🧭 BRIDGE2CARE+ — AI MAP LOCATOR (Multilingual MVP Version)

🌐 1. Technology Stack Overview

Component	Tool/Library	Purpose
Frontend	React.js / Vue.js	Dynamic web app
Map Engine	Leaflet.js	Interactive maps
Data Source	Health facilities API / JSON	Database
Geo Calculations	Haversine formula	Distance measurement
Backend	Node.js / Firebase	Data management
Styling	Tailwind CSS / Bootstrap	Responsive interface
Hosting	Firebase / Vercel	MVP deployment

🧩 *Multilingual UI Framework:* i18next (English / French / Kinyarwanda / Kiswahili)

🗺️ 2. Map Locator Core Structure

(1) User Access

EN: After language selection, tap "Find Nearest Health Center"
FR: Après la sélection de la langue, appuyez sur « Trouver le centre de santé le plus proche »
RW: Nyuma yo guhitamo ururimi, kanda "Shaka ivuriro riri hafi yawe"
SW: Baada ya kuchagua lugha, bofya "Tafuta kituo cha afya kilicho karibu"

(2) Location Detection

EN: Use GPS to detect location or select district manually.
FR: Utilisez le GPS pour détecter votre position ou sélectionnez le district manuellement.
RW: Koresha GPS cyangwa hitamo akarere ku buryo bw'intoki.
SW: Tumia GPS au chagua wilaya kwa mikono.

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(3) Map Initialization (Leaflet.js)

Displays Rwanda's map centered on the user's position.

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(4) Facility Data Loading

Loads facilities (Hospitals, Clinics, Pharmacies) from JSON or API.

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(5) Distance Calculation (Haversine Formula)

Computes distance (km) between user and each facility to sort nearest ones first.

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(6) Filter by Service & Insurance

Filters:

- 🏥 *Service:* Maternity, Emergency, Pharmacy

- 💳 *Insurance:* RSSB, MMI, Private

EN: Select filters to narrow search results.
FR: Sélectionnez des filtres pour affiner la recherche.
RW: Shyiraho amasefero kugira ngo ubone ibisubizo bihariye.
SW: Tumia vichujio kupata matokeo maalum.

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(7) Facility Popup Display

Each marker shows:

- 🏥 Facility name

- 📍 Distance (km)

- 💊 Services offered

- 💳 Insurance accepted

- 📞 Quick Call buttons (114, 912)

EN:
"Call 114 – Health Info"
"Call 912 – Ambulance"

FR:
« Appeler 114 – Santé »
« Appeler 912 – Ambulance »

RW:
"Hamagara 114 – Amakuru y'ubuzima"
"Hamagara 912 – Ambulance"

SW:
"Piga 114 – Taarifa za afya"
"Piga 912 – Ambulance"

🧠 4. AI Enhancement (Future Phase)

EN:

- Analyze user symptoms → suggest suitable facility.

- Predict waiting times.

- Learn user preferences.

Copy the code below into a file named

`bridge2care-map-prototype.html`

```
<!doctype html>
```

```html
<html lang="en">
<head>
  <meta charset="utf-8" />
  <meta name="viewport" content="width=device-width,initial-scale=1"
/>
  <title>Bridge2Care+ — AI Map Locator Prototype</title>

  <!-- Tailwind CDN for quick styling (production: precompile) -->
  <script src="https://cdn.tailwindcss.com"></script>

  <!-- Leaflet CSS & JS -->
  <link rel="stylesheet"
href="https://unpkg.com/leaflet@1.9.4/dist/leaflet.css"
    integrity="sha256-sA+e2k6Y1v8Xw+H2n5M5j2lzXnM7qK1h5v3o6E9m0o8="
crossorigin=""/>
  <script src="https://unpkg.com/leaflet@1.9.4/dist/leaflet.js"
    integrity="sha256-o9N1j8kS1w2gAqYI1mmO6w8D1n5wH1v9D4z1z0zS8wE="
crossorigin=""></script>

  <style>
    /* Simple small custom styles */
    #map { height: calc(100vh - 160px); min-height: 320px; }
    .lang-option { cursor: pointer; }
    .fixed-bottom { bottom: 16px; left: 0; right: 0; }
  </style>
</head>
<body class="bg-gray-50 text-gray-900">

  <!-- Language Selection Modal (first screen) -->
  <div id="langModal" class="fixed inset-0 z-50 flex items-center
justify-center bg-black/60">
    <div class="bg-white rounded-lg shadow-lg w-11/12 max-w-xl p-6">
      <h2 id="langTitle" class="text-xl font-semibold mb-3">Select
your preferred language</h2>
      <div class="grid grid-cols-2 gap-3">
        <button class="lang-option p-3 rounded border"
data-lang="en">English</button>
```

```html
        <button class="lang-option p-3 rounded border"
data-lang="fr">Français</button>
        <button class="lang-option p-3 rounded border"
data-lang="rw">Kinyarwanda</button>
        <button class="lang-option p-3 rounded border"
data-lang="sw">Kiswahili</button>
      </div>
      <p class="text-sm text-gray-500 mt-4">You can change language
anytime in Settings.</p>
    </div>
  </div>

  <!-- App Shell -->
  <header class="bg-white shadow-sm">
    <div class="max-w-6xl mx-auto px-4 py-4 flex items-center
justify-between">
      <div class="flex items-center gap-3">
        <div class="text-2xl font-bold
text-green-600">Bridge2Care+</div>
        <div id="tagline" class="text-sm text-gray-600">Smart health
for all</div>
      </div>

      <div class="flex items-center gap-3">
        <div id="langBadge" class="px-3 py-1 text-sm bg-blue-50
rounded">EN</div>
        <button id="openSettings" class="text-sm text-gray-700
hover:underline">Settings</button>
      </div>
    </div>
  </header>

  <main class="max-w-6xl mx-auto px-4 py-4">
    <!-- Top Controls -->
    <section class="mb-3 grid grid-cols-1 md:grid-cols-4 gap-3">
      <div class="md:col-span-2 flex gap-2">
        <input id="searchInput" class="flex-1 p-2 rounded border"
placeholder="Search facility name..." />
```

```html
        <button id="locateBtn" class="px-3 py-2 bg-green-600
text-white rounded">Find Nearest</button>
      </div>

      <select id="serviceFilter" class="p-2 rounded border">
        <option value="all">All Services</option>
        <option value="Maternity">Maternity</option>
        <option value="Emergency">Emergency</option>
        <option value="Pharmacy">Pharmacy</option>
        <option value="Surgery">Surgery</option>
        <option value="General Care">General Care</option>
      </select>

      <select id="insuranceFilter" class="p-2 rounded border">
        <option value="all">All Insurances</option>
        <option value="RSSB">RSSB</option>
        <option value="MMI">MMI</option>
        <option value="Private">Private</option>
      </select>
    </section>

    <!-- Map -->
    <section id="map" class="rounded-lg overflow-hidden
shadow-md"></section>

    <!-- Bottom Emergency Buttons -->
    <section class="fixed-bottom max-w-6xl mx-auto px-4">
      <div class="max-w-6xl mx-auto px-4">
        <div class="flex gap-3 justify-end">
          <a id="call114" href="tel:114" class="px-4 py-3
bg-yellow-500 text-black rounded shadow">📞 114</a>
          <a id="call912" href="tel:912" class="px-4 py-3 bg-red-600
text-white rounded shadow">🚑 912</a>
        </div>
      </div>
    </section>
  </main>
```

```html
<!-- Simple Settings Panel (hidden) -->
<div id="settingsPanel" class="fixed right-4 top-20 bg-white rounded
shadow-lg p-4 w-64 hidden">
    <h3 class="font-semibold mb-2">Settings</h3>
    <div class="mb-2">
      <label class="text-sm">Language</label>
      <select id="settingsLang" class="w-full p-2 border rounded">
        <option value="en">English</option>
        <option value="fr">Français</option>
        <option value="rw">Kinyarwanda</option>
        <option value="sw">Kiswahili</option>
      </select>
    </div>
    <button id="closeSettings" class="w-full p-2 bg-blue-600
text-white rounded">Close</button>
  </div>

  <!-- Translations (i18n) -->
  <script>
    const I18N = {
      en: {
        tagline: "Smart health for all",
        findNearest: "Find Nearest",
        searchPlaceholder: "Search facility name...",
        allServices: "All Services",
        allInsurances: "All Insurances",
        call114Text: "Call 114 — Health Info",
        call912Text: "Call 912 — Ambulance",
        settings: "Settings"
      },
      fr: {
        tagline: "Une santé intelligente pour tous",
        findNearest: "Trouver le centre le plus proche",
        searchPlaceholder: "Rechercher un établissement...",
        allServices: "Toutes les services",
        allInsurances: "Toutes les assurances",
        call114Text: "Appeler 114 — Santé",
        call912Text: "Appeler 912 — Ambulance",
```

```
      settings: "Paramètres"
    },
    rw: {
      tagline: "Ubuzima buhebuje kuri bose",
      findNearest: "Shaka ivuriro riri hafi",
      searchPlaceholder: "Shakisha izina ry'ivuriro...",
      allServices: "Serivisi zose",
      allInsurances: "Ubwishingizi bwose",
      call114Text: "Hamagara 114 — Amakuru y'ubuzima",
      call912Text: "Hamagara 912 — Ambulance",
      settings: "Imiterere"
    },
    sw: {
      tagline: "Afya bora kwa wote",
      findNearest: "Tafuta kituo kilicho karibu",
      searchPlaceholder: "Tafuta jina la kituo...",
      allServices: "Huduma zote",
      allInsurances: "Bima zote",
      call114Text: "Piga 114 — Taarifa za afya",
      call912Text: "Piga 912 — Ambulance",
      settings: "Mipangilio"
    }
  };
</script>

<!-- Sample facility dataset (trimmed/embedded) -->
<script>
  const FACILITIES = [
    {"name":"University Teaching Hospital of Kigali
(CHUK)","lat":-1.94995,"lng":30.05885,"services":["Emergency","Materni
ty","Surgery","General Care"],"insurance":["RSSB","MMI","Private"]},
    {"name":"King Faisal
Hospital","lat":-1.95067,"lng":30.10432,"services":["Emergency","Surge
ry","Specialized Care"],"insurance":["RSSB","Private"]},
    {"name":"Muhima
Hospital","lat":-1.9538,"lng":30.0642,"services":["Emergency","Materni
ty","Pharmacy","Lab"],"insurance":["RSSB","MMI","Private"]},
```

        {"name":"Kacyiru Police
Hospital","lat":-1.9401,"lng":30.0839,"services":["Emergency","General
Care","Maternity"],"insurance":["RSSB","Private"]},
        {"name":"Rwinkwavu District
Hospital","lat":-2.05,"lng":30.3333,"services":["Emergency","Maternity
","General Care"],"insurance":["RSSB","MMI"]},
        {"name":"Kibungo
Hospital","lat":-2.1892,"lng":30.5563,"services":["Emergency","Surgery
","General Care"],"insurance":["RSSB","Private"]},
        {"name":"Huye District
Hospital","lat":-2.5953,"lng":29.7399,"services":["Emergency","Materni
ty","Vaccination","Pharmacy"],"insurance":["RSSB","MMI","Private"]},
        {"name":"Musanze District
Hospital","lat":-1.5056,"lng":29.6321,"services":["Emergency","Materni
ty","General Care","Lab"],"insurance":["RSSB","Private"]},
        {"name":"Kibuye
Hospital","lat":-2.0486,"lng":29.3441,"services":["Emergency","General
Care","Pharmacy"],"insurance":["RSSB","MMI","Private"]},
        {"name":"Gisenyi District
Hospital","lat":-1.7,"lng":29.2583,"services":["Emergency","Maternity"
,"Surgery"],"insurance":["RSSB","Private"]},
        {"name":"Nyamata
Hospital","lat":-2.218,"lng":30.1563,"services":["Emergency","Maternit
y","General Care","Lab"],"insurance":["RSSB","MMI"]},
        {"name":"Ngoma
Hospital","lat":-2.1,"lng":30.5,"services":["Emergency","Maternity","V
accination"],"insurance":["RSSB","Private"]},
        {"name":"Nyanza
Hospital","lat":-2.3525,"lng":29.755,"services":["Emergency","Maternit
y","Pharmacy"],"insurance":["RSSB","MMI","Private"]},
        {"name":"Bugesera
Hospital","lat":-2.174,"lng":30.213,"services":["Emergency","General
Care","Vaccination"],"insurance":["RSSB","Private"]},
        {"name":"Gatagara
Hospital","lat":-2.328,"lng":29.9,"services":["Emergency","Surgery","M
aternity"],"insurance":["RSSB","Private"]},

```html
        {"name":"Byumba
Hospital","lat":-1.54,"lng":30.06,"services":["Emergency","Maternity",
"Pharmacy"],"insurance":["RSSB","MMI","Private"]},
        {"name":"Kirehe
Hospital","lat":-2.05,"lng":30.8,"services":["Emergency","General
Care","Vaccination"],"insurance":["RSSB","Private"]},
        {"name":"Rubavu Health
Center","lat":-1.734,"lng":29.261,"services":["Emergency","Maternity",
"General Care"],"insurance":["RSSB","Private"]},
        {"name":"Masaka
Hospital","lat":-1.99167,"lng":30.21194,"services":["General
Medicine","Emergency","Orthopedics","Psychiatry"],"insurance":["RSSB",
"Private"]},
        {"name":"Butaro
Hospital","lat":-1.5,"lng":29.9,"services":["Cancer
Treatment","Surgery","General Care"],"insurance":["RSSB","Private"]}
        // add more as needed...
      ];
  </script>

  <!-- Main JS: map, filtering, i18n -->
  <script>
    // --- Utility: Haversine distance (km) calculated step-by-step as
required ---
    function haversineDistanceKm(lat1, lon1, lat2, lon2) {
      const toRad = degrees => degrees * Math.PI / 180;
      const R = 6371.0; // Earth radius in kilometers

      const φ1 = toRad(lat1);
      const φ2 = toRad(lat2);
      const Δφ = toRad(lat2 - lat1);
      const Δλ = toRad(lon2 - lon1);

      const sinΔφ2 = Math.sin(Δφ / 2) * Math.sin(Δφ / 2);
      const sinΔλ2 = Math.sin(Δλ / 2) * Math.sin(Δλ / 2);
      const a = sinΔφ2 + Math.cos(φ1) * Math.cos(φ2) * sinΔλ2;
      const c = 2 * Math.atan2(Math.sqrt(a), Math.sqrt(1 - a));
      return R * c;
```

```
    }

    // --- State ---
    let map, userLocation = null, markers = [], currentLang = 'en';

    // --- DOM refs ---
    const langModal = document.getElementById('langModal');
    const langButtons = document.querySelectorAll('.lang-option');
    const taglineEl = document.getElementById('tagline');
    const langBadge = document.getElementById('langBadge');
    const locateBtn = document.getElementById('locateBtn');
    const searchInput = document.getElementById('searchInput');
    const serviceFilter = document.getElementById('serviceFilter');
    const insuranceFilter =
document.getElementById('insuranceFilter');
    const call114 = document.getElementById('call114');
    const call912 = document.getElementById('call912');
    const openSettings = document.getElementById('openSettings');
    const settingsPanel = document.getElementById('settingsPanel');
    const settingsLang = document.getElementById('settingsLang');
    const closeSettings = document.getElementById('closeSettings');

    // --- i18n update function ---
    function applyTranslations(lang) {
      currentLang = lang;
      const t = I18N[lang] || I18N.en;
      taglineEl.textContent = t.tagline;
      locateBtn.textContent = t.findNearest;
      searchInput.placeholder = t.searchPlaceholder;
      // update select default labels (first option)
      serviceFilter.options[0].text = t.allServices;
      insuranceFilter.options[0].text = t.allInsurances;
      call114.title = t.call114Text;
      call912.title = t.call912Text;
      langBadge.textContent = lang.toUpperCase();
      settingsLang.value = lang;
      document.getElementById('langTitle')?.textContent = {
        en: 'Select your preferred language',
```

```
        fr: 'Sélectionnez votre langue préférée pour continuer :',
        rw: 'Hitamo ururimi ushaka gukoresha:',
        sw: 'Chagua lugha unayopendelea kuendelea nayo:'
      }[lang] || 'Select your preferred language';
    }


    // --- Map init ---
    function initMap(lat = -1.95, lng = 30.06, zoom = 10) {
      if (map) {
        map.setView([lat, lng], zoom);
        return;
      }
      map = L.map('map').setView([lat, lng], zoom);

L.tileLayer('https://{s}.tile.openstreetmap.org/{z}/{x}/{y}.png', {
        maxZoom: 19,
        attribution: '© OpenStreetMap contributors'
      }).addTo(map);
    }


    // --- Add facility markers (clears existing) ---
    function displayFacilities(data) {
      // clear markers
      markers.forEach(m => map.removeLayer(m));
      markers = [];

      // compute distance if user loc present
      const withDistance = data.map(f => {
        const distance = userLocation ?
haversineDistanceKm(userLocation.lat, userLocation.lng, f.lat, f.lng)
: null;
        return {...f, distance};
      });

      // sort by distance when available
      if (userLocation) withDistance.sort((a, b) => (a.distance ??
1e9) - (b.distance ?? 1e9));
```

```
    withDistance.forEach(f => {
        const icon = L.circleMarker([f.lat, f.lng], { radius: 8,
fillColor: '#16a34a', color: '#065f46', weight: 1, fillOpacity: 0.9
});
        const marker = L.marker([f.lat, f.lng]).addTo(map);

        const distText = f.distance != null ?
`${f.distance.toFixed(2)} km` : '—';
        const services = f.services.join(', ');
        const ins = f.insurance.join(', ');

        const popupHtml = `
          <div style="min-width:200px">
            <strong>${escapeHtml(f.name)}</strong><br/>
            <small>${services}</small><br/>
            <small>Insurance: ${ins}</small><br/>
            <small>Distance: ${distText}</small><br/>
            <div class="mt-2">
              <a href="tel:114" class="inline-block px-3 py-1 text-xs
bg-yellow-400 rounded mr-1">📞 114</a>
              <a href="tel:912" class="inline-block px-3 py-1 text-xs
bg-red-600 text-white rounded">🚑 912</a>
            </div>
          </div>
        `;

        marker.bindPopup(popupHtml);
        markers.push(marker);
    });
  }

  // --- Helpers: escape HTML ---
  function escapeHtml(s) {
    return String(s).replace(/[&<>"']/g, function(m){ return
({'&':'&amp;','<':'&lt;','>':'&gt;','"':'&quot;',"'":"&#39;"}[m]); });
  }

  // --- Filtering logic ---
```

```
function getFilteredFacilities() {
  const service = serviceFilter.value;
  const insurance = insuranceFilter.value;
  const query = searchInput.value.trim().toLowerCase();

  return FACILITIES.filter(f => {
    const matchesService = (service === 'all') ||
(f.services.includes(service));
    const matchesIns = (insurance === 'all') ||
(f.insurance.includes(insurance));
    const matchesQuery = !query ||
f.name.toLowerCase().includes(query);
    return matchesService && matchesIns && matchesQuery;
  });
}

// --- Geolocation: attempt to get user location, else keep
default ---
function detectLocationAndShow() {
  if (!navigator.geolocation) {
    alert('Geolocation not available. Please select district
manually.');
    initMap();
    displayFacilities(getFilteredFacilities());
    return;
  }

  navigator.geolocation.getCurrentPosition(pos => {
    userLocation = { lat: pos.coords.latitude, lng:
pos.coords.longitude };
    initMap(userLocation.lat, userLocation.lng, 12);
    // show user marker
    L.circle([userLocation.lat, userLocation.lng], { radius: 50,
color: '#2563eb', fillOpacity: 0.2 }).addTo(map);
    displayFacilities(getFilteredFacilities());
  }, err => {
    console.warn('Geolocation denied/failed:', err.message);
    initMap();
```

```
      displayFacilities(getFilteredFacilities());
    }, { enableHighAccuracy: true, timeout: 8000 });
  }

  // --- Event wiring ---
  langButtons.forEach(btn => btn.addEventListener('click', (e) => {
    const lang = e.currentTarget.dataset.lang;
    applyTranslations(lang);
    langModal.style.display = 'none';
    initMap(); // init after language chosen
    // attempt detection so "Find Nearest" sorts properly
    // but do not force popup if permission denied
    displayFacilities(getFilteredFacilities());
  }));

  locateBtn.addEventListener('click', () => {
    detectLocationAndShow();
  });

  serviceFilter.addEventListener('change', () =>
displayFacilities(getFilteredFacilities()));
  insuranceFilter.addEventListener('change', () =>
displayFacilities(getFilteredFacilities()));
  searchInput.addEventListener('input', () =>
displayFacilities(getFilteredFacilities()));

  openSettings.addEventListener('click', () =>
settingsPanel.classList.toggle('hidden'));
  closeSettings.addEventListener('click', () =>
settingsPanel.classList.add('hidden'));
  settingsLang.addEventListener('change', (e) =>
applyTranslations(e.target.value));

  // --- init defaults ---
  document.addEventListener('DOMContentLoaded', () => {
    applyTranslations('en'); // default until user selects
    initMap();
    displayFacilities(FACILITIES);
```

```
      // set initial select default text values according to i18n
      serviceFilter.options[0].text = I18N.en.allServices;
      insuranceFilter.options[0].text = I18N.en.allInsurances;
    });

    // Optional: open settings from header
    document.getElementById('openSettings').addEventListener('click',
() => {
      settingsPanel.classList.toggle('hidden');
    });

  </script>
</body>
</html>
```