

An Intuitive WSN Approach For Slowing The Spread Of CORONAVIRUS

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Aim:

- 1] To stop the Infected people from running around and spreading the infection by Quarantine to them. The system monitors phone signals to alert police and local officials if those home quarantine people move away from their address or turn off their phones.
- 2] Contact Tracing of Infected Person and make them also quarantine.By using Location history, clean the place where Infected person visit.
- 3] If any chance Healthy Person comes in contact with Quarantine then notification alert to healthy Person's Smartphone

Introduction:

Recently I read post “The US government is talking to tech giants like Facebook and Google to see if users' location data could help track and slow the spread of COVID-19.”

Everyone is using Smartphone with continuous data. Google/Facebook access the location for its Google map or place recommendation, review etc.. Can we use, Data collected of users' locations to track patterns and groups, rather than monitor any single individual, or can we do “Contact Tracing” of corona suspected person whether they identify to each other or not. Thus anyone who's crossed paths with that person gets an alert in realtime or after confirmation of his positivity. In theory it looks simple , but in practice there are tons of reasonable concerns, privacy and user adoption among them.

One example will help health authorities to determine the impact of social distancing, similar to the way we show popular restaurant times and traffic patterns in Google Maps. Being able to monitor trends in where smartphone users go as a group, how many people are together in one place and hot spots for large gathering could be a 'powerful tool' for tracking the virus. 'In the longer term, such architecture could allow future disease epidemics to be more reliably contained, and make large scale contact tracing of the sort that has worked in China, Israel[1] and South Korea, feasible everywhere.' It could prevent many people from being exposed. Hong Kong residents who had travelled to Hubei over the previous 14 days would be ordered to stay at home, with the quarantine period lasting two weeks and wear electronic tracking wristbands[2]. In Singapore, the government uses text messages to contact people, who must click on a link to prove they are at home. China published an app that lets people scan QR codes to find out if they've been in close contact with someone infected with the virus. Israel is thought to be doing something similar by using residents' cellphone data to track the disease. Perhaps the most dramatic example to date is in Taiwan[3], where authorities have deployed an “electronic fence” around quarantined households — alerting police if citizens under quarantine leave the home or even turn off their phones. better than none and the wristband might be better without GPS

Enforcing quarantines:

- The Provided kit will record daily temperature and health status of the People under quarantine.

- The system monitors phone signals to alert local police if home quarantine People move away from their address or turn off their phones.
- If Healthy people came in contact with Quarantine people any chance, then Healthy people will get notification alert.

Contact Tracing:

- Mobile phone users can text for a list of locations they have visited.
- GPS data is also used in contact tracing.
- Credit/Debit card Transaction records also stored e.g. Mall/Shopping etc. (Aadhar card with online location Update)
- The government then releases details about the patients' travel history with time stamp.
- Then other (Healthy) Person visiting at same time to that place will get inform for test (Predicting their occurrences using location data of them).
- People can avoid those places where the virus was once active. Government authority will sanitize those area.

Steps:

- 1] Locate and quarantine those who have been infected
- 2] Using tracking algorithm locate people who have been in contact with those stricken by the Corona.
- 3] Inform these people that they must go into quarantine for 14 days or came for Test.
- 4] Monitor the location or Quarantine People.

Software: MATLAB

Hardware: Laptop or PC

Experiments & results:

- Green Color (*): Healthy people
- Blue Color (*): Corona +ve people
- Red Color (*): Infected Quarantined

Initially Only 2 Peoples are infected out of 20 people

Location x,y is obtained from user's Smartphone or anonymized data of Google or Facebook

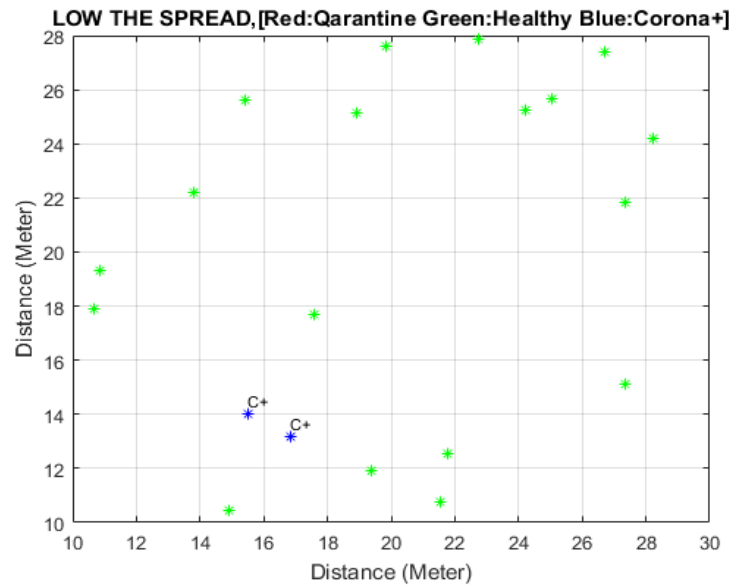


Figure 1: At Starting Time

WITHOUT ANY CONTROLLING METHOD:

The Healthy people comes in contact with Corona +ve Person (Less that 0.5m) and thus become Corona +ve, we denoted them as Q

Now Q also start infecting...

Total Healthy Person=17

Total Corona +Ve Person=3

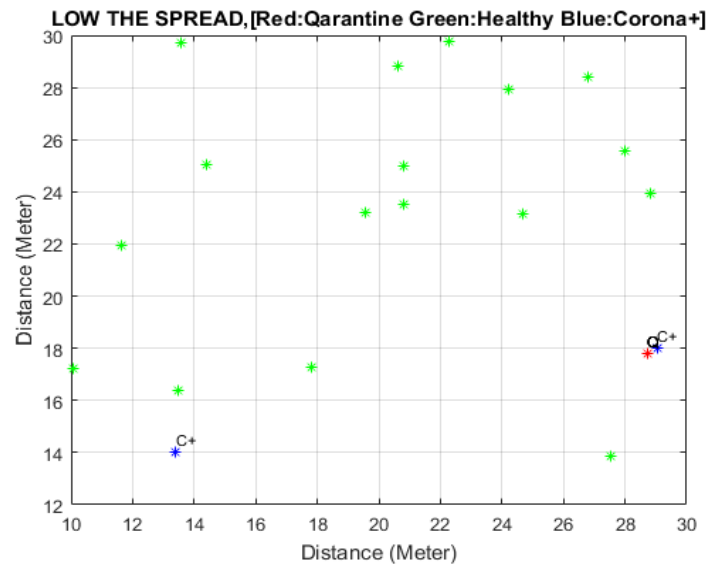


Figure 2: After One Minute

Total Healthy Person=7

Total Corona +Ve Person=13

If Simulation Continue....then all People will be infected...

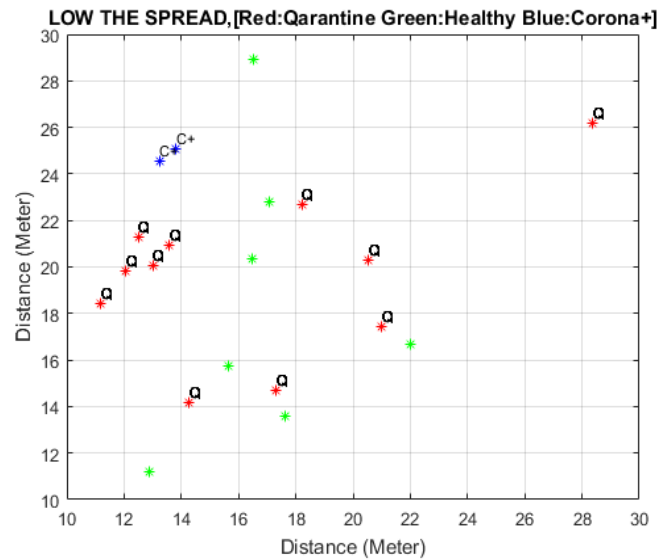


Figure 3: After 60 Minute

AFTER APPLYING PROPOSED METHOD:

Corona Person Symptoms will be seen after 14 days (average)

But., till now they infected one person (marked as Q)

Now , As our algorithm suggest, Quarantine to both confirm...

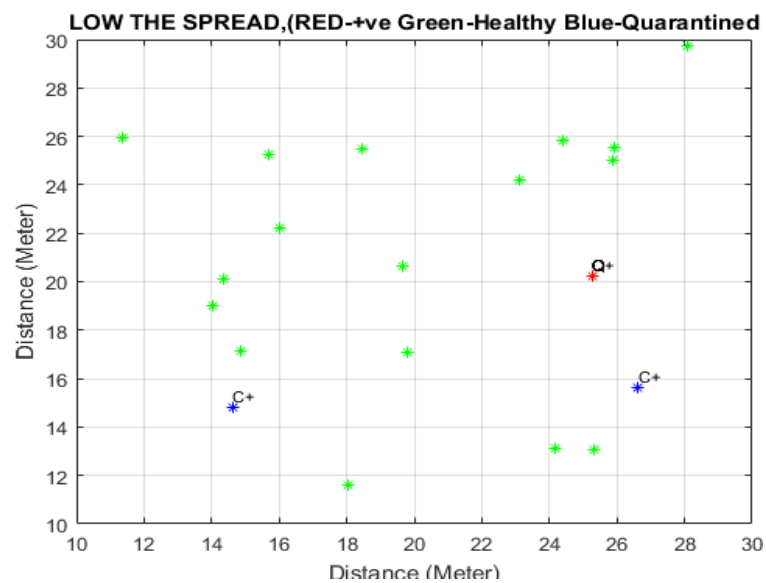


Figure 4: At One Minute

Thus Corona +ve Patient are confirmed.

Their Contact tracing Person from historical Data are traced.

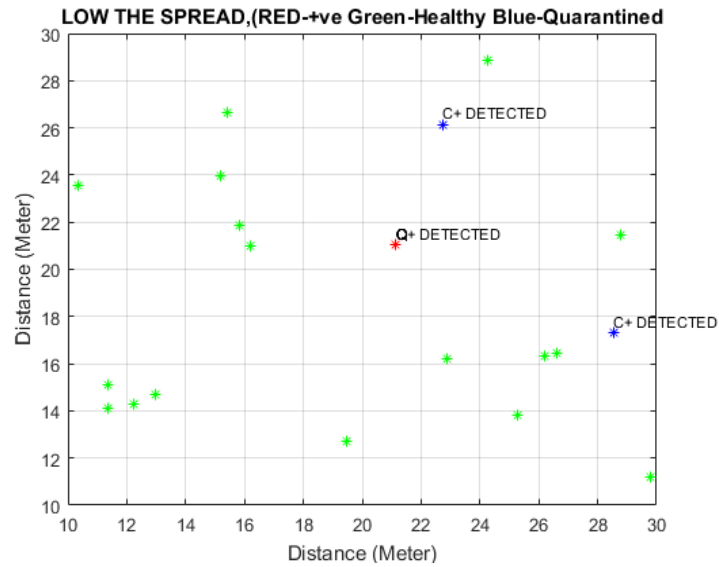


Figure 5: After One Minute

All the Infected person are Make Quarantined. Normal Routine of healthy person will be ongoing... If any chance , Healthy person goes in contact with Corona +ve Then Healthy person will get notification Alert...

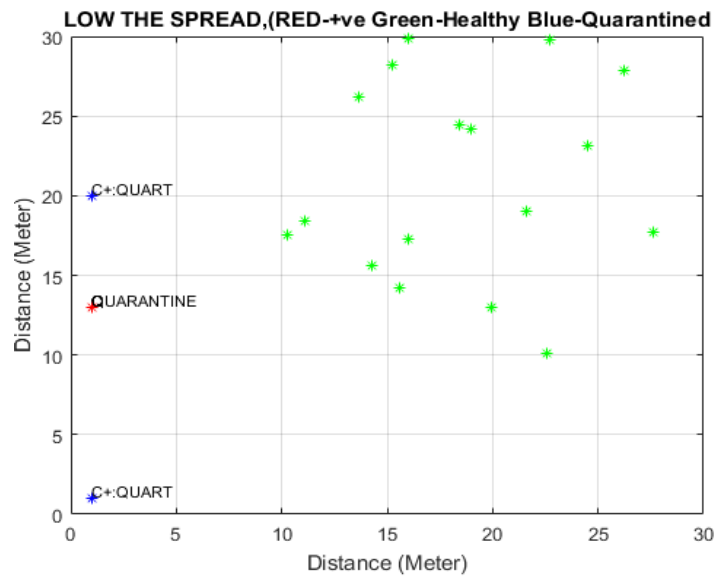


Figure 6: After One Minute

All the Infected person are Make Quarantined. Normal Routine of healthy person will be ongoing...

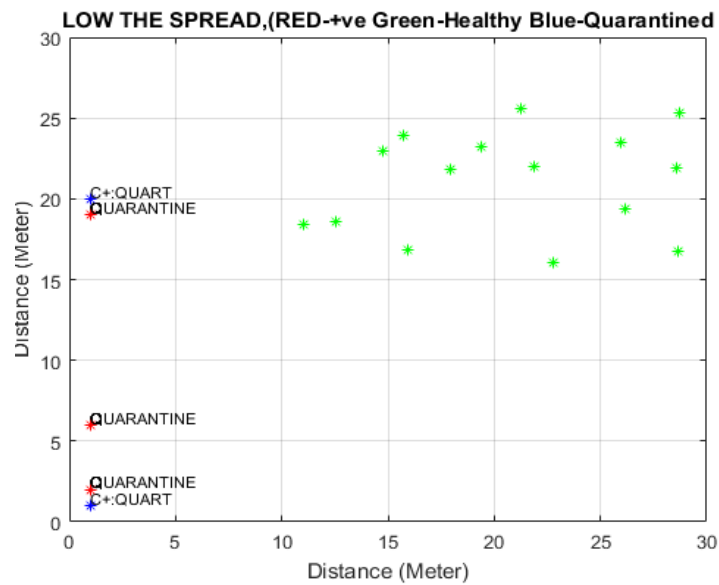


Figure 7: Quarantined

If any chance , Healthy person goes in contact with Corona +ve Then Healthy person will get notification Alert... See below, Healthy (*) comes in contact with Corona Patient (*) , Then notification alert is send to Healthy..

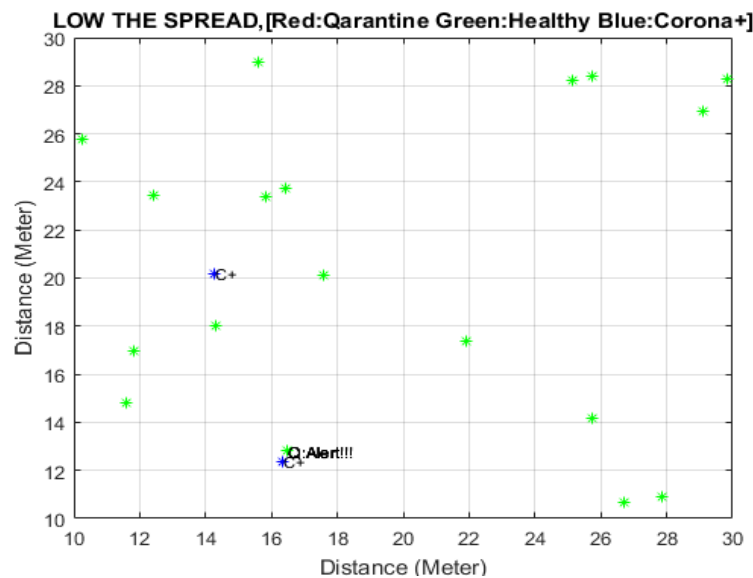


Figure 8: Quarantined

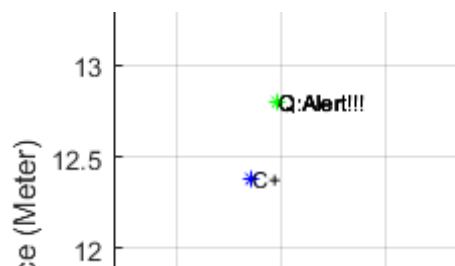


Figure 9: Zoom in.

Path History Of Corona Patient:

Figure shows location visit by corona +ve patient (When it Confirms +ve) so contact tracing is possible and according to history people in contact with him can be make Quarantined.

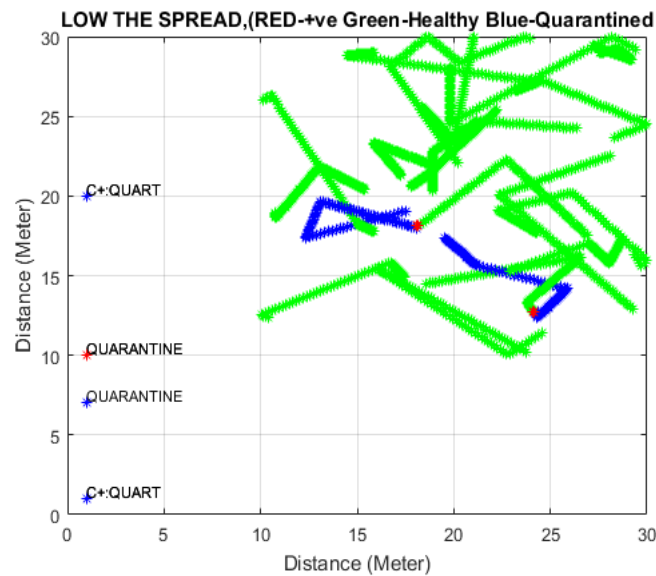


Figure 10: Quarantined

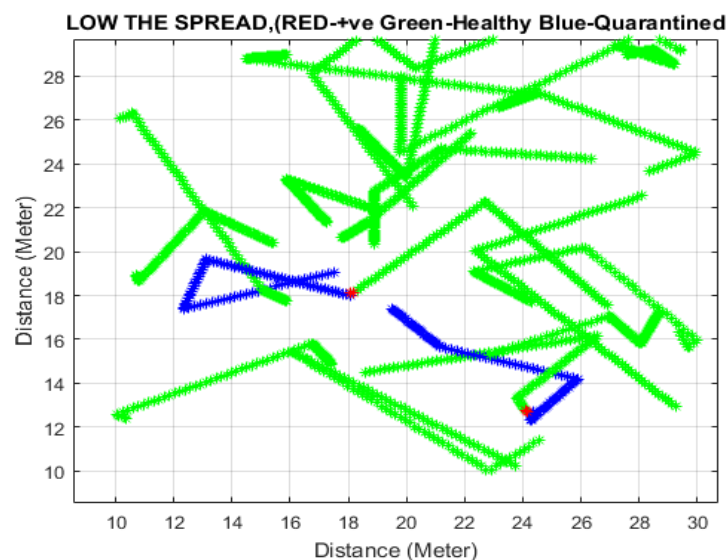


Figure 11: Zoom in.

Limitation:

A phone only determines positions to between 22ft and 42ft in urban built up areas and may actually be much less precise than that. The issue is that COVID-19 appears to spread between two people who are within just a few feet of each other.

Conclusion:

Mobile phone anonymized data can be efficiently used for tracking people infected with COVID-19 including to identify and quarantine others they have come into contact with and may have infected.

References:

- [1] Israel passes emergency law to use mobile data for COVID-19 contact tracing, Natasha Lomas / 3:55 pm IST • March 18, 2020, <https://techcrunch.com/2020/03/18/israel-passes-emergency-law-to-use-mobile-data-for-covid-19-contact-tracing/>
- [2] Coronavirus: 30 Hong Kong families under home quarantine to get tracking wristbands
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- [3] Coronavirus: Taiwan's new 'electronic fence' for quarantines leads wave of virus monitoring,
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