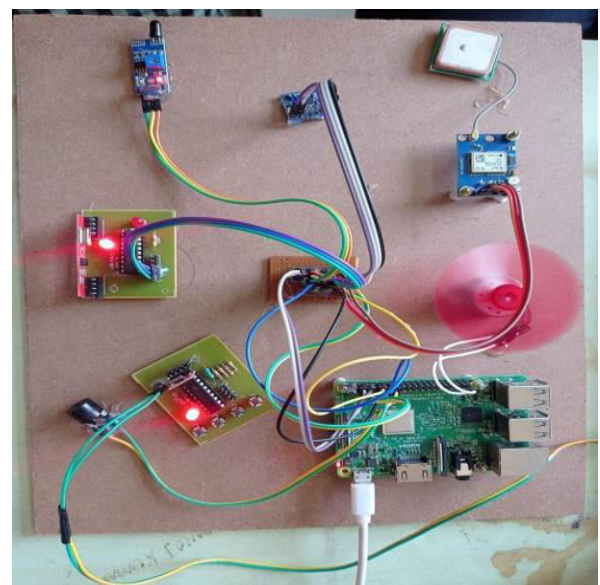
The **ADXL345** is a small, low power, complete 3-axis MEMS accelerometer modules with both I2C and SPI interfaces. The ADXL345 board feature on-board 3.3V voltage regulator and level shifter, which makes it simple to interface with 5V microcontrollers such as the Arduino.

III. EXPERIMENTAL RESULTS

The below figures show the circuit connecting raspberry pi and other components, as shown in Fig 8. As soon As the motor starts as shown in Fig 8 and location of the vehicle longitude and latitude readings are also posted using internet of things (IOT) as show in Fig 9.



(a)



(b)

Fig8.(a) Final module with outpower supply (b) Final module with power supply

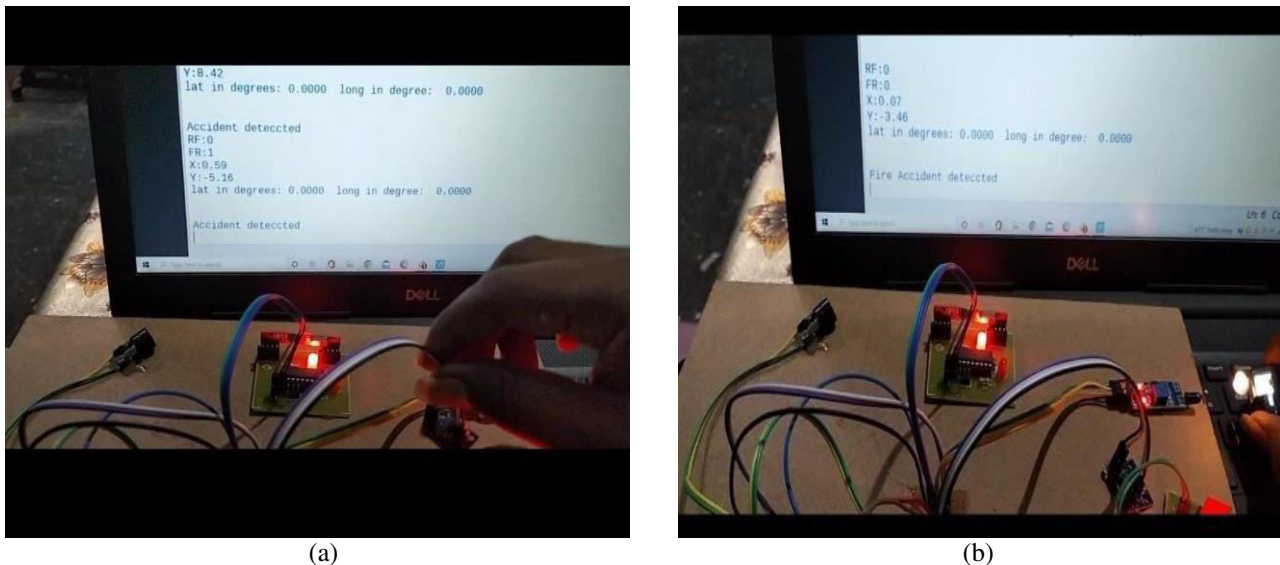


Fig.9.(a) accident detection (b) Fire accident detection

Taking advantage of the features of most Android devices, we can add crash detection to the device. In most Android devices, the device has an accelerometer and GPS. Together, we can use these to send a message if we think that a crash has occurred and send an emergency message with a location. As shown in Fig 9 To detect crashes, I've created a new class named Crash Detector. The class will monitor readings from the accelerometer. When it receives a reading that is above a certain level then it is assumed that the vehicle experienced an impact. The value that I've selected for indicating an impact here is a best estimate based on reading about car crashes. A flame detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system. When used in applications such as industrial furnaces, their role is to provide confirmation that the furnace is working properly; it can be used to turn off the ignition system though in many cases they take no direct action beyond notifying the operator or control system. A flame detector can often respond faster and more accurately than a smoke or heat detector due to the mechanisms it uses to detect the flame. this is shown in Fig 9.

IV.CONCLUSION AND FUTURE SCOPE

We got to learn a lot about system implementation, component interfacing on the board and efficient, compact programming. Vehicle theft detection device is the need of the hour and a compact, efficient and cheap device can be made using Raspberry pi. A powerful product can eventually be made out of this system. We can improve the accuracy by increasing the cost of the components. We can add ambulance contact numbers and police station contact number so that they can reach out very fast to that location. The application can be made capable of generating the voice based alert to the user. Also, the features to block the ignition unit by sending some instructions to the microcontroller can be added make the vehicle impossible to start for improved security. The entire system can be integrated with an android app and the relevant data can be stored in a database so.



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