

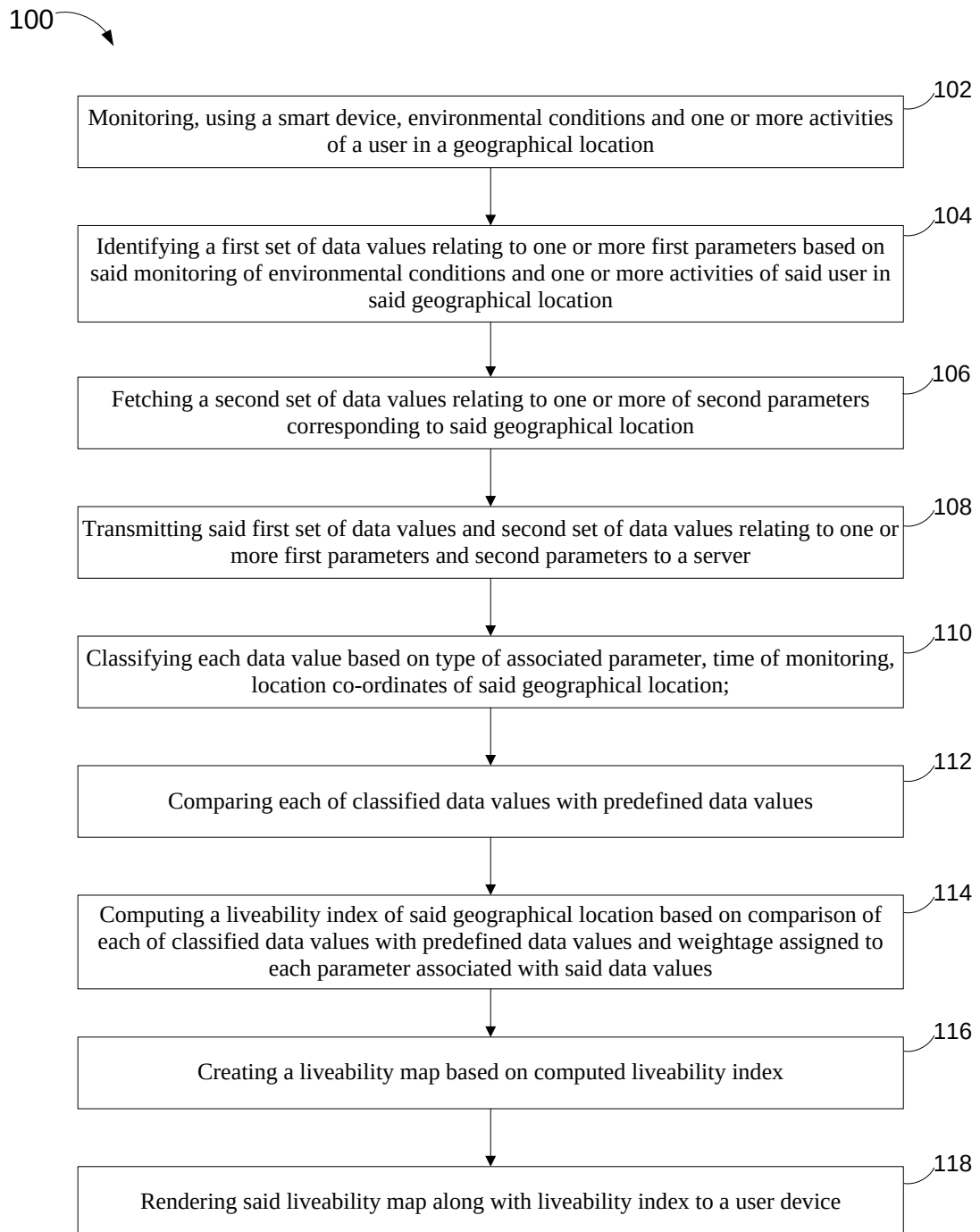


Figure 1

200

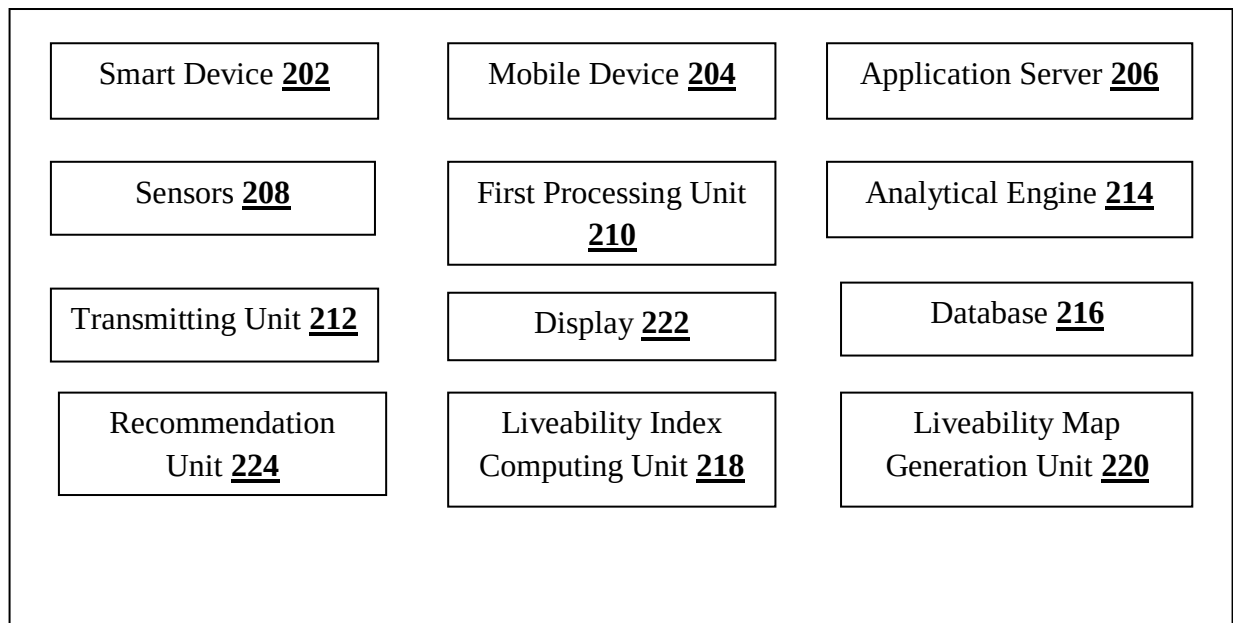


Figure 2

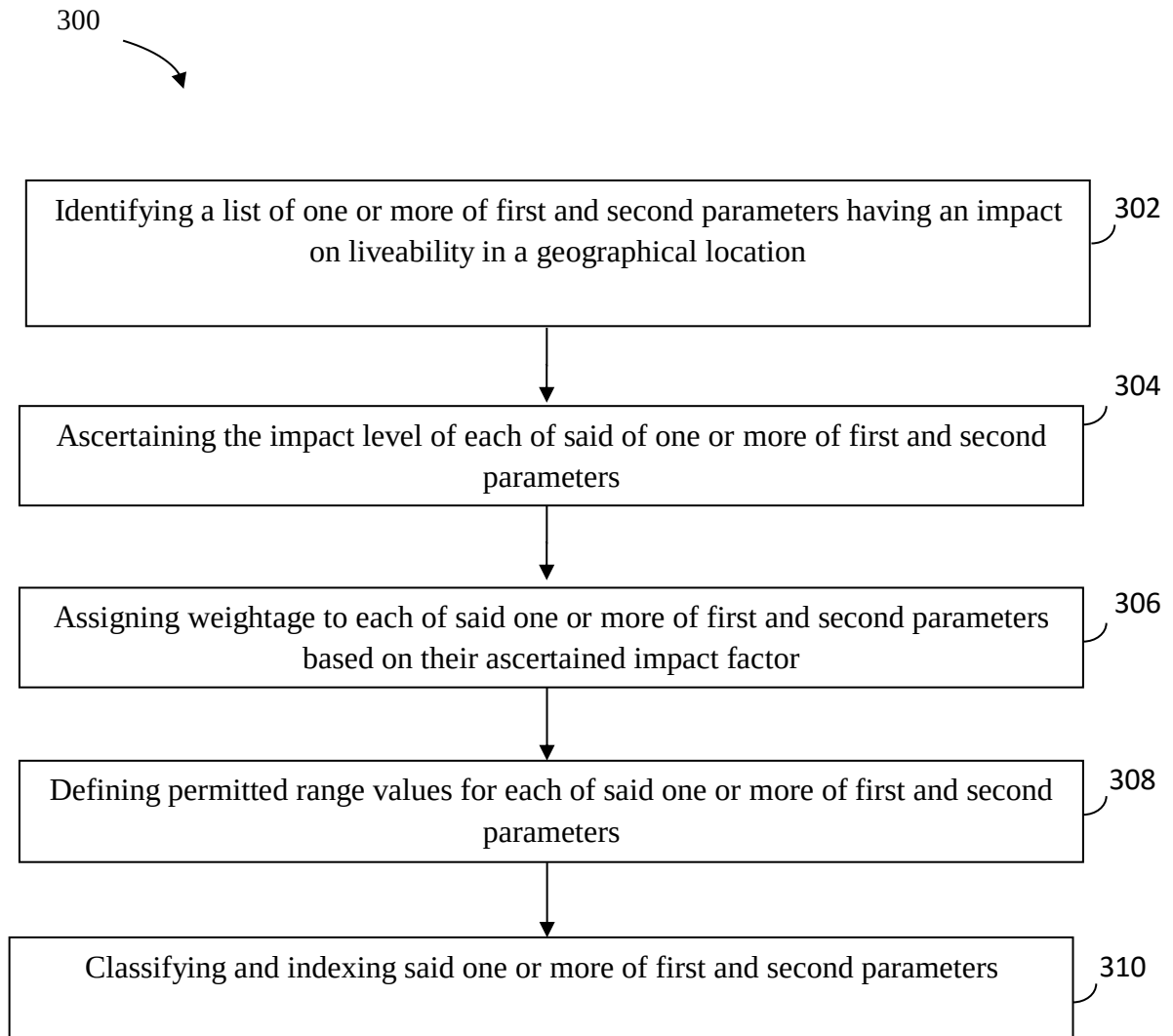


Figure 3

Parameters	
Traffic data	pressure,
Duration of traffic	humidity,
Presence of Traffic signal	wind strength
Probability of occurring traffic at different time in a day	Pollution i) Quantity and distribution of gases (O ₂ , CO ₂ , etc), ii) Flow of gases towards a direction, iii) Change in quantity of gases due to factories (chemical, toxic, leather etc)
Movement of vehicles (speed – slow, medium, fast over speeding)	Location of hospitals, clinics, medical shops
Road - speed of walking/jerks can be determined	Number/frequency of visits by a person to hospitals, clinics, medical shops
Footpath	Noise level index
Traffic intersections with pedestrian crossing	Disease index
Vehicles (bus, auto, train, metro, or any vehicle for travel)	Health data of a person (including diseases, disability)
Travel routes	People who visit hospital, clinics (probability)
Transportation points	Gym activity/ fitness tracker
Water availability-data Underground water	Any health-related activity such as marathon, events related to health in a locality
Depth of water availability	People who do yoga, pranayama (regular manner), location of institutes
Quality of water	Mobile phone access - Time spent in mobiles, games, social networks, you tube etc
Terrain data, building data, open space	Mobile phone access -By different age groups
Geographical content (latitude and longitude)	Mobile phone access -Probability of radiation from mobile devices
Seismic data	Hospital data - Number of hospitals, clinics, medical shops, total number of beds in hospital
Parks-area, depth in sq.km	location information & data of Fire station, Police station
lakes-area in sq.km	School, colleges
Climate related info, Temperature	Electrical sub-station, hubs, transformers, power cuts

Figure 4(a)

Parameters	
Number of yoga/fitness health teaching institutes teaches such activity	Factory index - Information relating to small, medium, large, chemical related factories
Number of parks, trees	Factory index - People dependency index / employment index
Affordability index - Shopping complex, jewelry shops, life style shops	Healthcare professionals per 10,000 population
Affordability index - Purchasing power	Response time in case of health emergencies
Social life index - All places of social activity, entertainment, music, concerts, events, movies, parks, theme parks	Period prevalence of diseases
Spiritual index - location of temples, church, spiritual gathering	Population index (people per sq.km), population density
Population index (people per sq.km), population density	Number of parks, trees
Terrain data	Electrical sub-station, hubs, transformers, power cuts
Water consumption data – by people Daily consumption data – water (drinking)	Affordability index - Purchasing power
Quality of water	Noise level index
Condition of civic amenities - drains, its pathways, footpath	Parks-area in sq.km
Number of waste dump yards, its location from locality, amount of waste dumped per day/hour/minute/second	lakes-area in sq.km
Segregation units	Water availability-data Underground water
Medicine data - Sale of medicines(in hospital, clinics, medical shops)	Depth of water availability
Police data – information relating to Theft, accident, burglary, murder or any other incidents in police database	Quality of water
Disease index	Vehicles (bus, auto, train, metro, or any vehicle for travel)
Air quality	Travel routes
Child index - Number of infant/children (age range),Health and Medicine monitor for children below 5 yrs	Transportation points
School information (timings, no. of children studying, quality of education),	Road, footpath- condition
Climate related info - Occurrence of rain, ozone depletion	Health data of a person (including diseases, disability)
Transport data - Total number of vehicles (two wheelers, LMV, HMV, HTV etc)	

Figure 4(b)

Liveability Index - Independent Parameters-Traffic &Transport (1)

Sl. No	Parameter (locality related)	Can it be done via a wearable device (Online services, Sensor data, Paid 3rd Party services) (1)	Significance to Livability Index (2)	Factor with respect to livability	Notes 1	Weightage
1	Traffic data	GPS	To determine the movement of vehicles, in a locality	Primary	Determination of traffic, more safer, but considered less healthy	1.9
2	Duration of traffic	GPS, accelerometer	To determine the average time of traffic at particular time or any time of a day	Primary	Determination of duration of traffic, people movement-more safer, but considered less healthy (if more traffic signal time is found)	1
3	Presence of Traffic signal	online services, Govt Traffic Police database	To determine overall time consumed in traffic, the smoke by vehicles, movement of vehicles when traffic signal is ON, or OFF etc	Primary	Presence of traffic signal, the locality is well maintained, but not healthier environment	0.7
4	Probability of occurring traffic at different time in a day	GPS, accelerometer	To determine the likelihood of occurring traffic in a locality, with respect to overall movement of vehicles, operation of traffic signals, duration of traffic signals etc	Primary	The probability of traffic is to determine the traffic index but if prolonged traffic is detected, then less healthy	0.9
5	Movement of vehicles (speed – slow, medium, fast over speeding)	GPS, accelerometer	To determine the motion of vehicles, and thereby calculating the probability of occurring traffic, or smooth movement of vehicles	Primary	The movement of vehicles determine different traffic patterns, possibility of traffic occurrence, quantity of pollution may occur	1
						5.5

Figure 5(a)-1

Liveability Index - Independent Parameters-Traffic &Transport (2)

Sl. No	Parameter (locality related)	Can it be done via a wearable device (Online services, Sensor data, Paid 3rd Party services) (1)	Significance to Livability Index (2)	Factor with respect to livability	Notes 1	Weightage
6	Road - speed of walking/jerks can be determined	Gyroscope, Accelerometer, Online services	To determine road type, road condition, Road size (used by people), speed breaks, pot holes in a road in a locality	Secondary	to detect the condition of road/civic amenities, if more jerk/pot holes are found, then less livable, but with more speed breaks then more livable	0.5
7	Footpath	Online services, Gyro, accelerometer	condition of foot path, in a locality, no foot path, size of foot path in a locality	Secondary	to detect the smooth motion of people, and to determine the condition of foot path based on the motion, gyro of user, if smoothness is maintained by the user, then more livable	0.4
8	Traffic intersections with pedestrian crossing	online services		Secondary	to indicate safe crossings in a road	0.4
9	Vehicles (bus, auto, train, metro, or any vehicle for travel)	mobile sensor, GPS, accelerometer, gyro	To determine the accessibility to one location to another location, it also involves movement of vehicles, routes, mode of vehicles, total number of vehicles in road, it also used to determine the pollution in that locality due to vehicle and its movement	Primary	Accessibility to people (transportation points, transport mode) - more accessible - more livable, more people movement - more safer more vehicle movement - more safer - but less healthy	0.8
10	Travel routes	smart wearable, online services, mobile sensor, GPS		Primary		1.2
11	Transportation points	smart wearable, online services, mobile sensor, GPS		Primary		1.2
						4.5

Figure 5(a)-2

Livability Index - Independent Parameters-Water

Sl. No	Parameter (locality related)	Can it be done via a wearable device (Online services, Sensor data, Paid 3rd Party services) (1)	Significance to Livability Index (2)	Factor with respect to livability	Notes 1	Weightage
12	Water availability-data Underground water	Borewell companies (sensor data)	Availability of water resources underground (in a locality) must be determined - for drinking/ or various other purposes	Primary	More livable is water content is more,	3.5
13	Depth of water availability	Borewell companies (sensor data)	To determine depth at which water is available underground - helps to plan and construct borewells or well	Primary	If we find water at comparatively less depth (in feet), then more livable	3
14	Quality of water	Borewell companies (sensor data)	To determine optimal pH value consumable by people in a locality	Primary	If we find water is qualified to be drinkable with standards of drinkability, then more livable	3.5
						10

Figure 5(b)

Livability Index - Independent Parameters-Environment (1)

Sl. No	Parameter (locality related)	Can it be done via a wearable device (Online services, Sensor data, Paid 3rd Party services) (1)	Significance to Livability Index (2)	Factor with respect to livability	Notes 1	Weightage
15	Terrain data, building data, open space	Online services, Sonar, proximity sensors	The geographical data relating to a locality must be determined	Primary	To know the elevation, slope, the distribution and density of buildings in a locality, mountains, hills, location of airports, lakes, forest area, Plain lands will be more livable, Populated area, More safety, prone to land slides	0.3
16	Geographical content (latitude and longitude)	GPS	The positioning of the person/location/locality area must be precisely determined	Primary	To locate the position of a person, place or location	0.3
17	Seismic data	Online services - Indian Seismic and GNSS Network (ISGN) and United States Geographical Survey (USGS)-historic downloadable data available	The geological survey data is important to determine the occurrence of earth quake or vibration on earth crust (to determine safety), No of such occurrences meaning not safer	Primary	To analyze the land conditions, tremors, earthquakes etc When the occurrence of such conditions are high, then less livable	2
18	Parks-area, depth in sq.km	Online services	park condition, aesthetic, cleanliness in a locality	Primary	the presence of more parks determines, the locality is more livable, it's even distribution is also considered to determine livability	1
						3.6

Figure 5(c)-1

Livability Index - Independent Parameters-Environment (2)

Sl. No	Parameter (locality related)	Can it be done via a wearable device (Online services, Sensor data, Paid 3rd Party services) (1)	Significance to Livability Index (2)	Factor with respect to livability	Notes 1	Weightage
19	lakes-area in sq.km	Online services	area of lake, its maintenance, maintaining the aesthetic of lake in a locality	Primary	presence of lake is considered, more livable, because open space is available	1
20	Climate related info, Temperature	sensors, smart wearable, online services - windy, accuweather	to determine the climatic conditions/variations of a locality	Primary	to analyze the climatic conditions of the locality, range of temperature info to determine the livability	1
21	pressure,	sensors, smart wearable, online services	to determine the climatic conditions/variations of a locality	Primary	to analyze the climatic conditions of the locality, range of pressure variation, humidity info to determine the livability	1
22	humidity,					
23	wind strength					
24	Pollution i) Quantity and distribution of gases (O ₂ , CO ₂ , etc), ii) Flow of gases towards a direction, iii) Change in quantity of gases due to factories (chemical, toxic, leather etc)	Gas sensor, online services, mobile sensor	to determine the pollution in a locality, due to various gases to determine the accumulation of gases/flow of gases from one location to another to determine the quantity and quality of gases released by factories, in a locality, which helps in determining pollution/air quality	Primary	to analyze the various gases in the atmosphere, disposition of gases from factories, and its spread to other localities (due to wind flow)- pollution index - More toxic gases - less livable	3.4
						6.4

Figure 5(c)-2

Livability Index - Independent Parameters-Health (1)

Sl. No	Parameter (locality related)	Can it be done via a wearable device (Online services, Sensor data, Paid 3rd Party services) (1)	Significance to Livability Index (2)	Factor with respect to livability	Notes 1	Weightage
25	Location of hospitals, clinics, medical shops	online services	To determine location of hospital, clinics, medical shops in a location, data can be shared with user	Primary	Location and distribution of hospitals in a locality determine more livable	0.9
26	Number/frequency of visits by a person to hospitals, clinics, medical shops	GPS/Location tracking devices	To determine frequency of visits to hospital, clinics, medical shops in a location, the data collected may be used to determine the health index of a person	Primary	Frequency of visits to hospital determine, the disease index of the location and considered less livable in terms of health	1
27	Noise level index	Mobile sensor	to determine noise level of a locality	Primary	Less noise, more health	1.5
28	Disease index	Online services- Centers for disease control and prevention (CDC, USA)	to determine the health-related data in a locality, number of people with diseases (frequent visit to hospital or clinic, purchase of medicines etc)	Primary	To know the locality is healthier enough	1.2
29	Health data of a person (including diseases, disability)	heart rate sensor, other gyro-based sensor for detecting Disability	to determine the health data of a person	Primary	More disease index - less livable	0.5
30	People who visit hospital, clinics (probability)	Location trackers/online services, GPS	to identify the frequent visit of a person to hospital/clinic in a locality	Primary	More number of visits - less livable	1
31	Gym activity/ fitness tracker	mobile sensor/smart wearable tracking activities	to determine the health data of a person based on its activity	Primary	More number of visits - more livable	1
						7.1

Figure 5(d)-1

Livability Index - Independent Parameters-Health (2)

Sl. No	Parameter (locality related)	Can it be done via a wearable device (Online services, Sensor data, Paid 3rd Party services) (1)	Significance to Livability Index (2)	Factor with respect to livability	Notes 1	Weightage
32	Any health-related activity such as marathon, events related to health in a locality	mobile sensor/smart wearable tracking activities, online services	to determine the likelihood of participating in such activities by the people (in a locality)	Primary	More number of such activities - more livable	0.4
33	People who do yoga, pranayama (regular manner), location of institutes	mobile sensor/smart wearable tracking activities	to determine how frequent the people performing yoga and keeping their health in good condition, location of such institutes determine healthier people	Primary	Distribution and location of such places, more livable - in terms of accessibility	0.4
34	Mobile phone access - Time spent in mobiles, games, social networks, you tube etc	sensors, device activity information, access to mobile applications	to determine the usability of mobile phones or social networks by people in a locality, who simply visit those pages now and then, wasting the time	Primary	More usage - less healthy	0.7
35	Mobile phone access - By different age groups	smart wearable, mobile devices,	to determine, the age class of people who uses mobile more, and determine its implications	Secondary	Age group determine, people prone or addicted to mobile devices	0.4
36	Mobile phone access - Probability of radiation from mobile devices	mobile sensors, temperature sensor, type of mobile devices, acceptable SAR value	to determine the likelihood of getting affected by radiation emitted by mobile phones, due to their continuous usage	Secondary	continuous use of mobile devices, more time in mobile/mobile data - less livable	1
						2.9

Figure 5(d)-2

Livability Index - Independent Parameters-Amenities (1)

Sl. No	Parameter (locality related)	Can it be done via a wearable device (Online services, Sensor data, Paid 3rd Party services) (1)	Significance to Livability Index (2)	Factor with respect to livability	Notes 1	Weightage
37	Hospital data - Number of hospitals, clinics, medical shops, total number of beds in hospital	online services	To determine number of hospital, clinics, medical shops in a location, data can be shared with user	Primary	Number of hospitals determine more livable, in terms of accessibility	1
38	location information & data of Fire station, Police station	GPS, online services	Location information, real-time determination of visiting a place in a surrounding locality to address any issue by the officials (Accessibility to such places by the officials)	Primary	Location and distribution of fire stations/police station in a locality determine more livable (accessibility factor)	1
39	School, colleges	GPS, online services	Location information, number of people who visit to these places	Primary	Location and distribution of school, colleges in a locality determine more livable (accessibility factor)	1
40	Electrical sub-station, hubs, transformers, power cuts	GPS, online services	Location information, real-time determination of visiting a place in a surrounding locality to address any issue by the officials (Accessibility to such places by the officials)	Primary	Location and distribution of offices/access points in a locality determine more livable (accessibility factor)	0.6
41	Number of yoga/fitness health teaching institutes teaches such activity	online services, GPS	to determine total number of such institutes in a locality	Primary	Distribution and location of such places, more livable - in terms of accessibility	0.7
						4.3

Figure 5(e)-1

Livability Index - Independent Parameters-Amenities (2)

Sl. No	Parameter (locality related)	Can it be done via a wearable device (Online services, Sensor data, Paid 3rd Party services) (1)	Significance to Livability Index (2)	Factor with respect to livability	Notes 1	Weightage
42	Number of parks, trees	online services, Govt Ministry of Environment, Forest and climate change, GPS	to determine total number of trees (different varieties), which can consume the pollution accumulated in that locality	Primary	More parks and trees - more livable	1.5
43	Affordability index - Shopping complex, jewelry shops, life style shops	GPS, location tracking, online services, mobile sensors,	The frequent or visit to such places determine likelihood	Secondary	spread of places determine accessibility- nearer more livable	1
44	Affordability index - Purchasing power	mobile app, payment tracking	Buying of products in such places indicate their purchase power	Secondary	spending on valuable/invaluable things determine person's affordability strength	0.8
45	Social life index - All places of social activity, entertainment, music, concerts, events, movies, parks, theme parks	GPS, location tracker, online services	Visits to social places are used to determine the selling power of the people	Primary	More people engaging activities - more livable	1.2
46	Spiritual index - location of temples, church, spiritual gathering	GPS, location tracker, online services	Visits to spiritual places is used to determine the peace and holiness of such places	Primary	More people visiting spiritual places - more livable	1.2
						5.7

Figure 5(e)-2

Livability Index - Independent Parameters-Population

Sl. No	Parameter (locality related)	Can it be done via a wearable device (Online services, Sensor data, Paid 3rd Party services) (1)	Significance to Livability Index (2)	Factor with respect to livability	Notes 1	Weightage
47	Population index (people per sq.km), population density	mobile sensor, smart wearable, GPS	to determine the total number of people in a locality	Primary	the spread of people in a locality	10

Figure 5(f)

Livability Index - Dependent Parameters (1)

Sl. No	Parameter (locality related)	Offline data	Significance to Livability Index (2)	Factor with respect to livability	Group
48	Terrain data	Govt sources, meteorological department	The geographical data relating to a locality must be determined	Primary	Environment
49	Water consumption data – by people Daily consumption data – water (drinking)	Govt sources, water supply companies	To determine overall consumption of water in a locality	Primary	water
50	Quality of water	Govt services, water supply companies, Water pollution control board	To determine the quality of water consumed by people in a locality	Primary	water
51	Condition of civic amenities - drains, its pathways, footpath	Govt-PWD dept, satellite imagery	Monitor flow of drainage, sewage, through canals, without clogging, condition of drains in heavy rains, in a locality	Primary	Environment
52	Number of waste dump yards, its location from locality, amount of waste dumped per day/hour/minute/second	Govt Municipal authority, satellite imagery	To quantify amount of waste accumulated and dumped from a locality	Primary	Waste management
53	Segregation units	Govt Municipal authority, satellite imagery	To monitor disposal of waste material from a locality	Primary	Waste management

Figure 5(g)-1

Livability Index - Dependent Parameters (2)

Sl. No	Parameter (locality related)	Offline data	Significance to Livability Index (2)	Factor with respect to livability	Group
54	Medicine data - Sale of medicines (in hospital, clinics, medical shops)	Offline supplier data for each locality/city - Bulk Drug Manufacturers Association (India), Organization of Pharmaceutical Producers of India (OPPI), INDIAN DRUG MANUFACTURERS' ASSOCIATION	Determining sale of medicines/medicinal products determine the medicinal consumption of a locality	Secondary	Health
55	Police data – information relating to Theft, accident, burglary, murder or any other incidents in police database	Govt, police database	To determine the crime index of a locality	Primary	Society
56	Disease index	Govt Health dept, National Centre for Disease Control(India), Centers for disease control and prevention (CDC, USA)	to determine the health related data in a locality, number of people with diseases(frequent visit to hospital or clinic, purchase of medicines etc)	Primary	Health
57	Air quality	Central pollution control board, National air quality index	to determine the air quality of a location based on presence of parks, trees, vehicle emissions, pollution, etc	Primary	Health

Figure 5(g)-2

Livability Index - Dependent Parameters (3)

Sl. No	Parameter (locality related)	Offline data	Significance to Livability Index (2)	Factor with respect to livability	Group
58	Child index - Number of infant/children (age range), Health and Medicine monitor for children below 5 yrs	Govt-Department of health, Centers for Disease Control and Prevention	to determine whether any child is affected with any diseases, between 0-5 years, health and nutritional drops/ medications can be provided to avoid such disease	Secondary	Health
59	School information (timings, no. of children studying, quality of education),	School database, Govt database	to determine traffic during such timings	Secondary	Amenities
60	Climate related info - Occurrence of rain, ozone depletion	Govt sources, meteorological department	considering weather parameters and prediction of such incidents	Secondary	Environment
61	Transport data - Total number of vehicles (two wheelers, LMV, HMV, HTV etc)	Govt sources, RTO data	Number of vehicles is indirectly providing probability of occurring traffic	Secondary	Transport
62	Factory index - Information relating to small, medium, large, chemical related factories	Govt-MSME, Factory association index,	to determine total number of such factories in a locality and its operation affecting the people	Secondary	Environment
63	Factory index - People dependency index / employment index	Govt-MSME, Factory association index	to determine people dependency to such factories,	Secondary	Environment

Figure 5(g)-3

Livability Index - Dependent Parameters (4)

Sl. No	Parameter (locality related)	Offline data	Significance to Livability Index (2)	Factor with respect to livability	Group
64	Healthcare professionals per 10,000 population	Hospital data, distribution of professionals	to map this data with population index and to arrive at a probability of no. of persons per professionals	Primary	Health
65	Response time in case of health emergencies	Hospital database	to determine the responsiveness of the emergency systems in hospitals	Primary	Health
66	Period prevalence of diseases	Hospital database, disease spread index	to analyze and determine occurrence of any diseases in a locality	Secondary	Health
67	Population index (people per sq.km), population density	Govt Population index data	to determine the total number of people (spread) in a locality	Primary	Population
68	Number of parks, trees	Govt Ministry of Environment, Forest and climate change	to determine total number of trees (different varieties), relative to consumption of accumulated pollution in that locality More parks and trees - more livable	Primary	Amenities
69	Electrical sub-station, hubs, transformers, power cuts	Govt electricity board	Location information, real-time determination of visiting a place in a surrounding locality to address any issue by the officials (Accessibility to such places by the officials)	Primary	Amenities

Figure 5(g)-4

Livability Index - Dependent Parameters (5)

Sl. No	Parameter (locality related)	Offline data	Significance to Livability Index (2)	Factor with respect to livability	Group
70	Affordability index - Purchasing power	Govt financial index	To determine Purchasability of goods/things in a locality, affordability of such goods with respect to other localities spending on valuable/invaluable things determine person's interest & affordability strength	Secondary	Amenities
71	Noise level index	Govt index, central pollution control board	to determine noise level of a locality Less noise, more health	Primary	Health
72	Parks-area in sq.km	Govt database	park condition, aesthetic, cleanliness in a locality	Primary	the presence of more parks determines, the locality is more livable, it's even distribution is also considered to determine livability (Environment)
73	lakes-area in sq.km	Govt-lake conservation and development authority, satellite imagery	area of lake, its maintenance, maintaining the aesthetic of lake in a locality	Primary	presence of lake is considered, more livable, because open space is available (Environment)

Figure 5(g)-5

Livability Index - Dependent Parameters (6)

Sl. No	Parameter (locality related)	Offline data	Significance to Livability Index (2)	Factor with respect to livability	Group
74	Pollution i) Quantity and distribution of gases (O ₂ , CO ₂ , etc), ii) Flow of gases towards a direction, iii) Change in quantity of gases due to factories (chemical, toxic, leather etc)	Govt-factory index	to determine the pollution in a locality, due to various gases to determine the accumulation of gases/flow of gases from one location to another to determine the quantity and quality of gases released by factories, in a locality, which helps in determining pollution/air quality	Primary	to analyze the various gases in the atmosphere, disposition of gases from factories, and its spread to other localities (due to wind flow)- pollution index - More toxic gases - less livable (Environment)
75	Water availability-data Underground water	Water Resources Information System of India (WRIS) & Central Ground Water Board (CGWB data), Govt	Availability of water resources underground (in a locality) must be determined - for drinking/ or various other purposes	Primary	More livable is water content is more, (water)
76	Depth of water availability	WRIS & CGWB	To determine depth at which water is available underground - helps to plan and construct borewells or well	Primary	If we find water at comparatively less depth (in feet), then more livable (water)
77	Quality of water	WRIS & CGWB	To determine optimal pH value consumable by people in a locality	Primary	If we find water is qualified to be drinkable with standards of drinkability, then more livable (water)

Figure 5(g)-6

Livability Index - Dependent Parameters (7)

Sl. No	Parameter (locality related)	Offline data	Significance to Livability Index (2)	Factor with respect to livability	Group
78	Vehicles (bus, auto, train, metro, or any vehicle for travel)	Govt transport dept	To determine the accessibility to one location to another location, it also involves movement of vehicles, routes, mode of vehicles, total number of vehicles in road, it also used to determine the pollution in that locality due to vehicle and its movement	Primary	Accessibility to people (transportation points, transport mode) - more accessible - more livable more people movement - more safer more vehicle movement - more safer - but less healthy (Traffic & Transport)
79	Travel routes	Govt transport dept		Primary	
80	Transportation points	Govt transport dept		Primary	
81	Road, footpath - condition	Govt Pwd dept	condition of foot path, in a locality, no foot path, size of foot path in a locality	Primary	to detect the smooth motion of people, and to determine the condition of foot path based on the motion, gyro of user if smoothness is maintained by the user, then more livable (Traffic & Transport)
82	Health data of a person (including diseases, disability)	heart rate sensor, other gyro based sensor, Disability records in Govt hospital	to determine the health data of a person More disease index - less livable	Primary	Health

Figure 5(g)-7