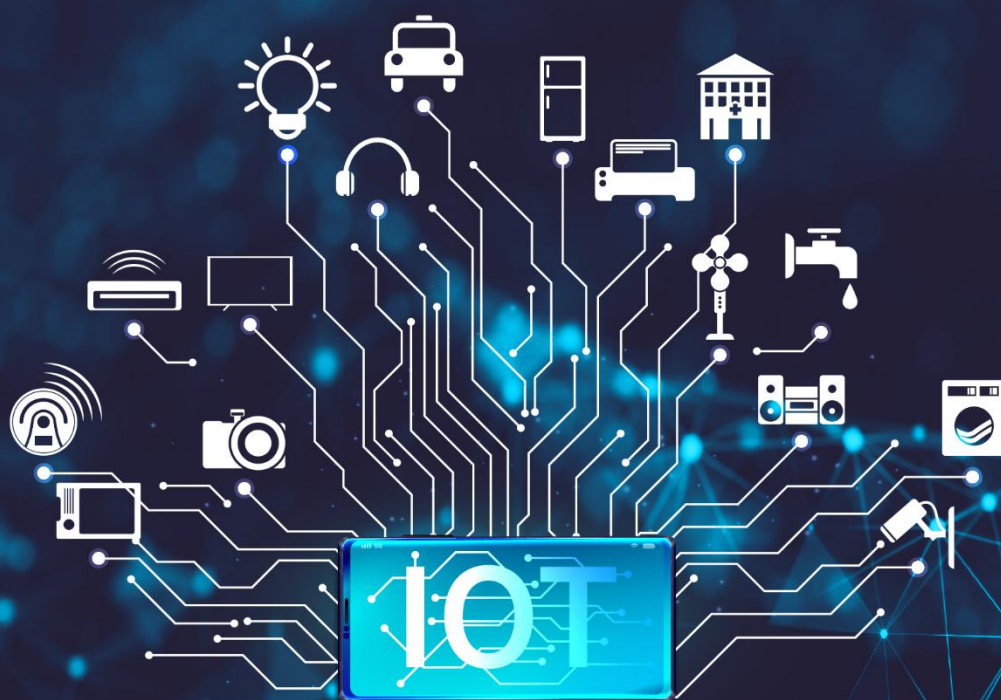


TECHNOLOGY-LED TRANSFORMATION IOT AIDING BUSINESSES TO RESUME AFTER COVID-19

White Paper
By
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Connected World. Connected Experiences.



1 ENTRY & EXIT SCREENING

Preventing sick employees from getting inside the work premise is a top priority. Edge computing and video analytics could come to our rescue to implement automated screening at entry and exits. Thermal imaging video cameras are a good choice to implement contact-less authorization through facial recognition, combined with fever detection. This requires infrastructure investments for high resolution cameras enabled with thermal imaging, edge computing, and integration with enterprise ERP for authorization and alert systems if any non-compliance is detected.

Thermal Cameras sense infrared light emitted by objects and detect their temperature by recognizing the intensity of radiation. Though infra-red light is invisible to naked eye, it can be felt as heat when in near proximity. Thermal cameras can detect these radiations from far away and are even used in defense systems for border surveillance and night vision. Usually these devices can read temperature differences up to

1,000 feet away and identify a person at 200 feet.



Handheld thermal scanners are also another option but less autonomous, hence less efficient. Handheld thermal scanners need a person operating the equipment and recording temperatures for every individual passing-by. This is a less expensive alternative on CapEx however not ideal as manual intervention could be biased and error prone.

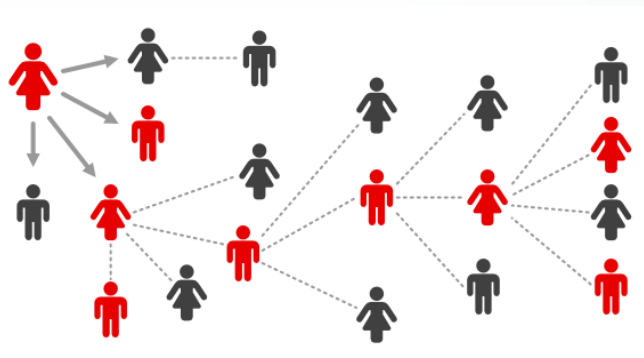




2 CONTACT TRACING

Contact tracing is the process of identifying all possible contacts an infected person could have come in proximity over the past several days (about 14 days in case of Covid tracking). Contact tracing can be performed using cellular GPS records, Bluetooth Low Energy, Ultra-wideband sensors, **contact's** travel history and various other data sources. Apple and Google, when combined, account for most of the world's smartphones operating systems. On 10th April 2020, they announced coronavirus tracking technology for iOS and Android that rely on Bluetooth Low Energy (BLE) wireless radio signals for contact tracing. These apps are expected to be released in May 2020 which would warn people about others they'd been in contact with, who are infected by SARS-CoV-2. Cloud computing, data lakes, data warehousing, big-data, streaming analytics and IoT all work hand-in-hand to enable contact tracing.

Citizens around the world have expressed concerns about their privacy due to these contact tracing apps. Various protocols, such as Pan-European Privacy-Preserving Proximity Tracing (PEPP-PT), Decentralized Privacy-Preserving Proximity Tracing (DP-PPT/DP-3T), TCN Protocol, Contact Event Numbers (CEN), Privacy Sensitive Protocols and Mechanisms for Mobile Contact Tracing (PACT) and others, are being discussed to preserve user privacy.





3 ON-PREMISE SAFE-DISTANCE MONITORING

Lesser the people coming in contact, the safer the society will be. Location trackers are ideal in these situations to monitor employee movements and restrict access to limited locations. Employees of the same department can be grouped together and monitored with a suggested group size of 4-5. They can have separate cafeterias and meeting rooms. When an employee is tested positive only that group can be quarantined and the contact areas are decontaminated. Employees shall be suggested to remain in their cubicles and have discussions over video/voice calls.

Video analytics and edge computing will help in monitoring adherence to safe-distancing guidelines by using CCTV footage. On large campuses and public places like roads and parks, this can be implemented with camera fitted drones.





4 REAL-TIME TEMPERATURE AND LOCATION TRACKING USING WEARABLES

Employers can recommend their employees to wear smartwatches that also continuously monitor the body temperature and alert the person wearing it, if they were not in safe limit. This would ensure the person can self-quarantine thereby avoiding possible chance of further spread. Groups of employees / family members / colleagues / acquaintances can share their location and health status with others to ensure mutual safety. As part of safety measures employees may be recommended to self-check their temperature before they start to work. By doing this they can avoid transmission on their way to work and also at business site. These smart watches can be configured to alert if any associate form their group with high temperature is in proximity, say if someone develops fever after entering the site. These watches will first notify the affected person to self-quarantine and can be configured to notify the employee health & safety staff to safely get them out of the site to avoid spread.





5 SENSOR TAGS

Sensor tags using BLE (Bluetooth Low Energy), Ultra-Wideband (UWB) or similar technologies can be used along with the ID badges to track employee movements. These tags can also be used to monitor count of persona in any area. Theses tags coupled with Geo fencing technology can be used to send alerts to the individual who enters restricted or unauthorized areas. Larger groups can be dissolved by broadcasting these alerts. These sensor tags also alerts if the safe distancing rule is breached. The Geolocation Sensor Interface collects details of latitude, longitude, altitude, direction and speed.

Outdoor
Tracking App

Sensor Tags

Indoor Tracking
Gateway





6 TEST KIT INTEGRATION

Results from test kits have to be associated with the tested individual to ensure safety of the community and workforce. Different types of testing are available for Covid like molecular (nasal swab, saliva) and serological (blood antibody) testing. Each tested and cleared person should be tagged and identified as safe to socialize, while “tested positive” persons identified for quarantine. These test results will have their respective validity, like nasal swab and saliva test valid for 3-4 weeks, antibody test results having a longer validity of about 6 months to a year. Once vaccines are available, vaccinated people should also be tagged as safe.

Test cleared or vaccinated individuals can be tagged to their social security number or unique national id using their iris scan. This could be a national / international database and all access at businesses, malls, airports, subways, public transportation, schools, and colleges etc., controlled by contact-less biometric iris authentication. Until this sophisticated iris scan access mechanism is implemented, good-to-go

individuals can be simply marked with permanent ink seal on their finger nails (simple, non-erasable, timed – as nails will grow out). Re-tested results can be stamped on other fingers.

At enterprise level tagging can be done by attaching a special sensor tag to the cleared individual. The attached tag can track the movement of the associate within the building and maintain logs to enable contact tracing, in the unfortunate event of any other associate being tested positive anytime soon. The tag will carry the validity of the test result and alert if they attempt to enter the premise without valid test result. It will also enable enforcement of work areas within the building and alert if they spend longer time at undesigned areas.

Until a national lookup registry is available, companies will face a challenge to handle visitors, as their well-being cannot be measured except by a self-declared questionnaire or current measure of body temperature – which may not identify asymptomatic persons.



7 COVID BI DASHBOARD

Enterprises can step-up to provide any assistance to the employees or their families, by constant monitoring of their health & safety (with consent). These real-time metrics can assist the competent authorities in making decision towards getting back to full potential of productivity without compromising on health & safety of our workforce. By evaluating the risk levels of employees in each geographic region, companies can fine-tune their remote work policies, plan work-shifts or decide off-loading work to other green regions, to meet customer demands.

Management can infer useful statistics about the state of affairs in the company and decide where to spend their remediation efforts. For example, identifying infected workers would enable the factory to deduce their approximate time of absence. A skill dashboard developed for this purpose can match their skill set and recommend to hire temporary staff to fill the demand or reshuffle between other production lines to maintain optimum output levels.

Global supply-chain ecosystem enables supply of raw materials & parts from several suppliers across different countries towards production of finished products like medicine, automobile, electronic equipment, turbines, windmills and more. Global industrial impact dashboards let manufacturers adopt to alternate sources of procurement and adjust production volume, by presenting trends of the outbreak at the countries or regions where they source these raw materials.

Business Intelligence dashboards developed using Predictive Analytics of data collected from all the above sources would help corporate leadership with the much needed clarity amidst chaos.





8

STAY SAFE! TRANSFORM! EVOLVE!

Smart IoT devices built-in with the entire ecosystem will assist to ensure safety, while also monitoring the adherence and well-being of the mankind. Our work environment will undergo a transformation by keeping in mind the wellbeing of our associates (employees, contractors, visitors, customers) as top priority. It is a tough call to resume work after this pandemic, but with our collective and coordinated efforts we will win this unprecedented humanitarian crisis, in this process reinventing ourselves. Technology-led transformation combined with intelligent protection measures and self-discipline will support to bring our business, people and economy back in action. This generation will collectively evolve, with the smartest and fittest surviving to see the dawn of a whole new world. This too shall pass!

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The views reflected in this paper are personal and not communicate the views of my employer.

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With almost two decades of experience, Sriram Raghunathan is a cross-domain IoT Consultant for Medical devices, Transportation, Logistics and Telecom, helping customers uncover their Digital Transformation needs, define their IoT strategic road-map towards Industry 4.0. He is a certified Scrum Master with years of agile experience in executing IT and Software development projects with globally distributed Scrum teams. A technical project manager with hands-on experience in Java, Web services, RDBMS, NoSQL, Javascript, Node-JS, Virtualization (Docker, AWS, Oracle VirtualBox, VMWare) and is an evangelist for DevOps (Continuous Integration, Continuous Delivery, Continuous Deployment).

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